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THE EFFECT OF TRUST ON MOBILE BANKING USAGE: THE MEDIATING ROLES OF PERCEIVED USEFULNESS AND PERCEIVED EASE OF USE

Abstract

Purpose: This study primarily examines the mediating effect of perceived usefulness and perceived ease of use on the relationship between trust and mobile banking use.

Methodology: For this purpose, university students studying at different levels at a state university in Turkey were chosen as the research population and the data were collected through a field study using a convenience sampling method and a face-to-face survey technique. SEM data analysis was conducted by using SPSS v20 and AMOS v20.

Results: The findings revealed a direct and positive relationship between the trust factor and mobile banking platform usage, and that the factors of perceived usefulness and perceived ease of use have a partial mediating effect in this relationship.

Conclusion: As a result, it is predicted that many different factors affect user preferences in the use of mobile banking platforms, these factors directly or indirectly affect compliance, adoption, and use, and it is necessary to focus more on these factors for the future of banking with the effect of digitalization.

Keywords: Mobile banking, trust, perceived usefulness, perceived ease of use, intermediary role

1. Introduction

Technology has become an essential part of daily life with digitalization (Alkan et al., 2021). The effect and control of these developments is a fundamental issue, especially in the developing countries (Çelik & Kabakuş, 2015). Parallel to these developments, it is also observed that people's attitudes and behaviors towards the banking sector differ.

The mobile banking platform, where financial transactions are offered independently of space and time, is one of the essential conveniences of this change. Despite its advantages, it is not easy for people to

adapt to these changes for several reasons (Tan et al., 2016). It can be said that the difference in the attitudes and behaviors of users regarding the use of mobile banking in banking transactions stems from different factors such as culture, environment, lifestyle, demographic factors, psychological reasons, government policies, and legal dimension (Dymi, 2012).

With the technological developments and widespread use of digital platforms, how people adapt themselves to this technology is an increasingly popular field of study and meaningful results have been obtained (Zalloum et al., 2019). Studies focused on university students that follow current trends closely are essential in terms of short- and long-term implications (Shanmugam et al., 2014). Studies in this concept are also predicted to have important theoretical and practical implications for understanding user-centered factors affecting the adoption of mobile banking and payment methods (Shankar & Datta, 2018). In addition, it is pretty clear that the effects of the digitalization process are also crucial in terms of understanding the behavioral intentions of users towards mobile banking adaptation, especially in developing countries (Sharma, 2019). For this reason, studies based on the digitalization effect provide critical and valuable information to service providers and users (Cheah et al., 2011).

One of the popular models used to examine external factors on individuals' use and adoption of new technology is the Technology Acceptance Model (TAM). In a study using this model, it was observed that trust had a negative effect on perceived risk, and perceived risk had a negative effect on internet banking adoption (Kesharwani & Singh Bisht, 2012). In another study using the TAM, it was found that trust had a significant effect on the acceptance of internet banking (Suh & Han, 2002). Moreover, in another study using the same model, it was concluded that trust positively affected the intention of using internet banking services, but perceived ease of use did not affect the intention of using (Al-Sharafi et al., 2016).

Davis (1985) claims that user motivation can be explained by attitude, perceived usefulness, and perceived ease of use. It is accepted that the user's attitude towards the internet is affected by perceived usefulness and perceived ease of use. Davis et al. (1989) also reveals that users prefer using new technology or system because they believe that it will be useful to them for doing their jobs better (perceived usefulness) and that the effort required to use the system (perceived ease of use) can directly affect their system usage behavior.

In this context, the study aims to determine the mediating effects of the factors of perceived usefulness and perceived ease of use, which are thought to affect the willingness to use mobile banking, in the relationship between trust and mobile banking usage. For this reason, university students were preferred as the research universe as they were considered to be more suitable in terms of technological aptitude and awareness. Therefore, the study can contribute to the theories developed for the mediating effects of perceived usefulness and perceived ease of use in the relationship between trust and mobile banking use and their examination by using two different models.

2. Conceptual framework

Many factors affect mobile banking adaptation of users in the banking sector transformed by digitalization. In the literature, studies in this context generally focus on lifestyle, ease of use, usability, practicality, portability, flexibility, reliability, cost, factors, etc. (Olasina, 2015).

In the study examining the mediating effects of perceived usefulness and perceived ease of use on mobile banking usage, it was stated that system compatibility, awareness, and high-risk perception positively affect user attitudes and intentions (Thakur, 2014). In another study investigating the mediating role of gender in mobile banking adaptation, it was stated that women preferred this channel because of its ease of use, while men's preferences were based on its relative advantage (Riquelme & Rios, 2010).

Researchers examining mobile banking adaptation of different generations in Thailand stated that Generation Y individuals' lifestyle fit and perceived usefulness positively affected their preferences, while trust and ease of use negatively affected their preferences (Ruangkanjanases & Wongprasopchai, 2017). In the study examining mobile banking behaviors of Generation Y individuals, it was concluded that social media promotions and advertisements do not affect banking channel preferences, but a directive mobile communication channel can be beneficial (Hussain & Wong, 2015). Again, in another study on Generation Y individuals, it is

concluded that while the pleasure of using mobile banking affects behavioral intention positively, its reliability affects negatively (Boonsiritomachai & Pitchayadejanant, 2019).

In a study conducted with university students working in a private bank in Turkey, it is concluded that the participants want to prefer channels which are less risky and safer for transactions made from digital banking platforms (Kabakuş & Küçükoğlu, 2019a). In a study conducted jointly in Azerbaijan and Turkey, it is determined that income level, social environment and technology aptitude affect banking channel preferences of users (Hajiyev & Chang, 2017).

In the study investigating the mediating roles of demographic features in mobile banking acceptance, it is claimed that users' first impressions of trust affect behavioral intention, but demographic factors do not impact initial trust and willingness (Chiu et al., 2017). The mediating role of attitude towards behavioral intention in mobile banking usage is examined and it is stated that perceived usefulness and ease of use do not affect intention at a significant level, perceived reliability is effective in terms of adaption, and people mostly refuse to adapt thereto because of perceived risk (Shanmugam et al., 2014). In the study examining the mediating role of perceived usefulness and ease of use on attitude, it is stated that resistance affects ease of use and risk affects the benefit negatively (Raza et al., 2017).

In a study conducted in Jordan, where perceived trust is used as a mediator on intention to use, it is claimed that perceived usefulness and ease of use affect intention significantly and positively through the trust factor (Al-Sharafi et al., 2017). The study investigating the mediating role of perceived trust in mobile banking usage reveals that online rumors, ease of navigation, personalization, information quality and rewards affect usage (Zalloum et al., 2019). Another study investigating the mediating role of factors in mobile banking use states that self-efficacy affects adaptation through perceived ease of use, while perceived usefulness and trust are also effective in terms of adoption (Kumar et al., 2020).

3. Methodology

3.1 Universe and sample

In order to determine the mediating effect of the factors that determine mobile banking usage, the data has been collected randomly from the students studying at the associate, undergraduate, graduate, and doctorate levels at Ataturk University in Turkey.

It has been calculated that the sample size should be at least 384 with a 5% error margin within 95% confidence limits to represent the population correctly. In this framework, questionnaires have been applied to 550 students, and 500 complete and error-free questionnaires have been analyzed.

3.2 Measure

The Technology Acceptance Model developed by Davis (1989) has been extended and adapted by researchers in many ways. In the data collected from the participants using a face-to-face questionnaire method with a random sampling technique, a scale developed by adapting different sources has been used to determine the relationships between factors.

In this context, the factors that make up the scale structure of the research, the definitions, the variables they have and the scale in which the resources are used are given in Table 1.

Table 1 Scale structure of the research

Factor	Description	Variable	Resource
Perceived Usefulness	The belief that using new technology will improve business performance	PU1, PU2, PU3, PU4, PU5	Davis (1989), Gefen et al. (2003), Lee et al. (2009)
Perceived Ease of Use	The belief that a new technology can be used easily	PEOU1, PEOU2, PEOU3, PEOU4, PEOU5	Davis (1989), Venkatesh et al. (2003), Luarn & Lin (2005)
Trust	The belief that new technology can be used without worry	T1, T2, T3, T4, T5	McKnight et al. (2002), Kim et al. (2009), Chong et al. (2010)
Mobile Banking Usage	The behavior occurs as a result of the desire to use new technology	MBU1, MBU2, MBU3	Sripalawat et al. (2011), Zhou (2011), Teo et al. (2012)

Source: Authors

The factors in Table 1 have been measured through a 5-point Likert scale (i.e., 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly agree) to determine the participants' attitudes towards mobile banking usage. The 10 questions in the first part of the questionnaire form measure the demographic characteristics of the participants, whereas the 18 questions in the second part measure their perceptions and attitudes towards the factors discussed in the research.

3.3 Hypotheses

The definitions and hypotheses regarding the variables used in the research are given below:

3.3.1 Trust

Trust is one of the requirements of eliminating uncertainties in the relationships with other people, groups, or social structures in situations involving uncertainty or risk (Okeke & Okpala, 2014). The concept of trust mentioned within the scope of the study is the belief that personal information cannot be seen or shared by others in the use of mobile banking, that system vulnerabilities are eliminated and necessary precautions are taken.

H1a: There is a significant and positive relationship between trust and perceived usefulness.

H1b: There is a significant and positive relationship between trust and perceived ease of use.

H2a: There is a significant and positive relationship between trust and mobile banking usage (for Model I).

H2b: There is a significant and positive relationship between trust and mobile banking usage (for Model II).

3.3.2 Perceived usefulness

Perceived usefulness refers to positive or negative thoughts that individuals have about their performance increases due to using technology, depending on their individual differences (Davis, 1989). The concept of perceived usefulness stated in this study is the belief that stating the advantages of this platform clearly and accurately can increase digital service channel adaption and utilization rates.

H3a: There is a significant and positive relationship between perceived usefulness and mobile banking usage.

3.3.3 Perceived ease of use

Perceived ease of use is the degree to which an individual believes that he/she easily comprehends a technology without showing extra effort (Davis, 1989). Within the scope of the study, this concept is the belief that factors such as simple interfaces, uncomplicated screens, directive warnings and understandable expressions of the platform positively affect the perception of convenience of the user.

H3b: There is a significant and positive relationship between perceived ease of use and mobile banking usage.

3.3.4 Mobile banking usage

Adaption of innovation is a sort of judgment about making the most of technological developments. Accordingly, concepts such as intention, implementation, satisfaction and utilization are considered as a kind of representation of this judgment (Kumar et

al., 2020). In this context, the use of mobile banking is the belief that user experience from this platform is transferred to others with satisfaction and the desire to repeat it positively affects the usage.

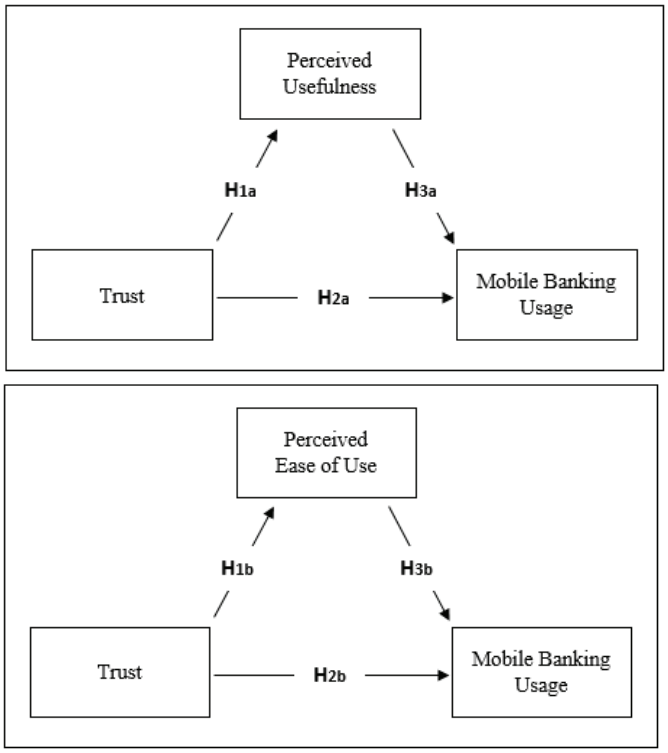
H4a: Perceived usefulness has a mediating role in the relationship between trust and mobile banking usage.

H4b: Perceived ease of use has a mediating role in the relationship between trust and mobile banking usage.

3.4 Research model

The effect of the trust factor as an independent variable on the acceptance and mobile banking usage has been examined by establishing two separate models through the mediating roles of perceived usefulness and perceived ease of use and the hypotheses have been formed accordingly. Since these hypotheses express the effect of mediating factors in the relationship between trust and mobile banking, they are not included in Figure 1.

Figure 1 Research model and hypotheses



Source: Based on the mediation analyses, Process Model 4 (Hayes, 2015)

4. Results

Tables providing descriptive statistics of variables, demographic characteristics of users, mean and standard deviation values of factors, goodness-of-fit values of models, direct, indirect, and total effects of mediating variables, hypotheses, and significance levels of mediating variables were included in the process of analysis. SPSS (Statistical Package for the Social Sciences-v20) and AMOS (Analysis of Moment Structures-v20) programs have been used for these analyses.

4.1 Analyses and results

4.1.1 Demographic characteristics of the participants

The questions in the first part of the survey and the frequencies and percentages seen according to the demographic characteristics of the participants are given in Table 2.

Table 2 Demographic characteristics of the participants

Demographic Features	Variable	Frequency	Percentage (%)
Gender	Female	238	47.6
	Male	262	52.4
Age	Under 20	93	18.6
	20-25	337	67.4
	26-30	59	11.8
	30+	11	2.2
Marital Status	Married	31	6.2
	Single	465	93.0
	Other	4	0.8
Education	Vocational school	43	8.6
	Faculty	419	83.8
	Master's program	28	5.6
	PhD program	10	2.0
Profession	Student	365	73.0
	Public sector	20	4.0
	Private sector	111	22.2
	Other	4	0.8
Income *(Monthly)**	Under 500 TL	192	38.4
	500-1,000 TL	141	28.2
	1,001-2,000 TL	99	19.8
	2,000+ TL	68	13.6
Channel	Mobile banking	253	50.6
	Phone banking	192	38.4
	Branch banking	39	7.8
	Other	16	3.2
Platform	Computer	40	8.0
	Smart device	438	87.6
	Pad	4	0.8
	Other	18	3.6
Mobile Banking Channel Usage *(Daily)*	Less than 1 hour	446	89.2
	1-3 hours	39	7.8
	3-5 hours	7	1.4
	More than 5 hours	8	1.6
Mobile Banking Channel Usage *(Generally)*	Less than 1 year	175	35.0
	1-3 years	204	40.8
	3-5 years	80	16.0
	More than 5 years	41	8.2

* Note: During the data collection period, the average EUR-TL exchange rate was 1:5. Income categories: (500TL = 100EUR, 500-1,000TL = 100-200EUR, 1,001-2,000TL = 201-400EUR, 2,000TL = 400EUR).
Source: Authors

Considering the demographic characteristics, frequency and percentages of the participants, gender distribution is balanced (47.6% female and 52.4% male participants), most of them are between the ages of 20-25 (67.4%), and they do not have an additional job (73%) while studying. It has been found out that the participants generally use digital platforms (50.6%) in their banking transactions and they mostly perform these transactions by means of their mobile phones (87.6%). It has been observed that the participants use digital platforms for less than 1 hour (89.2%) in terms of daily mobile banking channel usage time and they generally have 1-3 years (40.8%) of experience in terms of general mobile banking channel usage time.

4.1.2 Convergent and discriminant validity statistics

The standardized regression weights of variables in Model I and Model II are given in Table 3. In order to determine the variables to be included in the model according to these variants, the effects of the variables below 0.70 on the general alpha coefficient have been tested by adding to and subtracting from the model.

Table 3 Standardized regression weights (Model I and Model II)

Trust (T)			Perceived Usefulness (PU)		Perceived Ease of Use (PEOU)		Mobile Banking Usage (MBU)		
	Model I	Model II	Model I		Model II			Model I	Model II
T1	0.71	0.70	PU1	0.75	PEOU1	0.83	MBU1	0.88	0.88
T2	0.85	0.85	PU2	0.81	**PEOU2**	**0.49**	MBU2	0.91	0.91
T3	**0.63**	**0.63**	PU3	0.79	PEOU3	0.84	MBU3	0.90	0.90
T4	0.73	0.72	**PU4**	**0.67**	PEOU4	0.82			
T5	0.79	0.80	PU5	0.77	PEOU5	0.84			

Source: Authors

The overall alpha coefficient of the Trust (T) scale has been found as 0.87. The Cronbach's alpha value will decrease if the T3 variable is deleted. The overall alpha coefficient of the Perceived Usefulness (PU) scale has been found as 0.88. The general alpha value will decrease if the PU4 variable is deleted. The overall alpha coefficient of the Perceived Ease of Use (PEOU) scale has been found as 0.88. If the PEOU2 variable is deleted, the overall alpha value (0.90), the Composite Reliability (CR) value (0.90), the Average Variance Extracted (AVE) value (0.69), and the square root of the AVE value (0.83) will increase.

The Cronbach alpha reliability coefficient value in Table 4 was used to determine the reliability of the scale used in the study.

Table 4 Construct reliability and validity analysis results

	Cronbach's Alpha > 0.70	Composite Reliability CR > 0.70	Average Variance Extracted AVE > 0.50
Trust (T)	0.87	0.86	0.56
Perceived Usefulness (PU)	0.88	0.87	0.58
Perceived Ease of Use (PEOU)	0.88	0.88	0.60
Mobile Banking Usage (MBU)	0.92	0.92	0.80

Source: Authors

Convergent validity is ensured because the AVE value is more significant than 0.50. The CR value is greater than 0.70, which shows that it is reliable. The construct reliability and validity analysis results are given in Table 4. Discriminant validity indicates how a given construct differs from other constructs. The Fornell-Larcker criterion was used for discriminant validity. Fornell and Larcker (1981) suggest that the

AVE should be greater than the variance between the construct and other constructs in the model. Table 5 for Model I has three constructs (Trust, Perceived Usefulness and Mobile Banking Usage).

Table 5 Fornell-Larcker criterion for Model I

	Mobile Banking Usage	Perceived Usefulness	Trust
Mobile Banking Usage	**0.89**		
Perceived Usefulness	0.73	**0.76**	
Trust	0.73	0.72	**0.75**

Source: Authors

The Fornell-Larcker criterion compares the square root of AVE values with latent variable correlations. In particular, the square root of each structure's AVE should be greater than its highest correlation with any other construct. When the values in the table are examined, it is seen that the first value in each column from top to bottom is greater than the others. In each row, it is seen that the last value from left to right is greater than the others. At the same time, it is seen that the intersections of these values in the specified directions are arranged on the diagonal from the largest to the smallest thus providing discriminant validity.

Table 6 for Model II has three constructs (Trust, Perceived Ease of Use and Mobile Banking Usage).

Table 6 Fornell-Larcker criterion for Model II

	Mobile Banking Usage	Perceived Ease of Use	Trust
Mobile Banking Usage	**0.89**		
Perceived Ease of Use	0.77	**0.78**	
Trust	0.73	0.74	**0.75**

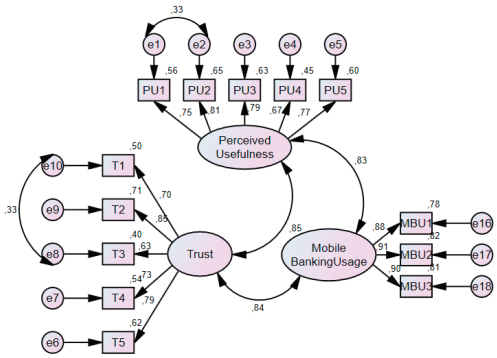
Source: Authors

According to the values given in Table 6, it is seen that the square root of the AVE value on the diagonal is greater than the correlation values below the diagonal and the left-hand side of the diagonal, so discriminant validity is provided for Model II.

4.1.3 Confirmatory factor analysis results of Model I

Confirmatory factor analysis used to test the validity of Model I, which examines the perceived usefulness mediating effect on trust in mobile banking usage, is given in Figure 2.

Figure 2 AMOS output confirmatory factor analysis of Model I



Note: PU = Perceived Usefulness, T = Trust, MBU = Mobile Banking Usage
Source: Authors

Appropriate measures of confirmatory factor analysis are shown in Table 7. With a χ2 value (χ2 = 195.14, df: 60 p = 0.000), this ratio is accepted as a goodness-of-fit measure of the model for this criterion. Goodness-of-fit indices for the model are shown in Table 7. GFI, AGFI, CFI, NFI, TLI, and RMSEA values are above the acceptable level.

Table 7 Fit indices for confirmatory factor analysis of Model I

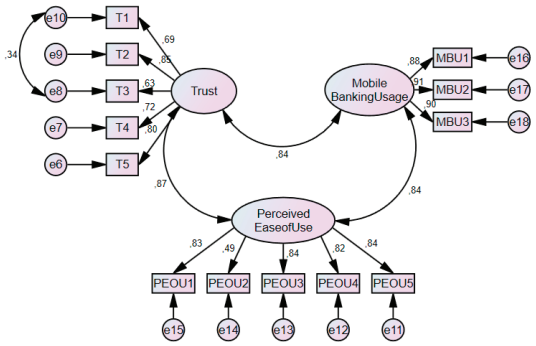
Model	χ^2	df	CMIN/ DF ≤ 5	GFI ≥.85	AGFI ≥.80	CFI ≥.90	NFI ≥.90	TLI ≥.90	RMSEA ≤ 0.08
Model I	195.14	60	3.25	0.95	0.92	0.97	0.96	0.96	0.07

Note: AGFI = Adjusted Goodness-of-Fit-Index, CFI = Comparative Fit Index, GFI = Goodness-of-Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation, TLI= Tucker-Levis Index
Source: Based on the goodness-of-fit values (Schermelleh-Engel et al., 2003)

4.1.4 Confirmatory factor analysis results of Model II

Confirmatory factor analysis used to test the validity of Model II, which examines the perceived ease of use mediating effect on trust in mobile banking usage, is given in Figure 3.

Figure 3 AMOS output confirmatory factor analysis of Model II



Note: PEOU = Perceived Ease of Use, T = Trust, MBU = Mobile Banking Usage
Source: Authors

Appropriate measures of confirmatory factor analysis are shown in Table 8. With a χ2 value (χ2 = 225.03, df: 61 p = 0.000), this ratio is accepted as a goodness-of-fit measure of the model for this criterion. Goodness-of-fit indices for the model are shown in Table 8. GFI, AGFI, CFI, NFI, TLI, and RMSEA values are above the acceptable level.

Table 8 Fit indices for confirmatory factor analysis of Model II

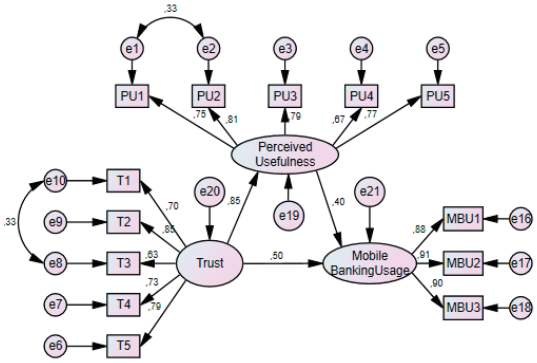
Model	χ^2	df	CMIN/ DF ≤ 5	GFI ≥.85	AGFI ≥.80	CFI ≥.90	NFI ≥.90	TLI ≥.90	RMSEA ≤ 0.08
Model II	225.03	61	3.69	0.94	0.91	0.97	0.95	0.96	0.07

Note: AGFI = Adjusted Goodness-of-Fit-Index, CFI = Comparative Fit Index, GFI = Goodness-of-Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation, TLI = Tucker-Levis Index
Source: Based on the goodness-of-fit values (Schermelleh-Engel et al., 2003)

4.3 Research model

The AMOS output of the structural equation model of Model I, which examines the perceived usefulness mediating effect of trust in mobile banking usage, is given in Figure 4.

Figure 4 Research model for mediating effect of perceived usefulness (Model I)



Note: PU = Perceived Usefulness, T = Trust, MBU = Mobile Banking Usage
Source: Authors

The goodness-of-fit values of Model I, in which the mediating effect of perceived usefulness is examined, can be found in Table 9.

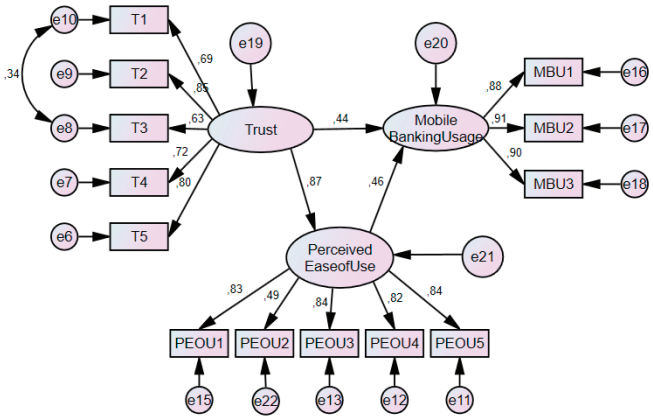
Table 9 Goodness-of-fit values of Model I

Variable	χ^2	df	CMIN/ DF ≤ 5	GFI ≥.85	AGFI ≥.80	CFI ≥.90	NFI ≥.90	TLI ≥.90	RMSEA ≤ 0.08
Model I	195.14	60	3.25	0.95	0.92	0.97	0.96	0.96	0.07

Note: AGFI = Adjusted Goodness-of-Fit-Index, CFI = Comparative Fit Index, GFI = Goodness-of-Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation, TLI = Tucker-Levis Index
Source: Based on the goodness-of-fit values (Schermelleh-Engel et al., 2003)

The AMOS output of the structural equation model of Model II, which examines perceived ease of use mediating effect of trust in mobile banking usage, is given in Figure 5.

Figure 5 Research model mediating effect of perceived ease of use (Model II)



Note: PEOU = Perceived Ease of Use, T = Trust, MBU = Mobile Banking Usage
Source: Authors

The goodness-of-fit values of Model II, in which the mediated effect of perceived ease of use is examined, can be found in Table 10.

Table 10 Goodness-of-fit values of Model II

Variable	χ^2	df	CMIN/ DF ≤ 5	GFI ≥.85	AGFI ≥.80	CFI ≥.90	NFI ≥.90	TLI ≥.90	RMSEA ≤ 0.8
Model II	225.03	61	3.69	0.94	0.91	0.97	0.95	0.96	0.07

Note: AGFI = Adjusted Goodness-of-Fit-Index, CFI = Comparative Fit Index, GFI = Goodness-of-Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation, TLI = Tucker-Levis Index
Source: Based on the goodness-of-fit values (Schermelleh-Engel et al., 2003)

The measure of the goodness-of-fit has been examined to see how well the predetermined research model explained the data obtained in the structural equation model. When the goodness-of-fit measures of Model I in Table 9 have been examined, it is seen that the values of χ2 /df, GFI, AGFI, CFI, NFI, TLI and RMSEA are among the recommended acceptable fit values. Likewise, when the goodness-of-fit measures of Model II in Table 10 have been examined, it is seen that the values of χ2 /df, GFI, AGFI, CFI, NFI, TLI and RMSEA are among the recommended acceptable fit values.

Structural relations of the models, standard and non-standard loads, standard error, t-value (critical ratio), p-value and hypothesis results are shown in Table 11.

Table 11 Evaluation of hypotheses

Structural Relations of Model		Non-Standard Loads	Standard Loads (sl)	Standard Error (se)	Critical Ratio (t)	P Value	Decision
Model I	**H1a:** PU <– T	0.89	0.85	0.06	15.18	0.000*	***Accepted***
	H2a: MBU <– T	0.59	**0.50**	0.10	6.25	0.000*	***Accepted***
	H3a: MBU <– PU	0.46	0.40	0.09	5.025	0.000*	***Accepted***
Model II	**H1b:** PEOU <– T	0.98	0.87	0.06	17.81	0.000*	***Accepted***
	H2b: MBU <– T	0.52	**0.44**	0.10	5.38	0.000*	***Accepted***
	H3b: MBU <–PEOU	0.48	0.46	0.09	5.62	0.000*	***Accepted***

*p < 0.001
Source: Authors

When p- and t- values given in Table 11 are evaluated, H1a, H1b, H2a, H2b, H3a and H3b are accepted at a 0.05 significance level. The results of factor relationships, mediated and direct effects, the indirect effect and the mediating level in the models are given in Table 12.

Table 12 Significance level of the mediator variable

Model	Relation	Direct Effect	Mediated Direct	Indirect Effect
Model I	H4a: T-PU-MBU	0.84 (0.000)*	0.50 (0.000)*	0.34
Model II	H4b: T-PEOU-MBU	0.84 (0.000)*	0.44 (0.000)*	0.40

* Two-Tailed Significance (BC)
Source: Authors

According to the data in Table 12, H4a and H4b are accepted at a 0.05 significance level. When the values in Table 12 are examined, it is seen that trust has a direct effect on mobile banking usage (r = 0.84; p = 0.000).

For Model I, the direct effect is 0.84, the mediated direct effect is 0.50, and the indirect effect is 0.34 in terms of the relationship between trust and mobile banking usage. By including perceived usefulness as a mediating variable in this relationship, a decrease in the effect shows that there is a partial mediating effect.

Similarly, for Model II, the direct effect is 0.84, the mediated direct effect is 0.44, and the indirect effect is 0.40 in terms of the relationship between trust and mobile banking usage. By including perceived ease of use as a mediating variable in this relationship, a decrease in the effect indicates a partial mediating effect.

5. Discussion

This study aims to shed light on the effect of trust in mobile banking use on perceived usefulness and ease of use tool variables for university students.

The study results are compatible with many studies in the field of adaptation and use of digital banking channels. The first hypothesis shows that increased confidence in mobile banking use increases perceived usefulness and ease of use. With this result, H1a and H1b hypotheses are accepted and studies in this context are supported in the literature (Davis, 1989).

The findings of the second hypothesis reveal that an increase in trust in mobile banking increases the usage rate. With this result, H2a and H2b hypotheses are accepted and studies in this context are supported in the literature (Riquelme & Rios, 2010).

The findings of the third hypothesis shows that usefulness and ease of use of mobile banking increased its usage. With this result, H3a and H3b hypotheses are accepted and studies in this context are supported in the literature (Kabakuş & Küçükoğlu, 2019b).

The findings related to the fourth hypothesis reveal that these factors have a mediating effect since perceived usefulness and perceived ease of use as mediating variables reduce the effect of trust on mobile banking use. With this result, H4a and H4b hypotheses are accepted and studies in this context are supported in the literature (Luarn & Lin, 2005).

When the findings related to the hypotheses are examined, it is revealed that the feeling of trust that university students have while using mobile banking, which is one of the digital banking platforms, has a direct and an indirect effect on the usage. In parallel with most studies in the literature, it has been seen that trust, which is used as an independent variable, is a direct and highly influential factor in the use of mobile banking, as in the use of any digital tool. It is seen that perceived usefulness and perceived ease of use used as a mediating factor in this study also directly and indirectly affect the use both as a fully independent and mediating variable in the literature.

It has been observed that the factors of perceived usefulness and perceived ease of use used in the study cause a decrease in the severity of the relationship between trust and mobile banking usage as a mediator variable. To put it more clearly, trust in the use of mobile banking increases the perception of usefulness and usability, and it has been revealed that these factors play a partial mediating role in the relationship between trust and mobile banking use.

In this context, the study sample has been collected from 550 students enrolled in different degree programs (vocational school, faculty, Master's program, PhD program) at a state university. The data obtained from university students who are considered more suitable in terms of criteria, such as the number of active mobile banking users, age range, education level, technology literacy, digital adaptation, predisposition, perception level, and so on, have been analyzed by using SEM. In addition, instead of modeling, in which the effect of full independent variables on the dependent variable is examined directly, the mediating effects of two different mediating variables on the dependent variable have been examined through two separate models. In this respect, it is aimed to bring a different perspective than most of the studies in this context in the literature.

6. Conclusion

The transformations brought about by digitalization are closely related to the banking sector and therefore to us as end-users. In addition to being fast and practical, they enable customizability, usability, accessibility, portability, inexpensiveness, variety of operations, and so on. Thanks to their advantages, digital banking channels can offer a more positive banking experience than their alternative ones. In addition to these advantages, disadvantages such as system problems, connection require-

ment, update requirement, complexity, difficulty of use, a purely virtual environment, and security vulnerabilities, can negatively affect user preferences.

Taking all these issues into account, researching the factors that push users to use digital banking channels is an increasingly important field of study. In this context, the effect of trust in the use of mobile banking has been examined through the variables of perceived usefulness and perceived ease of use. The results reveal that for individuals, especially university students, who have a dynamic digital environment, trust plays a critical role in preferring these platforms, and considering these platforms as handy and useful has a positive effect on their use.

The experimental results of the study provide an important reference for future studies so that the models can be adapted and validated in developing countries like Turkey. Moreover, the proposed models can help to understand user trends not only for banks but also for all stakeholders providing services through the mobile platform. In this respect, it is believed that the findings of this study will contribute to the literature academically and industrially.

7. Limitations and future directions

The study has some limitations. The data were collected only from certain users, such as university students, in a limited region. Therefore, collecting data on other profiles belonging to different age groups, occupations and cultures may be helpful in order to generalize the findings. In addition, by applying the prepared survey study to channels other than mobile banking, it may be possible to make more comprehensive predictions about the development and future of the banking sector. Finally, it is thought that the results obtained with different analysis tools and approaches to be used in the theoretical and practical applications of the defended view can contribute to the literature in many more areas and be useful for reference to future studies.

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METAPHORIC IMAGES OF THE STRATEGIC MANAGEMENT CONCEPT: RESEARCH ON UPPER- AND MIDDLE-LEVEL MANAGERS

Abstract

Purpose: The purpose of this study is to explain how organizational actors create their own reality with their subjective perceptions and interpretations of organizational phenomena. In this context, strategic management, which is fed from many different disciplines, is examined in terms of what it means for its practitioners. In other words, it is questioned how the concept of strategic management is defined in the eyes of organizational actors.

Method: A qualitative research method was used to achieve the purpose determined in the study, as well as metaphor analysis, which is one of the qualitative research designs evaluated within the scope of discourse analysis. The data obtained from a total of 40 participants were subjected to content analysis and descriptive analysis.

Result: As a result of the obtained data set analysis, it was determined that the participants produced impressive metaphors while defining the concept of strategic management. In addition, it was noted that the participants defined the concept of strategic management with sometimes similar and sometimes almost the same metaphors.

Conclusion: According to the analysis results, the dominant images among the managers match the definition of the concept of strategic management. In addition, it has been concluded that the shared reality among organizational actors is regular, clear and understandable, and that the dominant images in the shared reality are strong. Furthermore, **1)** this article reveals how the concept of strategic management defined by academics is perceived by practitioners, **2)** it was observed that the participants exhibited consensus rather than conflict in their evaluations of the concept of strategic management, and **3)** the different metaphors used are considered as proof that the strategic management field has a lively, active and broad intellectual content.

Keywords: Strategic management, strategic management perception, perception, metaphor, metaphor analysis

1. Introduction

The defining efforts exhibited at the organizational context level are basically based on the acceptance of differences. Despite the different meanings, the organization itself turns into a set of meanings through symbols and is reconstructed with some discourse patterns (Schultz, 1995). In fact, Wittgenstein (1968), who denied that organizations are concrete entities, stated that all organizational activities are much more than thoughts, words and actions, and organizational facts are nothing but symbols. As a result of the effort to understand organizations through cultural and symbolic approaches, anthropological expressions including values, ceremonies, beliefs, legends, myths and symbols and linguistic expressions including metaphors have started to take place in the relevant literature (Bolman & Deal, 1991; Smircich, 1983).

Based on the assumption that organizations are fixed and rigid, researches have been replaced by studies in which organizations are evaluated as dynamic and changing structures over time (Phillips & Hardy, 2002). This was the best research method at that time and its discourse has been replaced by methodological diversity. In fact, the ideas have been strengthened that using the same methods will narrow their perspectives and that using new, diverse and different methods will broaden their perspectives. With the linguistic expansion of Lakoff and Johnson (1980) and the methodological contribution of Schmitt (2005), the concept of metaphor has inspired many studies (e.g. Morgan, 1986; Sackmann, 1989; Inns, 2002; Kendall & Kendall, 1993; Erdem & Satır, 2003; Gibson & Zellmer-Bruhn, 2001; Phillips & Hardy, 2002). The use of metaphors in studies on understanding such organizations and management has contributed to the diversification of organization and management discussions. At this point, the following questions about strategic management come to mind: What does strategic management, nourished by so many different disciplines, mean for its practitioners? In other words, how is the concept of strategic management defined in the eyes of the actors operating in the organization? On the other hand, how do practitioners create their own reality with their subjective perceptions and interpretations of organizational phenomena?

Based on the inspiration created by the information presented above, the purpose of this study is to explain how organizational actors create their own reality with their subjective perceptions and interpretations of organizational phenomena. Therefore, what the concept of strategic management defined by academics means for practitioners will be examined through metaphors. For this purpose, data were collected through interviews with top and middle managers working in the Turkey representative office of an international company through a semi-structured interview. The data obtained from a total of 40 participants were subjected to content analysis and descriptive analysis. The emerging themes were classified and interpreted in line with the purpose of the research.

The fact that such a study has not been done before in the field of strategic management reveals the originality of the research in question, but it is expected that this article will make two main contributions to the literature: 1) to reveal how the concept of strategic management defined by academics is perceived by practitioners, and 2) to reveal how organizational actors create their own reality with their subjective perceptions and interpretations of organizational phenomena.

2. Conceptual framework

2.1 Efforts to define the strategic management area

When the intellectual roots in the field of strategic management are examined, it is seen that the first studies in the context of the business world were made in the 1960s. For example, Chandler (1962) focused on how the General Motors, DuPont, Standard Oil of New Jersey, and Sears companies grew, and with this study, he created the traditional strategic management understanding. Andrews (1965) made suggestions on how to construct good strategies based on the opportunities and the threats arising from the external environment and the strengths and the weaknesses of the companies by means of the still valid SWOT analysis. In his study, which is the main source of strategic planning, Ansoff (1965) made necessary suggestions for making strategic planning in various fields of an enterprise.

In the following years, for example, the relationship between growth and diversification strategies (Wrigley, 1970), the effects of diversification and organizational structures on performance (Rumelt et al., 1974), market conditions, the relationship between strategy and performance (Schoeff, 1972)

and issues such as relationship (Hatten et al., 1978) have been included in the studies in the field of strategic management.

When these studies are evaluated together, it will be seen that strategic management issues are approached as normative. However, in 1979, when Schendel and Hofer redefined the field of strategic management through the concept of business policy, and in 1980, under the editorship of Schendel, the Strategic Management Journal (SMJ) was launched, and there has been a strong shift towards the tradition of science (Rumelt et al., 1994).

With this shift, the definition of the concept of strategic management has also diversified. For example, Schendel and Hofer (1979) defined strategic management as the process of developing and using strategy to guide the growth, renewal and operations of the organization. According to Jemison (1981), strategic management is a process that organizations develop to coordinate the opportunities and constraints in their environment. Teece (1990) defined strategic management as the formulation, implementation and evaluation of a firm's managerial activities.

When these definitions are examined, it is seen that there are various definitions that express uncertainty about what the strategic management area is about and how it differs from the related areas, even though they do not fall apart from each other (Nag et al., 2007). The main reason for this diversity is that the field of strategic management intersects with disciplines such as sociology, psychology, economics, marketing, and finance (Hambrick, 2004; Bowman et al., 2002), and the academics working in the field of strategic management are trained in these disciplinary fields.

Although a general definition can be made based on the definitions specified, the meanings attributed to the concept of strategic management may differ. One of the most striking studies in this sense is a study conducted by Nag et al. in 2007. In this study, the authors aimed to determine a unique and distinctive definition of the field. To achieve this goal, they carried out their work in two mutually supporting phases. In the first stage, a large group of strategic management scientists was asked to evaluate the abstracts of 447 articles published in management journals. As a result of this evaluation, they determined that the evaluators achieved a high level of consensus. In the second stage, they applied a questionnaire to 57 academics to confirm the agreed definition. As a result of these efforts, researchers proved the existence of a strong common bond in the definition of the strategic management field. In addition, they found that the field of strategic management is interested in a constantly changing set of theoretical and practical research. The authors stated that this study contributes to framing the discussion about what scientists working in the field of strategic management want the field to be and what the field will be like. In addition, the authors stated that the common definition acts as a filter, and scientific studies that do not comply with this definition will remain outside the field of strategic management and attract related studies like a magnet.

2.2 Metaphor analysis as a way of defining the concept of strategic management

These and similar efforts, exhibited at the organizational context level, are mainly based on the acceptance of differences. As such, approaching an organization only as adaptive mechanisms and purposeful means means mechanizing it, and this effort entails the danger of reductionism (Smircich, 1983). As Giddens (2005) emphasizes, the people who make up the organization are an integral part of these contexts beyond their interaction with social contexts. Therefore, human constructs a social reality with the spiral of interaction and relationships (Smircich, 1983). Reality is unique to the individual (Burrel & Morgan, 1979), resulting in individuals attributing different meanings to a similar phenomenon or situation (Schultz, 1995). Despite the different meanings, the organization itself turns into a set of meanings through symbols and is reconstructed with some discourse patterns. According to Foucault, discourse is a structure that shapes the whole world and actors and it consists of thoughts, beliefs, judgments, values, symbols, words, letters, institutions, norms, traditions and language, and contains a hierarchical structure and power relationship (Baş & Akturan, 2017). In fact, Wittgenstein (1968), who denied that organizations are concrete entities, stated that all organizational activities are much more than thoughts, words and actions, and organizational facts are nothing but symbols.

As a result of the effort to understand organizations through cultural and symbolic approaches, anthropological expressions including values, ceremonies,

beliefs, legends, myths and symbols and linguistic expressions including metaphors have started to take place in the relevant literature (Bolman & Deal, 1991; Smircich, 1983). By using these concepts, organizations can be analyzed as animated cultural values that bind their members.

When the related literature is examined, the concept of metaphor has started to take place in interdisciplinary studies with the work of Lakoff and Johnson (1980). Criticizing Lakoff and Johnson (1980) for not proposing a systematic method, Schmitt (2005) discussed metaphor analysis as a qualitative research method and contributed to the development of the concept by proposing a procedure. The linguistic expansion of Lakoff and Johnson (1980), the methodological contribution of Schmitt (2005), and the concept of metaphor have inspired many studies.

What distinguishes metaphors from other symbols in interpretative and symbolic analyses of organizations is that individuals can map the ways of transforming organizational life into a subjective reality by passing through the stages of perception and interpretation (Erdem, 2010). Metaphor is defined as an expression with its real meaning or a form of language in which it is adapted to a different context in order to define a concept (Sackmann, 1989). With the help of metaphors, abstract concepts can be relatively easily reconstructed to understand concrete concepts we are familiar with (Yıldırım & Şimşek, 2018). In addition, abstract concepts with obscurity can be transformed into known features (Lakoff & Johnson, 1982). While metaphors describe a whole situation, they turn words into a mental image. By means of this imagination, a whole situation is defined by a single image. Thus, metaphors turn into powerful communication tools (Sackmann, 1989).

Morgan (1986) states that metaphors are used for two purposes: descriptive and prescriptive. When used for descriptive purposes, a state is defined as it exists. The use of metaphors as a qualitative data collection method falls under this category (Yıldırım & Şimşek, 2018). For example, a study conducted by Morgan (1986), which aims to reinterpret organizational theories through metaphors and triggers interest in metaphors, uses metaphors to define organizations as machines, as an organism, as culture, as political systems, as brains, and as psychological prisons.

When used to transform a process, metaphors are considered to be a means of change. When the related literature is examined, it can be seen that many studies have been conducted for this purpose. For example, Sackmann (1989) examined how metaphors were used by managers of a private firm to explain their new strategies to employees. The results of this research show that metaphors such as fertilization, vaccination, and cutting are used effectively in transforming a new strategic decision into practice.

When the relevant literature is examined, it can be seen that metaphors are frequently used in studies on understanding organizations and management, and these studies contribute to the diversification of organization and management discussions. Inns (2002) examined the extent to which metaphors are used in organizational literature and revealed that metaphors are used in areas that direct perception and interpretation (hegemonic, instructional and explanatory tools) in understanding organizations (questioning established assumptions, qualitative research, deconstruction, creative thinking tools). In their study, Kendall and Kendall (1993) tried to explain managerial roles through metaphors, and it was determined that managerial roles were defined by metaphors such as captain, head of the family, commander, president, designer, guard, caregiver, president, and coach. Erdem and Satır (2003) examined the perceptions of organization members towards the cultural values of the organization through metaphors and evaluated the cultural values of the organization according to the criteria of strong, weak and positive. Gibson and Zellmer-Bruhn (2001) examined how the group work established in organizations is defined by the members of the organization, and stated that the organization members use the metaphors of social community, partnership, sports, family, and army to describe group work.

Based on the assumption that organizations are fixed and rigid, research has been replaced by studies in which organizations are evaluated as dynamic and changing structures over time (Phillips & Hardy, 2002). This is the best research method now! Their discourse has been replaced by methodological diversity. In fact, the ideas that using the same methods will narrow their perspectives and that using new, diverse and different methods will broaden their perspectives have been strengthened.

Although metaphor analysis has a disadvantage in terms of obscuring the differences hidden in details (Yıldırım & Şimşek, 2006), it provides a versatile view of organization and management research, it gives flexibility (Phillips & Hardy, 2002; Schmitt, 2005), and the opportunity for researchers to evaluate the organizational system from a holistic perspective (Yıldırım & Şimşek, 2006).

3. Metaphor hunt in the context of a special organization

The problems whose answers are sought within the scope of the study are those that can be answered in the light of the data obtained from the world. Efforts in this direction require that the research in question be built on an empirical basis of discussion and that a descriptive and realistic picture of the subject is presented.

Qualitative research, which is a subjective research method, is a research method that offers more in-depth research on all dimensions of identified problematic issues and provides strong clues to understand why, how and which social events and phenomena are experienced (Silverman, 2005; Dey, 1993).

Table 1 An overview of the research method

Research process	
Research pattern	Discourse analysis
Analysis unit of the study	Managers at upper and middle level
Research universe	A total of 43 persons consisting of upper- and middle-level managers of an international company
Research sample	A total of 40 persons consisting of top and middle-level managers of the international firm
Data collection method	Interview
Data collection tool	Semi-structured interview
Data analysis	Content analysis and descriptive analysis based metaphor analysis

Source: Developed by the researcher

As summarized in Table 1, it is deemed appropriate to use the ***discourse analysis*** pattern as the research design in this study, which deals with the subject or event examined in depth and evaluates the facts about the individual within its own context and in a holistic manner. In this study, managers were asked to define the concept of strategic management through ***metaphors*** in order to learn their perceptions, definitions, thoughts, evaluations, knowledge, and opinions about the concept of strategic management.

The top management team plays a more active role in making and implementing strategic decisions compared to other organizational members. These actors are a group that strives to gain a corporate identity and build a corporate reality by giving strategic management the importance it deserves. Therefore, in this study, the parameters of applicability, accessibility, suitability and voluntariness (Creswell, 2007) were taken into account. In this direction, interviews were held with the top and middle-level managers of an international company in Turkey. Within this framework, the selection was made based on criterion sampling, one of the purposive sampling methods. According to Maxwell (1996), purposive sampling makes it possible to collect in-depth information about the person, event or situation that is the subject of the research, and for a specific purpose. Thus, it is possible to comprehensively examine situations that are thought to have rich information, and to obtain deep explanations for facts or events (Patton, 1987). Criterion sampling, one of the purposive sampling methods, is based on studying all cases that meet a set of predetermined criteria. At this point, the mentioned criterion or criteria can be determined by the researcher (Yıldırım & Şimşek, 2011). In the related study, the sample criterion was determined by the researcher, and the top and middle-level managers working in the Turkey representative office of an international company were taken as the criterion.

The company that hosted the research is a corporate company established in the 1930s, the world leader in its sector, serving in 56 countries with more than 370,000 employees. The research was conducted in the companies represented in Turkey's 11 regional offices and 70 branch offices with 20,000 employees.

In the firm, which has a horizontal organizational structure, the country president, country vice presidents, general managers, deputy general managers and regional managers constitute the upper-level management team, department directorates constitute the middle-level management team, and

department vice managers and branch managers constitute the lower-level management team. Of course, different groups of actors in an organization reflect different realities. Due to the operational structure of the organization that hosted the study, the lower-level management team was not active in strategic decision making, but it was excluded from this study because it was only responsible for operations. Since this study focuses on the strategic management perceptions of top and middle-level managers, this group formed ***the data sources (analysis unit) of the study***.

Table 2 gives the universe and sample of this study. The middle-level managers constituted the ***universe of this study*** (43 actors in total). Since 2 of 43 actors that make up the universe of the study could not answer the question and 1 actor could not participate in the interview due to health problems, they were excluded from the study, and 40 actors who were interviewed constituted the ***sample of the study***.

Table 2 Participant information

Management level	Task	Number
Upper tier	Country president	1
	Country vice president	2
	Coordinator	7
	General manager	5
	Regional director	11
	Deputy regional manager	1
	Total	**27**
Lower tier	Department manager	16
	Total	**16**
GENERAL TOTAL		**43**

Source: Developed by the researcher

The role of the researcher in metaphor analysis is of great importance (Koro-Ljungberg, 2001). The researcher can act with an identity that detects, evaluates and interprets images in the hunt for metaphors, as well as with an identity that identifies metaphors and presents them as an option to the participant, and in this way identifies, evaluates and interprets images. The role assigned by the researcher directly affects the way of obtaining data. In this study, the researcher hunted for metaphors and acted with an identity that identifies, evaluates and interprets images, and asked the participants to produce the metaphors. Therefore, in the research in question, interviews were conducted in the form of ***semi-structured interviews***. The questions presented below guided the data collection process:

1. What would you compare the concept of strategic management to if I wanted you to compare the concept to an object, a shape, an animal, a plant, a living thing, a fairy-tale hero or a historical figure?
2. Why or why?
3. Can I get information referring to your gender, age, educational status, organizational seniority and positional seniority?

In this study, the interviews were conducted on a webinar (online) platform that allows face-to-face interaction through the ***internet channel***. Thus, the features of the internet such as extending the field of research by removing the geographical boundaries, providing time and space flexibility to researchers, making communication continuous, and reducing data loss were used (Markham, 2004).

In the process of data collection, the ethics of research and qualitative research were followed and the ***ethical contingency stance*** (Hammersley & Atkinson, 2007) defined as minimizing the personalization threat arising from the researcher experiences was adopted.

Before planning of the interviews, the head of the company was informed about the content and progress of the study and permission was sought. In addition, before each interview, participants were informed about the study, it was stated that their participation in the study would be voluntary, that their names would not be used in the study, and

that they would be assigned a pseudonym. Thus, the participants were assured of confidentiality and security in the research. In addition, in order to eliminate the social barriers between the researcher and the participant before each interview, the interview started with unstructured conversation, and efforts were made to establish trust between the researcher and the participant (King, 1994).

Content analysis and ***descriptive analysis*** were performed at the point of data analysis of the relevant study, and the findings obtained within the framework of the emerging themes were classified and explained in line with the research purpose. It was deemed appropriate to use the criteria of credibility (internal validity), transferability (external validity) and consistency (internal reliability) and verifiability (external reliability) in terms of meeting the eligibility criteria of the study (Yıldırım & Şimşek, 2018).

4. Discussion

During the data collection phase of the research, all of the interviews were recorded with interview notes, and the raw data text was created by writing the records in textual integrity that can be analyzed (Creswell, 2016). In this study, the themes were obtained as a result of the integration of the data collected from the field, not with a thematic frame given to the field. First of all, *would you compare the concept of strategic management of the 40 participants who form the sample of the study to an object, a shape, an animal, a plant, a creature, a fairy-tale hero or a historical figure?* The metaphors used were determined by evaluating their answers to the question. Later, these metaphors were grouped and each group was named a related group. Thus, the main themes and sub-themes table related to the concept of strategic management was created (Table 3).

Table 3 Main theme and sub-themes regarding the concept of strategic management

Main theme	Sub-theme	Main theme	Sub-theme
Historical figure	Atatürk	Plant	Tree
	War hero		Seed
Hero of fairy tales, TV series, cartoons and mythology	White Rabbit	Vehicle	Machine
	Mythological hero		Car engine
	MacGyver		Tanker
	Jerry		Train
Animal	Lion		Robot
	Tiger	Object	Sun
	Leopard		Scales
	Chameleon		Spirit level
	Octopus	Sports and game	Go game
	Owl		Chess
	Elephant		Trekking
	Cuckoo bird	Other	Mother/father
	Raccoon		Life
			Chemist

Source: Developed by the researcher

As presented in Table 3, 40 participants used the concept of strategic management as Atatürk, war hero, White Rabbit, mythological hero, MacGyver, Jerry, lion, tiger, leopard, chameleon, octopus, owl, elephant, cuckoo, raccoon, tree, seed, machine, car engine, tanker, train, robot, sun, scales, spirit level, Go game, chess, trekking, mother/father, life and chemist metaphors to present their own reality. As a result of grouping the related metaphors, metaphor groups were formed under the names of Historical figure, Fairy tale, TV series, Cartoon and mythological hero, Animal, Plant, Vehicle, Object, Sports and Game, and Other.

At this point, the following question arises: *What do the participants express with these metaphors in relation to the institutional expressions accepted by the scientific community while defining the concept of strategic management?* As a result of the stated curiosity, *why or why?* The question was asked, the answers given were evaluated, and a summary description text table consisting of the participant own expressions was created and presented (Table 4).

Table 4 Summary descriptive statements on the concept of strategic management

Main theme	Sub-theme	Descriptive expressions
Historical figure	Atatürk	• Atatürk's way of administration, his vision of the future, having a problem, the way they go together is strategic management… He is a strategist *(P1).* • … I can say that Atatürk analyzed very well, managed every stage with thought and achieved the goal. He first decided what he wanted to do, then thought with whom and how he would do it. … Made plans according to sensitivity of the people. Progressed accordingly *(P32).*
	War hero	• … A war hero has a strategy so that his army is not defeated. For example, he sets up a series of strategic games such as archers waiting behind horsemen facing front and poking the enemy. And it's based on defeating, conquering, and gaining victories. In our current world… we all fight like war heroes, like war heroes. …The company executives are the same, you fight with the internal customer, you try to please them, and you try to please the external customer. By the way, you also have your own personal family. This is all I think war is, you're trying to survive. Meanwhile, you may lose your family, you may lose your job, you may lose your customer, and your friendships may go bad. Keeping all of these in the balance is also a strategy *(P10).*
Hero of fairy tales, TV series, cartoons and mythology	White Rabbit	• The White Rabbit knows what he wants to do, where he wants to go. He knows for what purpose and in what ways this can be done. He drags those with him like that. ... You need to know where to go. … You have to make a plan accordingly. You need to motivate your team in line with that plan. … You have to lock people to specific goals… *(P8).*
	Mythological hero	• I think mythological heroes will have a greater impact on people. When we talk about strategic management, we talk about management of managerial staff that makes an impact *(P7).*
	MacGyver	• He managed to get out of every difficult situation he had. He would plan the next step of everything and overcome the events that happened to him with the means he had at his disposal. He was very familiar with the details. He could see it all and see the little details that might come in handy. He could find solutions we wouldn't have thought of in the complex situation he faced, and he could put them together. He could make an explosive out of an agricultural tool. He could do something life-saving from a tape that would never work for you. He would see the big picture and master the small details. He always thought about what awaited him after one step, he always prepared accordingly. None of us lives in an ideal world, after all. He didn't either. How do we get maximum efficiency from what we have? He has always been a source of inspiration in that regard *(P14).*
	Jerry	• Jerry's struggle with Tom, his ability to come out using his mind in one way or another, to implement those instant decisions at once, behave wisely, thinking of his own characteristics (small, fast, smart, agile) ... how big the person is in front of him. He acts by considering his own personal and physical characteristics rather than being or having other characteristics. It is the same in the business world. … if you play the game well, if you set it up correctly, strategically, it doesn't matter how big your company is *(P35).*
Animal	Lion	• Their hunting strategies for their survival, their use of wind direction, their clear goals, taking actions according to their own needs… This is management *(P2).* • The lion is the king of the forests, it sits calmly, is dignified, and directs animals with its eyes and eyebrows. It is part of the game, it moves but sits down, just looks around. For some reason I thought of the leader in strategic management. Everything is planned and he checks that things are not going right within that organization *(P27).*
	Tiger	• It first makes a plan and then moves towards its goal. The strategy requires very strict planning first. It requires focus on the goal. … Planning is done while establishing this strategy. A tiger does this, too *(P15).*
	Leopard	• … Even when approaching its prey, it takes place in a planned way. The concept of hunting starts with feelings. There is sense perception. Animals are mischievous by smell. It calculates the course of the wind. Most animals calculate this when they plan. Actually, I would like to state that they use their sense organs while making strategic planning. …. Once it approaches its prey, it approaches quietly and moves very slowly. .. . It does not progress because of mass, this time it may lose its target. When it reaches a certain point patiently, it becomes aggressive … *(P24).*

Animal	Chameleon	• ... you will get if you try to make decisions, you show that symptoms are so variable that you should take into account or make decisions by making use of just a fixed idea with company principles or say these are my own principles, these are not always very accurate decisions ... Therefore, you may need to evaluate the situation from different angles and decide accordingly *(P12).*
	Octopus	• It acts both synchronously and independently. Strategic management requires you to be different from others in your industry, for example. That's why I see the living octopus identical to strategic management. It can share the same environment with many different stakeholders in the same ecosystem. Both she ecosystem compatibility with both her differences show *(P23).*
	Owl	• Owl is a symbol of wisdom. It thinks a lot, is cool and tells me about strategic management because it can turn its head 360 degrees. Versatile to look, to look at the top ... Owl symbolizes wisdom and knowledge. ... I think the basic knowledge is key to strategic management. I think composure is very important in strategic management. … You have to think calmly and do long-term planning in order to be able to act strategically. Your company must have corporate memory. Owls also have a very strong memory. They can also see very far. Foresight is very important in strategic management. The more future data you can read, the more future strategic decisions you can make *(P26).*
	Elephant	• There are aspects that they change from summer to winter. ... Actually, they act on instinct, but they also plan. … The same holds for companies, I have to make a profit in order to survive. They also plan this *(P29).*
	Cuckoo bird	• … The cuckoo nests in other birds' nests and lays its eggs. Those eggs are raised by birds outside of its species. I define this as a business model. The ability to manage different channels and genres. … People in many different structures can be considered to have the ability to do business in line with their strategy *(P33).*
	Raccoon	• The raccoon generates different ways and ideas when trying to find food. It is intelligent, has the ability to learn fast, can immediately produce strategic alternatives and is productive. It makes planning very well in terms of reaching results. These should also be present in strategic management. … You cannot move without planning *(P37).*
Plant	Tree	• A creature with a solid root, branches and fruit. I think strategic management should also be based on solid foundations. … Branches can be sub-departments of this administration, and fruit can be the results I have achieved. … A solid root actually comprises decision-makers' own experiences as well as culture and experience of two companies. Without a robust foundation not only with the decision, the objectives of our policy are very nice but difficult to achieve. In the tree, more than one branch and many leaves come together to form the tree. Although none of them alone makes sense, when the total assets of the company or institution come together, they form a large organization (i.e., the tree) *(P30).*
	Seed	• First, we sow the seed. Then, we use the growing plant in the food field or other areas. This reminds me of planning. We need a start to plan. Whatever seed we sow, a plant related to it will come out… *(P34).*
Vehicle	Machine	• It is a state-of-the-art machine with all wheels working perfectly at the press of a button. A malfunction of one part of the machine can actually cause damage to that part or the entire system. That is why each piece has to work in a coordinated manner at the same frequency. … The machine goes on the road and if there is a glitch, you may need to stop on the road. For this, planning, a road map, maintenance, repair, repair teams, managers, etc., should be in control of the details. Thus, a giant machine, always oiled forward, can pass casually. Maintenance before operation and the working principles of the machine must be well-known and assimilated very well. The wheels are actually people who must have a very good grasp of their purpose. If there is a deviation there, the whole body can be damaged. … Any damage to those wheels can affect the whole body. When it comes to a manager, he/she must be very focused, very conscious, know where he/she is going, understand what he/she is doing, and be able to convey the return of this to the parties … *(P5).*
	Car engine	• Because a car engine is made up of almost thousands of parts. A malfunction in one of the parts causes problems in the whole engine, while an improvement in one of the parts can make the entire engine work very well. So it is with strategic management. While you can make a lot of difference by touching a particle, you can make a negative difference by making one place worse. … The moves that I will do strategically, good or bad, can affect the whole machine *(P16).*

Vehicle	Tanker	• The size of the structure makes me feel like a giant tanker. When passing a giant tanker through the straits, you need to know the current, the weight of the tanker, the wind, the underwater conditions, the external conditions, the engine power of your tanker, you need to think about that current, the wind and the land parts under water and perform a maneuver you need to perform. The captain says that the tanker will turn around, but you must know that that giant tanker will cause that reaction with that force and that current. In other words, it is such a thing aimed at moving, giving its direction and passing its dangerous load through the straits without hitting here and there. Here is this strategy in my eyes. When you make what moves in business life and how that structure reacts after a certain period of time and when walk in the direction you want *(P21).*
	Train	• … There are a lot of components in that organization like the train that need to act together. The main purpose is to bring that community to the same point. The mechanic gives a command, the wheels make it turn on the rail. Need to adapt *(P39).*
	Robot	• The planning and framework of strategic management must be clear. In a robotic system, things to be done beforehand are programmed *(P18).*
Object	Sun	• Strategy is a bit about looking down, seeing the whole and planning for the future. … When you look at the sun, it is an object that commands everything, looks from above, and influences the flow of our lives by causing natural events to occur. … If we can use it correctly, we will benefit from the benefits of the sun. If we do not use it correctly, anything can happen to us and eliminate the ozone layer problem *(P13).*
	Scales	• … You need to balance strategy to build something happy, successful, and sustainable. There are risks, SWOT, you have accepted, there are things that can happen to you, there are things that will not occur. It is necessary to balance them. … In that management approach, without hurting anyone, without harming the climate, organizing the employee-employer relationship, considering the profitability of the company, scales are important in order to manage this balance. If you do not have a balance, if you do not have a strategy, you will not be able to go forward, you will not be able to build a future *(*P19*).*
	Spirit level	• Balances are very important. A spirit level balances both horizontally and vertically. Everything should be in the balance in management *(P28).*
Sport and game	Go game	• If you cannot establish the right strategy in the game, you may lose the game when you think things are going very well. The similarity of this game with strategic management only corresponds to thinking ahead, not today. Strategic management is not about saving the present. In that game, it is not the current move, but how far we can see, 5-10… that is, the next moves… Managing today is not a difficult thing, it is important to see the future *(P4).*
	Chess	• Strategy must be determined in order to be successful. In order to analyze ourselves well and win, we must use resources efficiently and make the right moves, as in chess *(P38).*
	Trekking	• While doing this sport, you need to walk thinking about the next step. You have to plan. You cannot say: I set out. What time will you stop where? How many clothes will you be wearing? How will your walking shoes be shaped? How much food will you get? What food will you get? For example, you walk in the August heat, but after 5 hours you get into the snow. Conditions can change completely. If you do not plan now, if you are unprepared, you will die where there is snow, you will fall, you will starve, you will disappear *(P11).*
Other	Mother/ father	• … I perceive the strategy as the parenting of a child. … What I understand from strategic management is that the company has a goal. There is a place it wants to come to. It has habits and spirit. You also give the children some habits to bring them together and direct them. Then you check whether this takes place *(P2).*
	Life	• … I would never say that the conditions are not perfect. We need to be flexible, we must change the way when it comes to location; if it is constantly good, you are going to win it, and since you should go back to the appropriate place, I'd say that you need to create your own strategy… *(P20).*
	Chemist	• Imagine a chemist who has millions of different materials in front of him, taking a piece from each of them and producing a product that belongs only to him, that will never be repeated, the same cannot be done. He manages with his executive background, materials, personnel and equipment. It produces a product… *(P22).*

Source: Developed by the researcher

When focusing on the descriptions of the relevant metaphors, while depicting the strategic management concept of the participants, management, foresight, goal, sustainability, effective resource use, coordination (togetherness, harmony), leadership, direction, control, planning, success, the power of the manager, motivation, fair communication, profitability, struggle, balance, change, seeing the whole, seeing details, generating solutions, determining action, knowing environmental conditions, uniqueness, difference, perception, patience, aggressiveness, calmness, wisdom, versatility, calmness, memory, experience, struggle, attention is drawn to the fact that they highlight concepts such as values, analysis, vigilance and tactics (Table 4).

The characteristics of the upper- and middle-level managers, who constitute the analysis unit of the study, were evaluated in terms of gender, age, education level, sectoral seniority, organizational seniority and positional seniority parameters. According to the evaluation of gender, it was determined that the analysis unit was mostly composed of men (36 people), and the number of female actors (4 people) was small. Based on the age criterion, it was determined that the analysis unit has an average age of approximately 48 years. It has been determined that the actors in question mostly have a bachelor's degree (30 people), the actors with a master's degree (7 people) are in the work team, and the actors with a high school diploma (3 people) are in the minority. Based on the results of the analysis of the sectoral, organizational and spatial seniority parameters, it was determined that the analysis unit consists of managers with an average of 24 years of sectoral seniority, an average of 11 years of organizational seniority and an average of 17 years of positional seniority.

5. Conclusion

The metaphors obtained as a result of the analysis of the data set obtained within the scope of the study and the descriptions of these metaphors reveal that the dominant images of the managers regarding the concept of strategic management match the concept of strategic management. However, as a result of the study, it can be seen that the participants who answered the questions independently of each other defined the concept of strategic management with sometimes similar and sometimes almost the same metaphors. For example, 6 of the participants used the metaphor of Atatürk, and 4 of them used the lion metaphor, while 2 of them used the machine metaphor. In addition 12 and 5 participants used metaphors to form an animal and vehicle groups, respectively. This situation points out that the shared reality among organizational actors is regular, clear and understandable, and that dominant images are strong in shared reality. If the constructed reality were irregular or complex, the images would also be uncertain and weak accordingly (Şimşek, 1997).

These two findings reveal that the participants exhibited consensus rather than conflict in their evaluations of the concept of strategic management. This shows that there is a strong common bond between the members of the organization. This result also contributes to an explanation of the success of the strategic management field. This consensus is proof that strategic management has a unique and distinctive identity. The different metaphors used are proof that the strategic management field has a lively, active and broad intellectual content. As a result of the study, it was seen that there is a strong and implicit consensus about the essence of the strategic management field. This result supports the research of Nag et al. (2007).

Another contribution of this study is that it enables academics to see how the concept of strategic management is perceived in the eyes of practitioners. Academics can start a discussion on whether they are satisfied with the projection of the field in practice, whether the field needs to change or what the points are where the field can be improved.

With Lakoff and Johnson's (1980) linguistic expansion and Schmitt's (2005) methodological contribution, the concept of metaphor has inspired many studies in organization literature (Erdem & Satır, 2003; Inns, 2002; Gibson & Zellmer-Bruhn, 2001; Kendall & Kendall, 1993; Sackmann, 1989; Morgan, 1986). What distinguishes metaphors from other symbols in interpretative and symbolic analyses of organizations is that individuals can map the ways of transforming organizational life into subjective reality by going through the stages of perception, meaning and interpretation (Erdem, 2010). This article also shows how organizational actors create their own realities with their subjective perceptions and interpretations of organizational facts. Although the reality achieved is not the same in different groups, it will create the possibility of confronting new realities. Therefore, it should not be

overlooked that organizational facts can be attributed different meanings within the specific context of each organization.

Undoubtedly, there are some limitations in this study as in other academic studies. The organizational context and the participants' own socio-cultural contexts were not analyzed in this study. Organizational context knowledge can be important to make sense of a metaphor (Akşehirli, 2005). In addition, individuals convey meanings by constructing them within their own socio-cultural contexts (Stenier & Mahn, 1996). Within the scope of the study, findings confirming this situation were found. For example, a participant whose focus was on topics such as motherhood and child care responded at that moment using a metaphor based on the situation he/she was in. It was observed that most of the participants used metaphors with the effect of their education, interests and past work experience. Although this was not the focus of the study, it became apparent as a side contribution. Therefore, this finding supports the claims of some studies in the literature (Akşehirli, 2005; Lakoff & Johnson, 2003; Stenier & Mahn, 1996). With this study, it was felt that contextual differences could push the strengthening, weakening and/or differentiation of a metaphor. Evaluation of metaphors together with the context in which they are functional can be an important inspiration for future studies.

This study offers a number of opportunities for future research. First of all, considering that our cultural experiences affect our metaphorical orientations (Morgan, 1998), it will be interesting to make a comparison by conducting this study in different cultures. Secondly, this study can be carried out on organizations at different institutional levels, and awareness of strategic management in practice can be revealed. Thirdly, the methodology used in this study will be used in different fields and will contribute to the diversification of methodology in research. Therefore, this study will be an incentive for similar studies by shedding a new light on both the field of strategic management and other areas.

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THE IMPACT OF COVID-19 ON LIQUIDITY MANAGEMENT IN SMALL AND MEDIUM-SIZED TRADE BUSINESSES: THE CROATIAN CASE

Abstract

Purpose: The aim of this paper is to examine empirically the relationship between liquidity management and profitability of Croatian small and medium enterprises in trade and to provide empirical evidence of the effects of liquidity management on the level of profitability during the COVID-19 crisis.

Methodology: The analysis began with descriptive statistics, where the authors observed the following variables: ROA, current liquidity, accelerated liquidity, immediate liquidity and employment. The collected data analyzed descriptive statistics and compared the Wilcoxon signed-rank test. The authors made six regression models and performed regression diagnostics for all models. The problem of heteroscedasticity examined the Breusch-Pagan test, the normality of relation errors examined the Jarque-Bera test, while multi-collinearity examined the variance inflation factor (VIF).

Results: All six models confirmed a statistically significant and positive impact of liquidity on the level of profitability in both years, which means that the increase in liquidity will result in an increase in the level of profitability of the observed companies. Control variables of company size and trade category did not prove statistically significant.

Conclusion: Scientific contribution is the development of a model for the analysis of the impact of liquidity on the profitability for small and medium enterprises in trade. The model is also applicable to similar transition and post-transition economies, especially to those in the region that have similar economic development as it will help economic policy makers and corporate managers understand the importance of the impact of liquidity on profitability levels.

Keywords: Liquidity management, profitability, COVID-19, Croatian small and medium enterprises, trade

1. Introduction

The health crisis caused by the COVID-19 coronavirus in 2020 occurred at a rapid pace causing a deep decline in economic activity and at the same time affecting the entire world. Croatia should have adapted to the new situation in the short term because it has a small open economy that is highly dependent on tourism and tourism-related activities such as accommodation and food preparation and serving, retail trade, production and others.

Wholesale and retail trade, according to the CBS data on 31 December 2020, had a share of 16.7% in gross value added, 16.7% in employment of legal entities, and 20.3% in the number of active legal entities (Croatian Bureau of Statistics, 2021), while its share in the total profit of all activities was 35% (FINA, 2021). Its importance to the economy is that it affects both production and consumption because of the intermediary role it plays in the value chain.

Small and medium-sized enterprises are the backbone of economic growth both due to the number of registered enterprises and due to the fact that they create a significant number of jobs. Their share in the total number of companies has been 99.7% for decades. According to FINA data, in 2020 the number of small and medium-sized enterprises in Croatia increased by 2.3% compared to 2019, which indicates that workers who lost their jobs started their own enterprises. This confirmed the increase in the number of employees in micro enterprises by 6.6% compared to the previous year, while the number of employees in small enterprises decreased by 2.9% and in medium enterprises by 3.7% compared to 2019. The net profit for the period decreased in micro enterprises by 46.5%, in small enterprises by 9.3%, and in medium-sized enterprises by as much as 32.3% compared to the previous year.

Small and medium-sized enterprises affected by the crisis were hardest hit due to their low levels of capital and working capital. Companies can operate without profit in the short term, but in case of illiquidity, they are quickly doomed to bankruptcy. Liquidity is becoming a priority in pandemic conditions, which one can see in the measures adopted by the Government, which has prepared measures to mitigate the pandemic for small and medium enterprises.

The COVID-19 pandemic has had serious consequences for many economies and the operations of companies from all sectors, directly affecting their profitability and liquidity. Liquidity is important for ensuring business continuity, especially during the COVID-19 pandemic, when the company's business activities have slowed down and lower revenues have been generated, which is also reflected in cash flows. The main objective of this study is to examine the relationship between liquidity and profitability management of Croatian small and medium-sized enterprises in trade in an environment typical of transition countries, and to provide empirical evidence of the effects of liquidity management on profitability at the time of the pandemic.

The research results in this paper make a scientific contribution in theoretical and applied terms to the economic sciences. The contribution of the research is in presenting the current knowledge of the impact of the crisis caused by the COVID-19 virus on the business of small and medium enterprises in trade as well as in the empirical research on a selected sample of companies to determine their liquidity during the pandemic. This paper also develops a model for analyzing the impact of liquidity and profitability of small and medium enterprises in the trade sector, which can help corporate managers understand the importance of liquidity management, which is especially important in times of crisis.

The paper is structured such that after the introduction it presents the theoretical assumptions of the research in Chapter 2, while Chapter 3 describes the research methodology, defined by the sample, and gives the results of empirical research. The concluding chapter synthesizes the obtained results, gives recommendations for further research and describes the research limitations.

2. Theoretical settings

2.1 COVID-19 pandemic

The economic effects of the coronavirus pandemic quickly caught the attention of global and domestic economists who analyzed the impact of the COVID-19 pandemic, the worst global recession since 1930 (Shen et al., 2020) that affected all economies (Carracedo et al., 2020) regardless of their size and development (Barua, 2020) and that significantly reduced GDP in the major economies of OECD countries in the first two quarters of 2020 (OECD, 2021). This crisis, which began as a health crisis, came abruptly, caused an unexpected decline in all

economic activities in all areas globally, and had an impact on various aspects of human life as well.

The impact of the pandemic on the business of small and medium enterprises is the subject of research by many authors in different countries. Thus, for example, Kaberia & Muathe (2020) in Kenya, Sun et al. (2021) in China or Aladejebi (2021) in Nigeria found a negative impact on their businesses. Revoltella et al. (2020) found that small and medium-sized enterprises in the European Union have higher income reductions than large enterprises, as is the case in less developed countries (World Trade Organization, 2021). Declining revenues affect their liquidity and require government assistance (Ikmal et al., 2020; Iancu et al., 2022) because without government assistance, far more companies would have poorer business results (Gourinchas et al., 2022). State aid can significantly reduce the negative impact of a pandemic on liquidity as they lack financial resources at the time of the pandemic (Eggers, 2020; Dimson et al., 2020).

In order to limit the spread of the pandemic, most countries have prescribed a reduction in or a complete ban on contacts, which has mostly affected small and medium enterprises in the service sector such as tourism and catering and in activities closely related thereto such as shops, restaurants, small family hotels, passenger transport (Čučković, 2020; OECD, 2021; Fernandes, 2020). In the first period and in the short term, the trade and services sector was most affected (Arčabić, 2020).

The economic impact of the pandemic can be seen in all sectors, but is particularly visible in the consumer goods sector due to changing consumer habits (Dertouzos et al., 2020; Becdach et al., 2020), but also increased demand for certain products (Becdach et al., 2020). Carnevale & Hatak (2020) conclude that the pandemic has forced customers to use the Internet in their daily routine and that there has been a significant increase in online sales (Becdach et al., 2020).

There are numerous papers examining the impact of COVID-19 on various economic aspects such as, for example, the analysis of the impact on the tourism sector (Škare et al., 2021; Čorak et al., 2020), on export competitiveness (Stojčić, 2020), on the construction sector (Gamil & Alhagar, 2020), and somewhat fewer papers analyzing the impact of COVID-19 on trade (Knezović, 2021; Končar et al., 2020; Tighe, 2021; Pantano & Willems, 2022).

According to the Croatian Bureau of Statistics (2021) data, Croatia's real annual retail trade turnover has been falling continuously since March 2020, and fell by 5.8% compared to the previous year, on an annual basis. At the same time, the turnover from retail trade in food and beverages increased by 4.7%, while the turnover from trade in non-food products decreased by 5.5%. The biggest drop was recorded in retail trade in textiles, footwear and clothing, which fell by as much as 50%.

Tighe (2021a) researched small and medium-sized enterprises in the US wholesale business and found that about 25% of companies achieved a negative business result, while in retail trade, for example, spending on food and household supplies has continued to increase, while spending on clothing and jewelry has been drastically reduced (Tighe, 2021b).

Restrictions on movement and forced closure of stores have affected changes in consumer behavior since they have decided to buy products online. The pandemic accelerated investments in the digitalization of trade (Knezović, 2021; Pantano & Willems, 2022). Končar et al. (2020) found in their study that in the Western Balkans, the share of online retail revenue in total revenue increased significantly during the pandemic period.

2.2 Liquidity and profitability

Maintaining the company's liquidity and achieving a profitable business are the most important tasks of company management. A company is liquid when it is able to convert its current assets into cash and cash equivalents that should be sufficient to cover its liabilities within one year.

Management of short-term assets and short-term liabilities is important for the company's operations in order for the business process to run smoothly and to avoid the risk of default. This is especially important for those companies that have a higher share of current assets in the balance sheet assets and whose sources of financing assets are short-term liabilities. The goal of the company is to achieve the highest possible profitability, and in this context to determine the possibility of the impact of liquidity on profitability.

There is a significant opus of scientific research in an attempt to determine the relationship between liquidity and profitability. Research was usually focused on the criterion of enterprise size (a small, medium or large enterprise), a specific geographi-

cal area or a specific activity. Thus, for example, Tušek et al. (2014) examined the impact of liquidity and profitability of large and medium-sized enterprises in the hotel industry in Croatia. The results of their research show that there is no significant correlation between liquidity and profitability.

Mamić Sačer et al. (2013) analyzed the impact of liquidity on the profitability of medium-sized and large enterprises in the information and communication industry and found that increasing the value of the current liquidity ratio affects the increase in the gross return on assets ratio. A positive link between liquidity and profitability of Portuguese small and medium-sized enterprises in service industries was also found by Nunes et al. (2010).

The trade sector has also been the subject of research related to the correlation between liquidity and profitability. Thus, for example, Lee & Song (2010) examine in their research the impact of liquidity measured by the money conversion cycle and the profitability of Korean wholesale and retail companies. Their results suggest a negative link between the money conversion cycle and net profit, as well as the money conversion cycle and return on assets (ROA).

Furthermore, the Svitlik & Poutnik (2016) study also addresses the issue of the relationship between liquidity and profitability in the Czech Republic and their results indicate a strong link between working capital and return on assets (ROA) in wholesale and retail trade. Research on liquidity and profitability of trade companies in Jordan was conducted by Al-Qadi & Khanji (2018). Their results indicate a significant impact of liquidity measured by the current and accelerated liquidity ratio on profitability through return on assets (ROA).

3. Research

3.1 Methodology

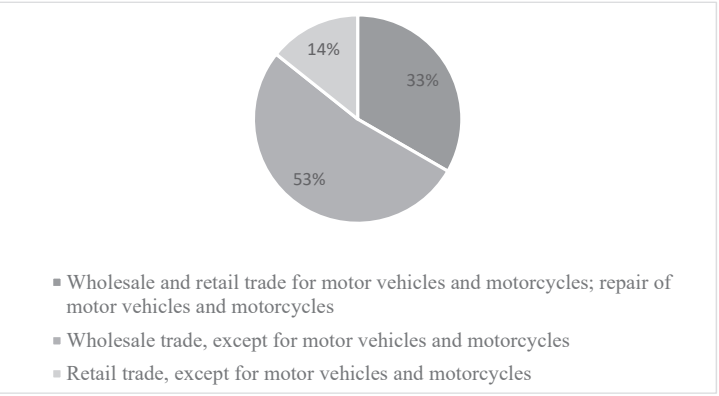
The research in this paper aimed at gaining insight into liquidity management of Croatian small and medium enterprises in the trade sector in the period 2019 to 2020. Empirical research focuses on the analysis of liquidity in selected SMEs in order to determine the relationship between their liquidity and profitability. According to the data available on the FINA website, in 2020 the total number of Croatian small and medium-sized enterprises increased by 2.3% compared to 2019. The largest increase was recorded in trade, which participates in total activities with 21.2%. In the classification of economic activities, researchers used the National Classification of Activities 2007 - NKD 20072, which is harmonized with European standards, i.e., it corresponds to the NACE Rev.2 classification.

The data used in the survey were collected from FINA, to which SMEs are required to submit their financial statements on an annual basis and which meet the definition of SMEs applied by the European Commission. According to this definition, the sample includes companies that have less than 250 employees, an annual turnover of up to EUR 50m and/or total assets of up to EUR 43m.

Small and medium-sized enterprises in the trade sector in the Central Croatia region were selected for the sample [since the term Central Croatia does not have a clearly defined line of demarcation, it often coincides with the term Northern Croatia], which includes the following counties: Bjelovar-Bilogora County, the City of Zagreb, Karlovac County, Sisak-Moslavina County and Zagreb County, in which 45% of all small and medium enterprises operating in the Republic of Croatia are registered. As trade activity is the most represented in the total activities, the initial sample of 101 micro, small, and medium-sized enterprises in trade activity was selected randomly according to the criterion of the size of the enterprise. Companies that showed extreme or inconsistent figures in any variable were not included in the sample, so that the ***final sample consists of 63 micro, small and medium enterprises.***

The sample of trade enterprises from the Republic of Croatia in 2019 and 2020 was divided into three subgroups (according to the NKD 2007 sections). The categories of subgroups comprised 22 enterprises in wholesale and retail trade for motor vehicles and motorcycles; repair of motor vehicles and motorcycles, 32 in wholesale trade, except of motor vehicles and motorcycles, and nine in retail trade, except of motor vehicles and motorcycles. Their distribution is shown in the following graph.

Graph 1 Presentation of trade enterprises by subgroups



Source: Authors

The collected data were analyzed by descriptive statistics and compared using the Wilcoxon signed-rank test. The authors made six regression models and performed regression diagnostics for all models. The problem of heteroscedasticity, the normality of relation errors, and multi-collinearity were examined by the Breusch-Pagan test, the Jarque-Bera test, and the variance inflation factor (VIF), respectively. The authors analyzed the data using the Stata 14.2 software tool.

3.2 Results of empirical analysis and discussion

3.2.1 Descriptive statistics

The analysis began with descriptive statistics, where the authors observed the following variables: ROA, current liquidity, accelerated liquidity, immediate liquidity and employment. Descriptive statistics of the observed variables are presented in Table 1 for 2019, and in Table 2 for 2020.

Table 1 Descriptive statistics for 2019

2019	ROA	Current liquidity	Accelerated liquidity	Immediate liquidity	Employment
average	0.0847	1.9865	0.9471	0.2782	41.7143
standard deviation	0.0619	1.3657	0.7968	0.3887	45.5467
coefficient of variation	73.10 %	68.75 %	84.13 %	139.74 %	109.19 %
maximum	0.2403	6.4701	4.2336	2.0791	245.0000
median	0.0593	1.5499	0.7138	0.0994	35.0000
minimum	0.0077	0.2620	0.1378	0.0019	1.0000

Source: Authors' calculation

Table 2 Descriptive statistics for 2020

2020	ROA	Current liquidity	Accelerated liquidity	Immediate liquidity	Employment
average	0.0936	2.0239	1.0939	0.3824	41.6984
standard deviation	0.0727	1.2711	0.9774	0.5228	44.7721
coefficient of variation	77.66 %	62.81 %	89.35 %	136.71 %	107.37 %
maximum	0.2805	7.0534	4.7931	2.2655	245.0000
median	0.0758	1.6175	0.7198	0.1550	35.0000
minimum	0.0046	0.2731	0.1188	0.0008	1.0000

Source: Authors' calculation

Based on the data given in Tables 1 and 2, it can be seen that within the selected sample of micro, small and medium enterprises there are enterprises with a wide range of observed values, which is shown by a coefficient of variation that shows a higher degree of dispersion in 2020's ROA and accelerated liquidity, and a smaller degree of dispersion in current liquidity as well as in employment.

The authors compared data for ROA, current liquidity, accelerated liquidity and immediate liquidity in 2019 and 2020 for all trades together using the Wilcoxon signed-rank test, where the following hypotheses were tested:

H0: There was no change in ROA/current liquidity/accelerated liquidity/immediate liquidity in 2020 compared to 2019.

H1: There was a change in ROA/current liquidity/accelerated liquidity/immediate liquidity in 2020 compared to 2019.

The average values of the observed variables and the corresponding p-values are given in Table 3.

Table 3 Average values of the observed variables for all trades and the corresponding p-values

	2019	2020	p
ROA	0.0847	0.0936	0.2309
Current liquidity	1.9865	2.0239	0.0234*
Accelerated liquidity	0.9471	1.0939	0.0031*
Immediate liquidity	0.2782	0.3824	0.0031*

*significant at the $p < 0.05$ level
Source: Authors' calculation

The analysis showed that compared to 2019, there was a statistically significant increase in current liquidity, accelerated liquidity and immediate liquidity in 2020. ROA was slightly higher in 2020 compared to 2019, but that difference is not statistically significant.

Enterprises in motor vehicle trade activity, which are shown in Table 4, were also analyzed separately, as well as enterprises in non-motorized vehicle activity, which are shown in Table 5.

Table 4 Average values of observed variables and corresponding p-values for wholesale and retail trade of motor vehicles and motorcycles; repair of motor vehicles and motorcycles

	2019	2020	p
ROA	0.0747	0.0705	0.9308
Current liquidity	1.5551	1.6500	0.0078*
Accelerated liquidity	0.5495	0.6708	0.0173*
Immediate liquidity	0.1377	0.2524	0.0228*

*significant at the $p < 0.05$ level
Source: Authors' calculation

Based on the data from the table, it can be noticed that there was a statistically significant increase in all three liquidities, i.e., current, accelerated and immediate liquidity, while the change in ROA was not statistically significant.

Table 5 shows average values and p-values for the wholesale trade category, except of trade in motor vehicles and motorcycles, and the retail trade category, except of trade in motor vehicles and motorcycles, analyzed separately.

Table 5 Average values of observed variables and corresponding p-values for wholesale and retail trade, except of motor vehicle trade

	2019	2020	p
ROA	0.0897	0.1052	0.1384
Current liquidity	2.2022	2.2108	0.2526
Accelerated liquidity	1.1460	1.3055	0.0362*
Immediate liquidity	0.3484	0.4474	0.0409*

*significant at the $p < 0.05$ level
Source: Authors' calculation

There was a statistically significant increase in accelerated liquidity and immediate liquidity, while changes in ROA and current liquidity were not statistically significant.

3.2.2 Regression models

A regression technique was used in further research into the dependence between variables to see where the dependent variable is profitable; the independent variables are current liquidity, accelerated liquidity and immediate liquidity, while the control variables are company size and the division of trade (section G) into sections G45, G46 and G47.

Return on assets (ROA) (Garcia-Teruel & Martinez-Solano, 2007) is used as a measure of profitability, which is calculated as the ratio of earnings before interest and taxes (EBIT) and total assets and shows how much is earned independently of the method of financing.

Current liquidity is calculated as the ratio of current assets to short-term liabilities, accelerated liquidity as the ratio of cash and receivables to short-term liabilities, and immediate liquidity as the ratio of cash to short-term liabilities.

The first control variable of firm size is expressed as the natural logarithm of the number of employees (according to Deloof, 2003; Raheman & Nasr, 2007; and others). One expects that the growth of company size will affect the profitability of companies, primarily because large companies find it easier to acquire capital in the financial market, while small companies are primarily oriented to internal sources of financing. For example, Deloof (2003), Raheman & Nasr (2007), and Garcia-Teruel & Martinez-Solano (2007) found a positive relationship between profitability and firm size, Enqvist et al. (2014) identified a negative correlation, while Wesley et al. (2013) did not get any significant relationship between firm size and profitability.

The second control variable is the category, i.e., a division of trade into subgroups. The trade sector (section G according to the NKD 2007) is divided into the following three sections (subgroups): wholesale and retail trade of motor vehicles and motorcycles; repair of motor vehicles and motorcycles (division 45), wholesale trade, except of motor vehicles and motorcycles (division 46), and retail trade, except of motor vehicles and motorcycles (division 47), which differ in the duration of a business cycle.

Six regression models were developed, in which the impact of three types of liquidity on ROA was observed for 2019 and 2020.

The following defines control variables:

- company size (the logarithm of the number of employees),
- a dummy variable category *Wholesale*, where the basic category wholesale and retail trade of motor vehicles and motorcycles; repair of motor vehicles and motorcycles, was assigned the value of 0, while the category wholesale, except of trade in motor vehicles and motorcycles, was assigned the value of 1,
- a dummy variable category *Retail*, where the basic category wholesale and retail trade of motor vehicles and motorcycles; repair of motor vehicles and motorcycles, was assigned the value of 0, while the category of retail trade, except of trade in motor vehicles and motorcycles, was assigned the value of 1.

Since all observed variables were positively asymmetric for the models, they used their logarithmic values. A list of all variables and abbreviations are given in the following table:

Table 6 List of variables with full names and abbreviations

Variable	Abbreviation
ROA (return on asset)	ROA
Current liquidity logarithm	L_TEKL
Accelerated liquidity logarithm	L_UL
Immediate liquidity logarithm	L_TRENL
Number of employees logarithm	L_ZAP
Wholesale category	K_VEL
Retail category	K_MAL

Source: Authors

Table 7 provides an overview of regression models analyzed in the paper with the dependent and independent variables indicated.

Table 7 Overview of the model with the independent and dependent variables indicated

Model	Independent variable	Dependent variable
01	Current liquidity 2019	ROA 2019
02	Accelerated liquidity 2019	ROA 2019
03	Immediate liquidity 2019	ROA 2019
04	Current liquidity 2020	ROA 2020
05	Accelerated liquidity 2020	ROA 2020
06	Immediate liquidity 2020	ROA 2020

Source: Authors

Six regression models were developed for the impact of liquidity on profitability. The first three regression models refer to the impact of current and accelerated liquidity on ROA in 2019 (tables 8-10), while the other three regression models relate to the impact of current and accelerated liquidity on ROA in 2020 (tables 11-13).

The results of the impact of current liquidity on ROA in 2019 are given in Table 8.

Table 8 Regression model 1

Variable	Coefficient	Standard error	p-value
L_TEKL*	0.4588	0.1504	0.003
L_ZAP	-0.0303	0.0927	0.745
K_VEL	-0.1137	0.1099	0.305
K_MAL	0.1278	0.1379	0.358
CONST*	-1.2145	0.1714	0.000

*significant at the $p < 0.05$ level
Source: Authors

Current liquidity and the constant are statistically significant, while employment and the trade category did not affect ROA in 2019. Trade companies that had higher current liquidity also had a higher ROA.

The results of the impact of accelerated liquidity on ROA in 2019 are given in Table 9.

Table 9 Regression model 2

Variable	Coefficient	Standard error	p-value
L_UL*	0.4176	0.1405	0.004
L_ZAP	-0.0155	0.0929	0.868
K_VEL	-0.1859	0.1163	0.115
K_MAL	0.0362	0.1470	0.806
CONST*	-1.0249	0.1790	0.000

*significant at the $p < 0.05$ level
Source: Authors

Accelerated liquidity and the constant are statistically significant, while employment and the trade category are not statistically significant for ROA in 2019. Trade companies that had higher accelerated liquidity also had a higher ROA.

The results of the impact of current liquidity on ROA in 2019 are given in Table 10.

Table 10 Regression model 3

Variable	Coefficient	Standard error	p-value
L_TRENL*	0.2510	0.0623	0.000
L_ZAP	-0.0025	0.0882	0.977
K_VEL	-0.1182	0.1043	0.262
K_MAL	0.0281	0.1362	0.837
CONST*	-0.8957	0.1771	0.000

*significant at the p < 0.05 level
Source: Authors

Companies that had higher current liquidity also had a higher ROA in 2019. Other variables, with the exception of the constant, were not statistically significant.

The results of the impact of current liquidity on ROA in 2020 are given in Table 11.

Table 11 Regression model 4

Variable	Coefficient	Standard error	p-value
L_TEKL*	0.4243	0.1930	0.032
L_ZAP	0.0929	0.1048	0.379
K_VEL	0.0118	0.1297	0.928
K_MAL	0.1809	0.1610	0.266
CONST*	-1.4401	0.1962	0.000

*significant at the p < 0.05 level
Source: Authors

Companies that had higher current liquidity also had a higher ROA in 2020. Employment and the trade category had no impact on ROA.

The results of the impact of accelerated liquidity on ROA in 2020 are given in Table 12.

Table 12 Regression model 5

Variable	Coefficient	Standard error	p-value
L_UL*	0.3737	0.1507	0.016
L_ZAP	0.1023	0.1034	0.327
K_VEL	0.0508	0.1339	0.706
K_MAL	0.0833	0.1688	0.623
CONST*	-1.2688	0.2001	0.000

*significant at the p < 0.05 level
Source: Authors

Companies that had higher accelerated liquidity also had a higher ROA in 2020. Employment and the trade category had no impact on ROA.

The results of the impact of current liquidity on ROA in 2020 are given in Table 13.

Table 13 Regression model 6

Variable	Coefficient	Standard error	p-value
L_TRENL*	0.1543	0.0669	0.025
L_ZAP	0.1094	0.1041	0.298
K_VEL	0.0133	0.1290	0.918
K_MAL	0.1248	0.1654	0.454
CONST*	-1.2216	0.2089	0.000

*significant at the p < 0.05 level
Source: Authors

Companies that had higher current liquidity also had a higher ROA in 2020. With the exception of the constant, other variables were not statistically significant.

The authors performed regression diagnostics for all models. A summary of the results is given in Table 14.

Table 14 Regression diagnostics for all models

Model	01	02	03	04	05	06
Prob > F	0.0159	0.0190	0.0013	0.0846	0.0514	0.0706
R^2	0.1869	0.1811	0.2627	0.1298	0.1476	0.1364
Adj. R^2	0.1308	0.1247	0.2119	0.0698	0.0888	0.0768
Breusch-Pagan	0.2209	0.4210	0.1332	0.9707	0.7678	0.8517
Jarque-Bera	0.6074	0.6501	0.4153	0.2732	0.1423	0.1542

Source: Authors' calculation

The table shows that the first three models are statistically significant at the level of significance $p < 0.05$. The remaining three models related to 2020 are statistically significant at the level of significance $p < 0.1$, but the liquidity variable in these models is significant at the level of $p < 0.05$. The problem of heteroscedasticity was examined by the Breusch-Pagan test and the obtained values were greater than 0.05, which confirmed the absence of the problem of heteroscedasticity. The normality of the relation errors was examined by the Jarque-Bera test. The obtained values are greater than the limit value of 0.05, which indicates that the relation errors follow the normal distribution.

The authors examined multi-collinearity by using the variance inflation factor (VIF). The VIF results for all six models are given in Table 15.

Table 15 VIF results for all six models

Model	01	02	03	04	05	06
K_VEL	1.63	1.81	1.62	1.65	1.80	1.65
L_ZAP	1.37	1.37	1.37	1.39	1.38	1.38
K_MAL	1.26	1.42	1.36	1.25	1.40	1.33
L_LIKV*	1.04	1.23	1.11	1.03	1.20	1.09

*The L_LIKV variable indicates the type of liquidity used in the model
Source: Authors

All VIF values are less than five thus confirming the absence of multi-collinearity problems in all six models.

The impact of the indicators of current, immediate and accelerated liquidity, company size and the category of trade activity on ROA was examined for 2019 and 2020. All six models confirmed a statistically significant and positive impact of liquidity on the level of profitability in both years, which means that the increase in liquidity will result in an increase in the level of profitability of the observed companies. Control variables of company size and the trade category were not statistically significant.

4. Conclusion, recommendation and limitations of the research

The primary purpose of this study was to analyze liquidity management of Croatian small and medium-sized trade enterprises during the crisis caused by the COVID-19 pandemic. The authors used regression analysis to examine the impact of current liquidity, accelerated liquidity and immediate liquidity, the size of enterprises and the trade sector by subgroup on the profitability of small and medium enterprises in trade. The results of regression analysis showed that liquidity measured by these indicators has a statistically significant impact on profitability measured by return on assets (ROA), i.e., the increase in liquidity affected the increase in ROA. If liquidity represents the ability of a company to settle its short-term liabilities in time, and profitability represents its business success, we can conclude that the company is able to meet its obligations and thus increase its profitability. If a company were not able to meet its obligations, it would have to find new sources of financing and borrowing, which increases costs, and thus reduces profits, i.e., reduces its business profitability. Company size and the trade category had no impact on profitability.

Previous research mainly focused on large enterprises, so that this research focused on small and medium-sized enterprises in trade that are important for a small post-transition economy, justifies its importance. Scientific contribution of this paper is in the review of relevant and recent literature on the impact of the crisis caused by the COVID-19 coronavirus on liquidity of small and medium-sized enterprises in trade. Previous research on the impact of the pandemic on business operations has been conducted mainly through surveys or questionnaires, so empirical research conducted on a selected sample of companies represents a significant contribution to economic science. A model for the analysis of the impact of liquidity on the profitabili-

ty of small and medium enterprises in trade activity has also been developed in the paper. The model is also applicable to similar transition and post-transition economies, especially to those in the region that have similar economic development as it will help economic policy makers and corporate managers understand the importance of the impact of liquidity on profitability levels. The model reads:

$$ROA = \beta_0 + \beta_1 \cdot L\_LIKV + \beta_2 \cdot L\_ZAP + \beta_3 \cdot K\_VEL + \beta_4 \cdot K\_MA$$

Research results presented in this paper make a scientific contribution in theoretical and applied terms to economic sciences. The scientific results obtained in this research will be beneficial to small and medium enterprises in Croatia, but also in the region where they will provide a better understanding of the relationship between liquidity and profitability.

During the preparation of this paper, the authors noticed certain limitations. A restriction was encountered at the time of data collection. The authors obtained the data from the annual financial statements of small and medium-sized enterprises, and for small enterprises only abbreviated financial statements submitted by small enterprises to FINA were available, which limited the possibility of a more detailed analysis.

Future research on the impact of COVID-19 on SME liquidity management should broaden the theoretical framework (assuming that there will be more papers on the impact of the crisis caused by COVID-19), take into account longer time series, expand research to other Croatian regions and analyze other activities. The paper provides a basis for further research that would compare liquidity management in small and medium-sized enterprises with large enterprises in similar economies.

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LET'S CLOUD WITH ME! USERS' WILLINGNESS TO USE CLOUD COMPUTING SERVICES AS A FUNCTION OF SOCIAL NORMS

Abstract

Purpose: The current study is theoretically grounded in the Technology Acceptance Model (TAM) and Social Influence Theory. It attempts to explain how acts of others influence attitudes and behaviors of individuals in the context of the adoption of cloud computing services.

Methodology: The present study used the convenience sampling technique to conduct empirical research. Data collection was performed via an online survey. We used Partial Least Squares Structural Equation Modelling (PLS-SEM) to test the proposed research model.

Results: Our findings suggest that a favorable social norm towards cloud computing services produces a positive and statistically significant effect on perceived ease of use, perceived usefulness, and willingness to use cloud computing services. In terms of mediating the role of perceived ease of use and perceived usefulness, findings revealed that perceived ease of use mediates the relationship between social norms and willingness to use cloud computing services.

Conclusion: The present study advances our understanding of the role of social influence and individual perceptions of technology (i.e., usefulness and ease of use) in the intention to use technology in the cloud computing context.

Keywords: Cloud computing, adoption, social norms, social influence

1. Introduction

Progress in information and communication technologies (ICT) has already shaped and is still shaping consumption patterns of Web-based information services. New technologies emerge on a daily basis and become part of our everyday lives. An increasing number of people throughout the globe have embraced new technologies to meet their needs. A critical advantage of modern ICT is the ability to handle vast amounts of data at high speeds, which implies that people require a stable and large-capacity data storage solution. Whether you are interested in storing your photos or videos from a memorable travel experience, or you want

to make a backup of your personal and business data from your personal computer or need to create shared documents with your colleagues, you will probably consider cloud storage as a gateway. Cloud computing (CC) refers to a large-scale parallel and distributed system that provides computing resources (such as servers, networks, storage, and applications) to users over the Internet on a payper-use basis (Mariani et al., 2021; Song et al., 2020). Regardless of whether you are an individual or an organization, as a user of CC, you are entitled to access computer resources just as you are entitled to use traditional utility services such as water, natural gas, or telecommunication services (Buyya et al., 2009). Nowadays, CC is a driving force of future innovations, particularly in deploying services that would be almost difficult to execute without cloud technology (e.g., Machine Learning - ML, Artificial Intelligence - AI, and the Internet of Things - IoT).

The coronavirus outbreak has resulted in social distancing, remote work environments, and other changes to people's everyday lives all across the globe. Due to COVID-19 caused by the coronavirus, individuals and organizations had ample opportunities to hear about CC services and even started using them on a daily basis. As a result, CC has emerged as an unsung hero of COVID-19 (Ashhab et al., 2021). Nowadays, we are witnessing a considerable expansion of CC applications. According to the report published by *Research & Markets* in April 2021, the global market for CC services, which was previously estimated to be worth US$ 313.1 billion in 2020, is expected to grow to US$ 937.5 billion by 2027, at a compound annual growth rate (CAGR) of 17 percent over the period 2020-2027. Amid the COVID-19 pandemic, enterprises (small, medium, and large) across industries, healthcare organizations, and educational institutions have been forced to move to digital environments (Ashhab et al., 2021; Md Noh & Amron, 2021), and as a result, usage of CC services has been increased in volume by both enterprises and individuals. Microsoft, for instance, had approximately 32 million active daily users of Microsoft Teams (Software as a Service CC, SaaS) at the beginning of the COVID-19 pandemic. However, the number of Microsoft Teams active users increased to 75 million in a couple of weeks (Warren, 2021).

The topic of the adoption of CC services at the individual (micro) and organizational (intermediate) level has attracted interest of scholars in the field of information systems (IS)/information technology (IT) (e.g., Adjei et al., 2021; Sharma et al., 2016; Song et al., 2020; Vu et al., 2020). Previous studies suggest that the main factors driving organizational-level adoption of CC are benefit-cost risk considerations, technological and organizational readiness, and environmental factors (Vu et al., 2020). Currently, the research stream focused on individual-level adoption of CC services is in its infancy (Mariani et al., 2021; Song et al., 2020). Only a few studies have addressed the factors influencing individual acceptance of CC services (e.g., Mariani et al., 2021; Song et al., 2020; Sharma et al., 2016). In terms of CC adoption at the individual level, scholars have used technology acceptance theory and unified theory of acceptance and use of technology to explore antecedents of an individual's intention to use or adopt CC. Perceived usefulness, perceived ease of use, trust, and self-efficacy are found to be significant predictors of an individual's willingness to adopt CC services (Mariani et al., 2021; Sharma et al., 2016). However, group influence on willingness to adopt CC services has seldom been explored (e.g., Ho et al., 2017). Hence the primary purpose of this study is to examine the role of social influence, i.e., social norms, in crafting users' willingness to use cloud computing services. Our central assumption is that individuals' willingness to adopt CC services is determined by perceived usefulness and ease of use, both shaped by social norms (group influence). The current study is theoretically grounded in the Technology Acceptance Model (TAM) and Social Influence Theory.

2. Literature review and research hypotheses

2.1 Cloud computing

As a new approach to the usage of computer technology, CC empowers people by allowing them to access, work on, share, and save information through the Internet (Park & Ryoo, 2013). With conventional information technology solutions, user data might get locked in specialized software accessible on a limited number of devices, discouraging them from being more effective in their job tasks. In contrast, CC services allow users instant access to their data from any location using multiple devices (Park & Ryoo, 2013). As a result, migration to CC services makes users more productive and enhances communication with their co-workers. Three service models can deliver CC

services: Infrastructure as a Service - IaaS, Platform as a Service - PaaS, and Software as a Service - SaaS (Assante et al., 2016; Balco et al., 2017; Song et al., 2020). Software as a Service (SaaS) refers to "the ability to 'rent' the use of software hosted by a third party, so the user does not need to buy additional hardware or software to support it" (Baldwin & Cromity, 2012, p. 121). This service model is among the first CC services provided, and it has the most significant number of users. Platform as a Service (PaaS) is a CC service that creates an environment for developing applications and services and providing them to end-users (Raza & Mahfooz, 2017). With the help of PaaS, developers and information technology administrators develop applications primarily intended for end-users in the web or mobile environment. Developers and information technology administrators can configure the system operating parameters but not the hardware infrastructure on which PaaS services run. Infrastructure as a Service (IaaS) is a CC service model primarily based on virtualization. Developers and information technology administrators can configure and set specific parameters at the hardware level, but cloud providers still maintain hardware and all components and elements necessary for IaaS (Raza & Mahfooz, 2017). This model allows the highest level of personalization compared to the previous two models (SaaS and PaaS), but at the same time, the user bears the highest responsibility.

To better understand the advantages and disadvantages of cloud technology, it is essential to present the basic characteristics of cloud deployment models (Aljabre, 2012; Raza & Mahfooz, 2017):

- Public Cloud refers to the "pay-per-use model", which in most cases involves the calculation of resources used per unit time (usually 1 hour). This cloud model implies the use of a cloud infrastructure that is shared among a large number of users, where user data are not mutually visible. It is crucial to point out that this model includes SLA (Service Level Agreement), which defines service delivery quality.
- Private Cloud is a cloud model within an organization or company whose infrastructure is used/managed exclusively for one organization or company. This model often has a fixed monthly charge for complete resources available to the user rather than the amount of resources used. This cloud model is much more expensive than the public cloud and is often used in cases where another cloud model cannot be used due to the user's internal procedures and policies or legal restrictions.
- Hybrid Cloud refers to the usage of its own data center (on-premises) in combination with other cloud models, for example, with one of the domestic or global cloud providers. In this way, users can use the existing infrastructure if they own it, but they can also use the benefits and advantages of cloud technology.

Since PaaS and IaaS are enterprise-level CC services, we focus on the SaaS model, a prevailing deployment model of CC services among individual users. While traditional solutions are based on the commercial off-the-shelf principle (COTS), according to which the vendors sell the application and can provide assistance in the installation process and use, the SaaS model is based on the principle of a monthly subscription, usually per user. Therefore, the user is not responsible for purchasing, installing, or implementing the solution, or the procurement or administration of the infrastructure necessary to operate an information system. In most cases, the SaaS model represents a cheaper and more efficient solution than the traditional solutions (Ma, 2007). Some examples of SaaS services are Salesforce.com, Microsoft Office 365, Box, Google Apps, Amazon Web Services, Dropbox, GoToMeeting, Cisco WebEx, Concur, SAP Concur, etc. (Fechter, 2020; Watts & Raza, 2019).

SaaS services are provided in a virtual Application Service Provider (ASP) environment. ASPs ensure that each SaaS service user receives sufficient resources required for the efficient operation of the service. Thus, the users are no longer in charge of purchasing hardware and licenses or installing, configuring, maintaining, and upgrading software itself. In this way, the user does not have to bear long-term monetary costs, and at the same time, it enhances the flexibility and agility of its information technology solution. Due to the characteristics of cloud technology and SaaS services, the implementation and provision of SaaS services to new users are remarkably fast and simple. A stable and fast Internet connection is necessary for the effi-

cient use of the service, i.e., access to SaaS services is possible from anywhere via any smart device. Besides the benefits, there are legitimate concerns regarding the security of cloud-based data storage. Users are primarily concerned about the possibility of data loss, information control/oversight, and compliance with information management standards (Ho et al., 2017). In addition to the presented potential risks, potential factors hindering the adoption of CC services at the individual level are insufficient information, knowledge, and understanding of infrastructure, costs, and other aspects of SaaS services (Assante et al., 2016). Specific risks and issues can also arise during the transfer of large data amounts, especially in the implementation and migration to SaaS services (Goyal, 2013). When using the SaaS model, the users will need to increase the Internet speed and its quality and availability significantly.

2.2 Development of hypotheses

Social group influence and willingness to use CC services. Social norms theory posits that individuals develop subjective norms in a way that they tend to adjust their attitudes and behaviors in response to the people around them (Berkowitz, 2005). Family members, friends, and co-workers all have a significant impact on a person's life. In general, people assume that they belong to specific groups. So when other individuals in such groups, especially those who are very important to them, start using information technology services (e.g., CC services), people would see the usage of such services as a "signal" of belonging to the group (Wu et al., 2021). In addition, individuals who are less knowledgeable about CC services will be more prone to use the opinions of others about the benefits and risks of CC services adoption. Since CC services are intangible, individuals can form opinions about ease of use and usefulness only after adopting CC services. In addition, people are often "ill-informed" about a new information system before utilizing it and during the early stages of adoption; thus, their intention to use a new information system depends on other opinions (Watjatrakul, 2013). Therefore, people tend to rely on the experience of knowledgeable users belonging to their social groups to form their attitudes towards CC services. Thus, the following hypotheses are formulated:

H1a: A favorable social norm toward CC positively affects perceived ease of use of CC services.

H1b: A favorable social norm toward CC positively affects perceived usefulness of CC services.

H1c: A favorable social norm toward CC is positively associated with users' willingness to use CC services.

Technology acceptance theory and willingness to use CC services. The technology acceptance model (TAM) is a common framework for analyzing how individual users accept CC services (Ho et al., 2017; Park & Kim, 2014; Sharma et al., 2016). There are four key TAM constructs, i.e., perceived ease of use, perceived usefulness, attitude toward utilizing, and behavioral intention. Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320), while perceived usefulness is described as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). The central idea behind the TAM is that perceived ease of use and perceived usefulness are critical drivers of an individual's attitude toward using and the intention to use specific information systems or services (Davis, 1989). CC is known for its usefulness in many ways, including the fact that the user is not restricted by location, that it provides multiple opportunities to learn new software tools, and that it allows users to access a variety of hardware and software resources that they do not own (Sharma et al., 2016). Previous research suggests that perceived usefulness and ease of use have a significant positive effect on the intention to use CC services (e.g., Park et al., 2014; Sharma et al., 2016). Bearing this in mind, we formulated the following hypotheses:

H2: Perceived ease of use positively affects users' willingness to use CC services.

H3: Perceived usefulness positively affects users' willingness to use CC services.

H4: Perceived ease of use mediates the relationship between the favorable social norm and users' willingness to use CC services.

H5: Perceived usefulness mediates the relationship between the favorable social norm and users' willingness to use CC services.

3. Research methodology

The present study used the convenience sampling technique to carry out empirical research. Although the convenience sampling technique demonstrates certain limitations concerning the generalization issues, this sampling technique is an appropriate and pragmatic sampling approach when researchers focus on the target population directly accessible and willing to participate in a survey (Etikan et al., 2016). Data collection was performed in December 2020 and January 2021 via an online survey. At the end of the survey period, we collected 125 completed and valid responses. The profile of the respondents is presented in Table 1. In terms of CC services used, the most prominent CC service used by participants in this study is Software as a Service (83.2%). One-third of the participants are Platform as a Service users, and every fifth participant has experience of using Infrastructure as a Service.

Table 1 Sample profile

Characteristic	Frequency	Percentage
Gender		
Male	65	52.0
Female	60	48.0
Age		
Under 30	59	47.2
31- 40	37	29.6
Over 40	29	23.2
Education		
High school	47	37.6
Undergraduate	29	23.2
Graduate (Master's degree and PhD degree)	49	39.2
Type of the cloud computing service used		
Software as a Service users	104	83.2
Platform as a Service users	39	31.2
Infrastructure as a Service users	27	21.6

Source: Research results

The items included in the questionnaire were derived from previous studies. Survey items were adapted from previous studies encompassing social influence (Lu, 2014; Venkatesh et al., 2003), perceived ease of use (Sharma et al., 2016), perceived usefulness (Sharma et al., 2016), and willingness (Sharma et al., 2016). We modified all items to satisfy the purpose of the current study, i.e., whether social influence, perceived ease of use, and perceived usefulness affect users' willingness to use CC services. A 5-points Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree") was used for all items. We employed Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyze the measurement model and test the research hypotheses through a structural model. PLS-SEM is particularly attractive when researchers are interested in testing research models with small samples and non-normal distribution of data (Sarstedt et al., 2017). In the present study, Smart PLS 3.3.3. was employed to perform PLS-SEM analysis.

4. Results and discussion

Assessment of the measurement model. We assessed the internal consistency of the used scales by Cronbach's alpha coefficient. According to Hair et al. (2016), Cronbach's alpha values should not be below 0.7. In our case, values of Cronbach's alpha ranged from 0.789 to 0.893, indicating the internal consistency (reliability) of the used measurement scales. Convergent validity was assessed by the following statistical criteria: item loadings, the average variance extracted (AVE), and composite reliability (CR). Factor item loadings were above the recommended value of 0.7 (Sarstedt et al., 2017) for all but two items (see Table 2). As suggested by Hair et al. (2016), indicators with factor loadings between 0.40 and 0.70 are acceptable if the AVE and CR values are above the threshold. Moreover, all AVE values were higher than 0.5 (Sarstedt et al., 2017), indicating that all measures exhibit an adequate level of convergent validity. Moreover, CR values were satisfactory, ranging from 0.782 to 0.891. The results indicated that convergent validity was achieved and that all items (manifest variables) were linked to their respective latent variable well.

Table 2 The results of measurement models

Construct	Code	Item	Factor loading	Cronbach's alpha	CR	AVE
Social influence (SI)				0.814	0.806	0.518
	SI1	People around me believe that it is a good idea to use CC services.	0.744			
	SI2	People around me encourage me to use CC services.	0.701			
	SI3	The media encourages me to use CC services.	0.501			
	SI4	IT experts encourage me to use CC services.	0.882			
Perceived ease of use (PEOU)				0.789	0.782	0.568
	PEOU1	I think learning how to use CC is easy.	0.915			
	PEOU2	Learning how to use CC services require less mental efforts.	0.396			
	PEOU3	I think CC services are easy.	0.843			
Perceived usefulness (PU)				0.893	0.891	0.733
	PU1	I think CC services improve my performance.	0.791			
	PU2	I think CC services improve my productivity.	0.833			
	PU3	I think CC services are useful for my overall work.	0.938			
Willingness (WILL)				0.866	0.886	0.723
	WILL1	I am using CC services.	0.760			
	WILL2	I recommend the use of CC services to peers.	0.834			
	WILL3	I will be using CC services in the future.	0.946			

Note: Reliability and validity tests by using Smart PLS® 3. 3.3.
Source: Research results

Discriminant validity was evaluated using the following three statistical criteria: cross-loadings, the Fornell-Larcker criterion, and the Heterotrait-monotrait (HTMT) ratio of correlations criterion (Henseler et al., 2015). First, factor loadings for each item linked to the latent variable were greater than those of other latent variables. Second, the square root of each construct's average variance extracted (AVE) was higher than correlations between constructs (Fornell & Larcker, 1981). Third, as shown in Table 4, the HTMT ratio values ranged from 0.372 to 0.691, which are lower than the threshold value of 0.85 (Sarstedt et al., 2017). Moreover, we utilized a complete bootstrapping procedure to evaluate the distribution of HTMT statistics. As shown in Table 4, the confidence interval calculated from 5,000 bootstrap samples confirms that neither lower nor upper 95% percentile confidence interval (CI) includes a value of one. Hence we established the discriminant validity of the constructs used in our study.

Table 3 Correlations and the average variance extracted

Constructs	Mean	SD	SI	PEOU	PU	WILL
Social influence (SI)	0.814	0.036	0.719			
Perceived ease of use (PEOU)	0.789	0.041	0.411	0.754		
Perceived usefulness (PU)	0.893	0.027	0.480	0.437	0.856	
Willingness (WILL)	0.886	0.024	0.706	0.555	0.553	0.850

Note: The square root of the average variance extracted (AVE) of each construct are values in the diagonal; below the diagonal line are correlation values.
Source: Research results

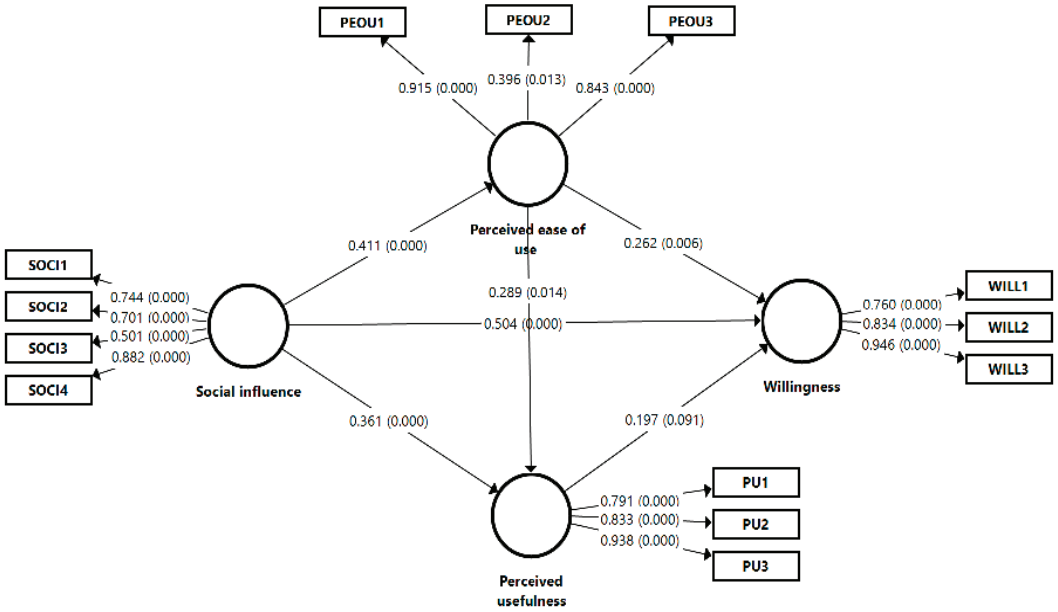
Table 4 Discriminant validity by HTMT values

	SI	PEOU	PU	WILL
Social influence (SI)	-			
Perceived ease of use (PEOU)	0.372 CI 95 (0.201 – 0.479)	-		
Perceived usefulness (PU)	0.466 CI 95 (0.313 – 0.607)	0.412 CI 95 (0.213 – 0.611)	-	
Willingness (WILL)	0.691 CI 95 (0.561 – 0.798)	0.557 CI 95 (0.383 – 0.707)	0.547 CI 95 (0.341 – 0.712)	-

Source: Research results

Furthermore, we used the variance inflation factors (VIF) to assess the degree of multicollinearity among constructs of interest. The PLS collinearity statistics revealed that the inner VIF values are between 1.000 and 1.427, which is above the threshold of 3.3 (Kock & Lynn, 2012). Therefore, the results confirmed that there are no multicollinearity issues in our data. Figure 1 depicts the Smart PLS output of the measurement and structural model.

Figure 1 Smart PLS output of the measurement and structural model



Source: Researchers' own findings

Assessment of the structural model. We assessed the structural model using the coefficients of determination (R^2) and an effect size (f^2), as suggested by Hair et al. (2017). The coefficient of determination (R^2) for willingness to use CC services was 0.604, indicating that 60.4% of the variation in willingness to use cloud computing services is explained by social influence, perceived ease of use, and perceived usefulness. In

terms of an effect size, the f^2 values above 0.35, 0.15, and 0.02 can be considered strong, moderate, and weak, respectively (Hair et al., 2017). In our model, two hypothesized relationships (H2 and H3) were supported. Still, the effect size (f^2) indicated a moderate effect of perceived ease of use on perceived usefulness and a weak effect of perceived ease of use on willingness to use CC services. The finding indicates that perceived ease of use is significantly related to perceived usefulness (H2) and willingness to use CC services (H3), but the impact is weak.

As presented in Table 5, most hypothesized paths are statistically significant. A favorable social norm towards CC services produces a positive and statistically significant effect on perceived ease of use ($\beta = 0.411$, $p < 0.001$), perceived usefulness ($\beta = 0.361$, $p < 0.001$), and willingness to use CC services ($\beta = 0.504$, $p < 0.001$), which supports H1a, H1b, and H1c. Furthermore, H2 was validated ($\beta = 0.289$, $p < 0.005$), but the f^2 effect size indicated a moderate effect of perceived ease of use on perceived usefulness ($f^2 = 0.099$; $p < 0.005$). This finding is consistent with the study conducted by Mariani et al. (2021), in which they established a positive link between perceived ease of use of CC services and perceived usefulness of CC services. Similarly, H3 was supported ($\beta = 0.228$ $p < 0.01$), but the impact of perceived ease of use of CC services on willingness to use CC services is relatively small ($f^2 = 0.133$; $p < 0.01$). In contrast, we did not validate the direct effect of perceived usefulness on willingness to use CC services ($\beta = 0.197$ $p > 0.01$). As a result, hypothesis H4 was not supported. This finding contradicts earlier research that found perceived usefulness to be an important driver of technology and information system adoption (e.g., Mariani et al., 2021; Md Noh & Amron, 2021; Sharma et al., 2016).

Table 5 Hypothesized paths are statistically significant

Hypothesis	Hypothesized path	Path coefficient	t-value	f^2 effect size	95% CI	Hypothesis analysis
H1a	SI → PEOU	0.411***	5.003	0.203	(0.251, 0.578)	Supported
H1b	SI → PU	0.361***	3.945	0.155	(0.177, 0.535)	Supported
H1c	SI → WILL	0.504***	5.812	0.469	(0.333, 0.669)	Supported
H2	PEOU → PU	0.289**	2.509	0.099	(0.055, 0.510)	Supported[a]
H3	PEOU → WILL	0.262**	2.899	0.133	(0.097, 0.457)	Supported[a]
H4	PU → WILL	0.197	1.622	0.070	(-0.056, 0.415)	Not supported

Note: ***$p < 0.01$; **$p < 0.05$: [a]f^2 values below 0.15 indicating a weak effect
Source: Research results

To test the mediating role of perceived ease of use and perceived usefulness, as suggested by Hair et al. (2016), we assessed the multiple mediation model. By considering the mediating roles of perceived ease of use and perceived usefulness simultaneously in one model, we are able to gain valuable insight into the mechanisms through which social influence affects users' willingness to use cloud computing services.

Table 6 Results of mediation analysis

Hypothesis	Hypothesized path	β	t-value	95 % CI	Hypothesis analysis
H5	SI → PEOU →WILL	0.107***	2.411**	(0.05, 0.039)	Supported
H6	SI → PU → WILL	0.071	1.451	(-0.008, 0.188)	Not supported

Source: Research results

Regarding the indirect effect of favorable social norms on willingness to use CC services mediated by perceived ease of use, we found that this effect is positive and statistically significant ($\beta = 0.107$; $p < 0.05$). However, the hypothesized indirect effect of social norms on willingness to use CC services me-

diated by perceived usefulness was positive but statistically insignificant. Thus, our findings suggested that perceived ease of use is a mediator between social norms and users' willingness to use CC services. Our results also indicate that perceived usefulness of CC services does not display a significant effect on users' willingness to use CC services.

5. Conclusion

The present study advances our understanding of the role of social influence and individual perceptions of technology (i.e., usefulness and ease of use) in the intention to use technology in the cloud computing context. Among the analyzed predictors (social influence, perceived usefulness, perceived ease of use), we found that social influence has the highest impact on individuals' willingness to use CC services. In addition, our findings suggest that social influence has an impact on an individual's decision to use CC services through the perception of easiness of using CC services. In the context of CC services, perceived usefulness does not significantly affect an individual's decision to use CC services. Moreover, perceived usefulness does not have a mediating role in the link between social impact and an individual's intention to use CC services.

The theoretical implications of the current study are twofold. First, this study sheds light on the mechanism by which social influence plays an essential role in driving users' willingness to use CC services. This study explains that social influence drives users' willingness to use CC services through users' perception of ease of use. Second, this study adds to current knowledge of the application of the TAM model in the context of CC services. Although previous research suggests that the TAM can be used to explain technology acceptance in different settings (e.g., Davis, 1989; Gangwar et al., 2015; Sharma et al., 2016), our study does not confirm the importance of perceived usefulness in predicting users' intention to use CC services. Our study suggests that individuals tend to prioritize ease rather than usefulness of CC services when deciding to use CC services.

This study informs service providers and organizational users of potential paths for increasing individual users' acceptance of CC services. Given the significance of the social impact on an individual's propensity to utilize CC services, organizations and service providers can inform potential users about the advantages of CC services via members of reference groups (e.g., friends, colleagues, mentors, etc.). Informed consumers will grasp the benefits of engaging in CC services and develop more positive views about them, resulting in their desire to utilize CC services. Additionally, service providers should bear in mind that customers have a propensity to jump on the bandwagon when it comes to CC services. The bandwagon effect is a well-documented phenomenon associated with the adoption and use of new technologies such as mobile phones, social networking sites, online films, and movies (Wang et al., 2019), and therefore plays a critical role in the dissemination of CC services.

This study has several limitations. First, it does not distinguish social influence of various reference groups (family members, friends, co-workers) who may impact users' intention to use CC services differently. Second, the study does not differentiate an individual's willingness to use CC services among three service models (Infrastructure as a Service - IaaS, Platform as a Service - PaaS, and Software as a Service - SaaS). Since perceived ease of use and usefulness differ between different service models, future studies focusing on one service model (e.g., SaaS) are welcome. Third, the present empirical research was carried out at a single point in time, and it does not capture the idea that users' attitudes and behaviors can change over time. Therefore, future studies should focus on behavioral change over time in the context of individuals' willingness to use CC services.

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RELATIONSHIP BETWEEN PERCEIVED ORGANIZATIONAL SUPPORT, JOB CRAFTING, AND JOB PERFORMANCE: A MEDIATED MODEL*

Abstract

Purpose: This study discusses perceived organizational support, job performance, and job crafting, and aims to determine the relationships between these variables with a mediated model.

Methodology: In line with the purpose of the study, a literature review was first carried out and research hypotheses were developed based on both theoretical and empirical findings. The data required to test the hypotheses (222 data) were obtained from a company operating in the manufacturing sector in Konya (Turkey). Data were analyzed using the SPSS, AMOS, and PROCESS Macro software.

Results: The analysis showed that perceived organizational support positively affects job crafting and job crafting positively affects job performance. Furthermore, job crafting was observed to have a mediating role in the effect of perceived organizational support on job performance.

Conclusion: Perceived organizational support increases job performance both directly and indirectly. Therefore, the perception of support in the organization increases job crafting and ultimately job performance.

Keywords: Perceived organizational support, job crafting, job performance

1. Introduction

Performance is an important criterion for organizations to reach their goals and continue their lives (Gavrea et al., 2011). For this reason, the concept of performance has attracted the attention of both academics and administrators through time, and there have been attempts to determine the individual and organizational factors that determine performance. Findings of subsequent studies have revealed that many variables originating from the individual and the organization such as personality (Bakker et al., 2012), motivation (Shahzadi et al., 2014), organizational trust (Biswas & Kapil, 2017), ethical climate (Büte, 2011), psychological empowerment (Chiang, & Hsieh, 2012), perception of justice (Chien et al., 2010), job stress (Fonkeng, 2018), work engagement (Bakker et al., 2012), and job satisfaction (Miao & Kim, 2010) affect employee performance. Therefore, each study has attempted

* This study was obtained from the first author's master's thesis in Turkey under the supervision of the second author.

to answer questions such as "What can be done to improve employee performance? What characteristics make employee performance higher? What kind of work environment should be offered to the employees so that they can fulfill what is expected of them and even go beyond it?", and has partially answered these questions with satisfactory findings. This study tried to find the answers to these questions and discussed the concepts of perceived organizational support and job crafting, which are two variables that affect work performance.

Perceived organizational support is the situation in which a colleague meets the needs and expectations of the organization of which they are a member and feels valued. This feeling allows important outcomes that benefit work and the organization such as decreased cynical attitudes of employees and increased organizational identification and attachment to the organization (Kerse & Karabey, 2019). Additionally, the employee feeling that they are supported in the organization promotes job crafting behavior (Kim et al., 2018). Job crafting involves employees making changes in their work for different individual or organizational purposes and making their work suitable and meaningful for themselves. This enhances employees' positive emotions, psychological well-being, the level of attachment to work, job satisfaction, citizenship behavior (Kerse, 2019a), and work performance, which this study focuses on (Miraglia et al., 2017).

This study, which focuses on the impact of perception of organizational support of manufacturing sector employees on business performance through job crafting, is expected to contribute to the literature in three ways. Firstly, there are limited studies on job crafting in the national literature (Kerse, 2017; Kerse, 2019a); therefore, it was thought that studies on the subject should be carried out in Turkey and additions should be made to the precursor and successor variables of job crafting. Secondly, this study is the first in Turkey to address the relationship between job crafting and job performance, although such studies exist in the international literature. Finally, although dual relationships between the variables used in the study were discussed in different studies (Ingusci et al., 2016; Park et al., 2020; Turunç & Çelik, 2010; Chiang & Hsieh, 2012; Leana et al., 2009; Bakker et al., 2012), the variables of perceived organizational support, job crafting, and work performance were discussed together for the first time in this study and their relationships were examined. For these reasons, the study is expected to contribute to both national and international literature.

2. Theoretical framework and hypotheses

2.1 Perceived organizational support

Eisenberger et al. (1986) were the first to coin the concept of "organizational support" in the literature. These researchers defined organizational support as employees' level of perception and belief that organizations value the contributions of employees to their work and care about their well-being (Eisenberger et al., 1986). In the following years, this definition was used as a reference and various definitions of the term were made in this direction. Looking at these different definitions of perceived organizational support, it can be said that the common denominator expresses the general opinion of employees as to whether organizations value the efforts and contributions of employees, care about their levels of well-being, and meet their needs (Kerse & Karabey, 2019).

It is possible to explain perceived organizational support with social exchange theory (Blau, 1964). Social exchange theory was put forward by Blau (1964). According to this theory, interactions between employees and the continuation of these interactions depend on the existence and alteration of mutually valuable things (Kerse & Karabey, 2019). If the organization values the employee, considers their well-being, and carries out practices accordingly (what the employee considers valuable), the employee also makes more efforts to achieve the objectives of the organization (what the organization considers valuable) and carries out activities that will ultimately achieve that goal (Eisenberger et al., 1990). Therefore, in line with social exchange theory, employee perceptions of support bring along many positive outcomes. In other words, the perception of support by employees in the organizational environment increases their job satisfaction (Côté et al., 2021), organizational commitment (Wu & Liu, 2014), identification with the organization (Edwards & Peccei, 2010), citizenship behaviors (Wu & Liu, 2014), and work engagement (Gokul et al., 2012), while reducing turnover intentions (Arshadi, 2011), silence behavior, (Akçin et al., 2017), and cynical attitudes (Biswas & Kapil, 2017). Therefore, it can be said that the perception of support is important for achieving organizational objectives and continuing life.

2.2 The relationship between perceived organizational support and job crafting

Job crafting refers to the changes and arrangements that employers make in their work in order to adapt their work to them. In other words, job crafting in-

volves employees organizing their work according to their personal interests, needs, expectations and abilities for different purposes and ultimately harmonizing their work with them. This concept was first discussed by Kulik et al. (1987). The researchers stated in their study that the work being done should involve employees, and that they should be able to redesign their work on their own initiative from time to time without approval of the managers, therefore describing job crafting as it is used today.

Job crafting has an in-depth view of what changes employees undergo to improve their performance and well-being (Bruning & Campion, 2019). From this point of view, employees change the tasks and relationships in their work on their own initiative (Hetland et al., 2018). This change becomes part of the work, leading the work to be organized according to individual goals and needs (Bruning & Campion, 2019).

Individual and organizational factors play a decisive role in employees exhibiting job crafting behavior. Individual factors such as self-efficacy (Golparvar & Khafi, 2021; Kanten, 2014; Kim et al., 2018), person-organization fit (Koçak, 2018), personality (Bell & Njoli, 2016), personal initiative (Tims et al., 2012), adaptation to change (Lyons, 2008), workaholicism (Hakanen et al., 2018), and employee engagement (Tims et al., 2015) are positively associated with job crafting. It can be said that organizational factors such as leadership (Kerse & Babadag, 2019), job characteristics (Petrou, 2013), and organizational objectives (Lyons, 2008) are a decisive factor in job crafting. Another variable that determines the emergence of job crafting behavior is perceived organizational support.

It is possible to explain its relationship with job crafting behavior, which is a positive result of perceived organizational support, using the conservation of resources theory. This theory suggests that individuals attempt to obtain and conserve resources. According to the theory, individuals always tend to get more resources than they have (Hobfoll, 1989). Therefore, when organizations take individually and socially supportive actions such as respecting their employees and increasing seniority, they strive to increase their success in their work and can take more individual responsibility and make some positive changes in their business processes (Kim et al., 2018). As a matter of fact, studies in the literature have revealed findings that support this claim. For example, a study conducted by Kim et al. (2018) found that employees' perceptions of organizational support had a positive effect on task crafting, relational crafting and cognitive crafting behaviors. Ingusci et al. (2016) conducted a study on teachers and found a positive relationship between perceived organizational support and job crafting. Park et al. (2020) concluded in their study on human resources experts that the effect of organizational support on job crafting was statistically significant and positive. Based on these views, the following hypothesis was developed:

H_1: Perceived organizational support has a positive effect on job crafting.

2.3 The relationship between perceived organizational support and job performance

Performance is the indicator of the gains made by employees as a result of their efforts to perform their tasks (Büte, 2011). Job performance is defined as direct or indirect contributions of employees to the goals of organizations (Fonkeng, 2018). In other words, job performance is the actions and behaviors that employees consciously exhibit to contribute to the goals of the organization to which they belong (Chien et al., 2010). These actions and behaviors by employees include material or intangible results that affect the success and performance of their organizations (Anitha, 2014). Therefore, job performance relates to what employees do or do not do when performing their tasks (Shahzadi et al., 2014).

From a general point of view, employee performance is considered to be the most important output in the organization. Therefore, employees, who are the determinants of performance, play a critical role in the success of organizations. Job performance is seen as the main building block of organizations operating with a focus on service and production. Thus, it is expected to remain an important output in the future (Khtatbeh et al., 2020). It is hence important to determine which variables contribute to improving employee performance and which variables hinder it. Although there are many individual and organizational variables that affect job performance, organizational support is one of the most important perceptual variables.

The relationship between organizational support and job performance can be explained within the scope of Blau's (1964) "social exchange theory". According to social exchange theory, if a person exhibits behavior that benefits another, the receiving party is also obliged to do so (Cetin & Senturk, 2016). When this theory is reflected in business life, employees exhibit loyalty and performance to the extent that they believe that the activities carried out by the organiza-

tion are beneficial for them. The main determinant of the beginning of social exchange between the organization and the employee is that the organization supports and invests in the employee. In this context, support provided by organizations to employees can improve their performance. Studies examining the relationship between organizational support and job performance have obtained results that indicate this. For example, Turunç and Çelik (2010) concluded in their study on small business employees that perceived organizational support positively and meaningfully affects job performance. In their study conducted on teachers, Işık and Kama (2018) observed that perceived organizational support has a positive effect on teacher performance. Mioa and Kim (2010) concluded in their study that job performance is positively related to perceived organizational support. In another study, Chiang and Hsieh (2012) found that organizational support positively and meaningfully affects job performance. Based on these views, the following hypothesis has been developed:

H_2: Perceived organizational support has a direct positive effect on job performance.

2.4 The relationship between job crafting and job performance

Job crafting refers to the actions that employees take with the aim of making improvements in their work by making some changes. Employees exhibit job crafting behavior to increase the meaningfulness of their work for themselves, have a positive business identity, increase their well-being and performance levels, and make their jobs more compatible with themselves (Tims & Parker, 2020). Their job crafting behavior can enable them to develop methods that include some autonomy in their work and subsequently increase their performance by adapting to their work.

We can explain the relationship between job crafting and job performance by Hobfoll's (2001) conservation of resources theory. Employees can more easily meet what their job demands from them by increasing their resources in the job through job crafting behavior. This allows them to perform more, protecting them from stress, burnout, and exhaustion. Furthermore, employees are willing to use all their skills in their work when existing work resources are sufficient to cope with job demands (Miraglia et al., 2017).

Job crafting is a concept that generally improves job performance. Many studies have been carried out on these two variables. Leana et al. (2009) found that teachers' job crafting behaviors reflected positively in their job performance. In their study, Bakker et al. (2012) found that employees were able to proactively improve their performance to the extent that they could regulate their work environment. In another study, Ince and Özbozkurt (2019) found that job crafting significantly affects job performance. Based on these findings and explanations, the following hypothesis was developed**:**

H_3: Job crafting has a positive effect on job performance.

2.5 The mediating role of job crafting

As mentioned earlier, employees' perceptions of organizational support increases their job crafting levels (Kim et al., 2018; Ingusci et al., 2016; Park et al., 2020; Kim et al., 2018) and job performance (Arshadi & Khaavi, 2013; Chiang & Hsieh, 2012; Turunç & Çelik, 2010). However, employee job crafting levels also improve their job performance (Leana et al., 2009; Miraglia et al., 2017). Therefore, it can be stated that perceived organizational support can indirectly affect job performance. In other words, job crafting can have a mediating role in this effect. Although there are no studies in the literature that examine these variables and their relationship together, there are studies showing that job crafting can be a mediator in a model with different variables (Sen & Dulara, 2017; Opea et al., 2019). In line with these findings and explanations, the following hypothesis regarding mediation was developed:

H_4: Job crafting has a mediating role in the effect of perceived organizational support on job performance.

3. Research method

The Karamanoğlu Mehmetbey University Scientific Research Publication Ethical Committee granted Ethics Committee approval for this study dated 26 May 2021 under No. 61-70.

3.1 Research purpose and sample

This study examined whether the perception of organizational support in the manufacturing sector affects job performance and, if it does, whether job crafting plays a mediating role. In line with this, the study attempted to answer questions such as: To what extent and how does the perception of support from the organization of which the employees are members affect their job crafting? To what extent and how do employees' perceptions of organizational support affect their performance? Do employee job crafting behaviors improve their job performance? Does job

crafting play a role in the effect of the perception of support on job performance?.

The sample consists of employees working in a factory in the manufacturing industry in Konya. The intense work pace present in the manufacturing industry has led the study to examine the variables of perceived organizational support, job crafting, and job performance and the relationship between them within the context of this industry. Therefore, data were collected from employees in the industry with the survey method. The company employs 340 employees. Calculations regarding sample size were made and it was determined that 181 individuals were sufficient for representability (with a 95% confidence level)[1]. Using this as a reference, 248 surveys were sent to employees in the manufacturing industry using the simple random sampling method, and 228 of them were returned. There were data losses in 6 surveys, therefore, analyses were carried out on 222 surveys. Of the 222 surveys, male employees were more likely than women (89.2%) to be in the industry, and the rate of single employees was slightly higher (50.09%) than the rate of married people. Based on age-related data, it was determined that the proportion of employees between the ages of 26 and 35 was higher (44.01%), and that the majority of employees had 1-4 years of work experience (33.8%). Their education status revealed that the majority were high school graduates (52.3%).

3.2 Scales used in the research

The study utilized the survey method to collect data. The items in the survey were measured by a Likert-type scale (from 1 - strongly disagree to 5 - strongly agree).

Perceived Organizational Support: A scale of 10 questions developed by Eisenberger et al. (1986) and later used by Armstrong-Stassen and Ursel (2009) was used to measure participants' perceptions of organizational support. Reliability and validity of the organizational support perception scale was examined by Turunç and Çelik (2010). In Turunç and Çelik's study (2010), it was observed that the Cronbach alpha coefficient of the scale was 0.880, and that met the criteria for validity.

Job Performance: The job performance scale was first developed by Kirkman and Rosen (1999) and later used by Sigler and Person (2000). The scale contains four (4) items. For this study, the original scale was referenced and scale items were arranged within the context of the manufacturing industry. Reliability and validity of scale items were examined in Çöl's (2008) study and deemed reliable due to the Cronbach alpha coefficient being 0.828. Additionally, criteria regarding its validity have been provided in the study.

Job Crafting: The scale developed by Slemp and Vella-Brodrick (2013) and adapted to Turkey by Kerse (2017) was used to measure job crafting. The scale consists of 15 expressions and 3 sub-dimensions: task crafting, cognitive crafting and relational crafting. In the analysis of the scale, Kerse (2017) suggested that the Cronbach alpha coefficient and validity values met the reference criterion, both dimensional (0.757; 0.860; 0.844) and scale overall (0.918).

3.3 Statistical methods used in the research

The data obtained in the study were analyzed using the SPSS and AMOS package programs. Reliability analysis, exploratory and confirmatory factor analysis, and correlation analysis were performed using these programs. In addition, the SPSS PROCESS Macro plug-in was used for testing hypotheses. The normal distribution conformity test was performed before data analysis. In this respect, skewness and kurtosis values of the variables were examined and it was determined that the assumption of normality was achieved by confirming that these values ranged between -3 and 3 (Sposito et al., 1983), which can be seen in Table 3.

The Cronbach alpha reliability criterion, which demonstrates the internal consistency of the scale, was used to test the reliability of the scales involved in the study. The Cronbach alpha coefficient of 0.70 and above was taken into consideration. The items with a total score correlation of less than 0.30 were removed from the scale. As a result of the analyses, the total score correlation of the three (3) items on the perceived organizational support scale was excluded from the analysis its value less than 0.30. Therefore, other analyses were carried out using seven (7) items. In terms of reliability analysis, it was determined that the scales of perceived organizational support (0.923), job crafting (0.936) and job performance (0.911) were reliable.

3.4 Factor analysis of scales

Exploratory and confirmatory factor analyses were performed on the scales to analyze the structure validity of the scales used in the study. In exploratory factor analysis, it was ensured that the lowest values of factor loads were 0.40 and above. The items below this value were not analyzed. The KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy)

1 https://www.surveysystem.com/sscalc.htm

is based on sample adequacy of 0.60 and above, and the significance of Bartlett's globality test being <.05. Furthermore, the compatibility of the factor structure found as a result of exploratory factor analysis was tested with validating factor analysis and it was ensured that the standardized regression loads of the items were not less than 0.50. In the factor analyses made in this direction, it was determined that all scales met the reference criteria (see Table 1 and Table 2).

Table 1 Exploratory and confirmatory factor analysis findings

Exploratory Factor Analysis					Confirmatory Factor Analysis
Scales	**Factor Loads**	**Eigenvalue**	**Explained Variance**	**Total Variance**	**Factor Loads**
POS					
POS1	.682	4.823	68.900	68.900	.76
POS2	.775				.82
POS3	.732				.85
POS4	.718				.84
POS5	.536				.67
POS6	.698				.79
POS7	.682				.79
JC					
JC-TC1	.708	8.219	54.795	68.279	.71
JC-TC2	.671				.81
JC-TC3	.643				.73
JC-TC4	.643				.69
JC-CC1	.715	1.084	7.227		.83
JC-CC2	.597				.73
JC-CC3	.673				.79
JC-CC4	.720				.79
JC-CC5	.681				.76
JC-RC1	.669	.939	6.258		.79
JC-RC2	.738				.79
JC-RC3	.810				.45
JC-RC4	.649				.71
JC-RC5	.657				.82
JC-RC6	.668				.83
JP					
JP1	.777	3.160	79.002	79.002	.87
JP2	.818				.92
JP3	.790				.77
JP4	.774				.75

POS: Perceived Organizational Support; JC = Job Crafting; TC: Task Crafting; CC = Cognitive Crafting; RC = Relational Crafting; JP = Job Performance
Source: Authors' calculations

Table 2 Scale fit index results

Indexes	Reference value	POS	JC	JP
CMIN/DF	0< χ2/sd ≤ 5	1.875	1.959	.356
CFI	≥.90	.991	.963	1.000
RMR	<.1	.047	.046	.002
IFI	≥.90	.991	.963	1.000
TLI	≥.90	.983	.951	1.000
RMSEA	<.05-.08≤	.063	.066	.000

Source: Authors' calculations

3.5 Hypothesis testing

Before analyzing research hypotheses, correlation analysis was performed to determine the magnitude and direction of the relationship between perceived organizational support, job crafting, and job performance. The findings are presented in Table 3.

Table 3 Relationships between variables and normality values

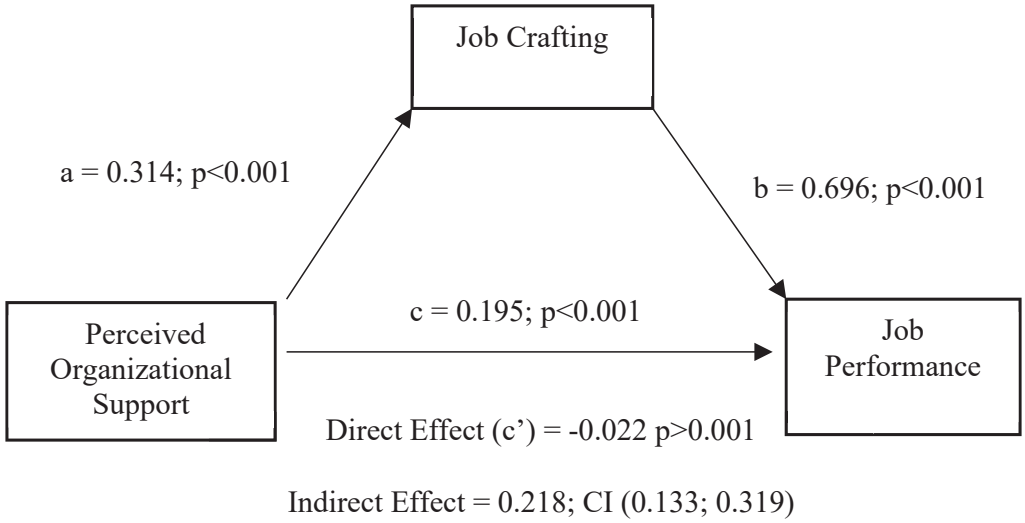
Variables	Mean	S.D.	POS	JC	JP	Skewness	Kurtosis
POS	3.20	1.131	1			-0.152	-0.296
JC	4.11	.787	.443**	1		-1.322	2.382
			.000				
JP	4.40	.801	.276**	.683**	1	-2.071	5.498
			.000	.000			

POS: Perceived Organizational Support; JC= Job Crafting; TC: Task Crafting; CC= Cognitive Crafting; RC= Relational Crafting; JP= Job Performance
Source: Authors' calculations

The relationships between the variables in Table 3 reveal that there is a moderate positive relationship between perceived organizational support and job crafting (r=.443), a low-level positive relationship between perceived organizational support and job performance (r=.276), and a good positive relationship between job crafting and job performance (r=.683).

The hypotheses were tested after identifying the relationships between the study variables. The basic hypotheses and the mediation hypothesis have been tested in line with the established model using PROCESS Macro. X (perceived organizational support) refers to the independent variable, M (job crafting) refers to the mediating variable, and Y (job performance) refers to the dependent variable in the mediating variable model. In order for variable M to assume the role of a mediating variable, there needs to be a significant regression relationship between X and Y, X and M, and M and Y, respectively. For this reason, the paths a, b, and c should be statistically significant in terms of regression relationships (Hayes, 2013). The findings obtained in the study after the use of these criteria as a reference and their analysis are given in Figure 1.

Figure 1 Findings of the hypothesis test



Source: Authors' calculations

Figure 1 reveals that organizational support statistically does not directly and significantly predict job performance (β=-0.022; p>0.001). In this respect, H_2 is not supported. The analysis revealed that organizational support had a positive effect on job crafting (β=0.314; p<0.01). This result indicates that H_1 is supported. According to another finding obtained in the analysis, job crafting has a positive and significant effect on job performance (β=0.696; P<0.01). Therefore, H_3 is also supported. Multiplying the effect coefficients in paths "a" and "b" yields the magnitude of the indirect effect. The indirect effect in the model (0.314×0.696) was found to be 0.218 (β=0.218; CI [.1333; .3195]). Furthermore, Figure 1 reveals that the direct effect is -0.0229 and is insignificant (p>0.001). Therefore, perceived organizational support has an indirect effect on job performance. In other words, organizational support has a statistically significant effect on job performance through job crafting. For this reason, H_4 is supported. Job crafting was identified as a full mediator in this model due to the significant relationship between organizational support and job performance, losing its significance when job crafting is included in the model.

4. Evaluation and results

This study attempted to determine whether perceived organizational support directly or indirectly (through job crafting) affects job performance. The findings of the study are presented below and evaluations were made.

The first of the findings obtained in the analyses reveals that organizational support affects job crafting positively and at a significant level. This finding is consistent with previous studies on organizational support and job crafting (Kim et al., 2018; Ingusci et al., 2016). Therefore, it was determined that the employees who thought they enjoyed support of their organization were more selfless in their work, took individual responsibilities, and made some changes, harmonizing them ultimately with their work.

According to another finding obtained in the study, job performance increases as job crafting behavior increases. This finding is similar to previous studies (Tims et al., 2015; Leana et al., 2009; Bakker et al., 2012). Therefore, employees are motivated to adapt their work to themselves with some changes they make in the process. The fact that the work is done in line with the knowledge, skills, abilities, and desires of the person also leads to high performance.

The last finding obtained in the study reveals that the perception of organizational support does not directly affect job performance, but does so indirectly through job crafting. In other words, employees' beliefs that their personal values and needs are valued in the organization make them organize and make changes in their work by acting proactively. The behavior of making these arrangements and changes aligns the employee's work with their needs and expectations. This allows them to do their job better to predetermined standards, improving their performance.

When the findings are examined holistically, the importance of employees' perceptions of support and their job crafting levels for improving job performance is clearly visible. Performance is one of the most important criteria for survival in past and currently existing organizations (Gavrea et al., 2011). Therefore, organizations and their representative managers should constantly investigate activities and practices that will improve the performance of employees - and hence the organizations - and attempt to make changes in the organization in this regard. This study revealed that improving performance at work and ultimately in the organization can be made possible by two important variables: the perception of support and crafting behaviors. Based on this finding, it is worth mentioning a few recommendations for managers who want to improve job performance. Managers should first tell their employees that they are supportive of them in all matters, turn to supportive behavior, and also ensure that the employees perceive this support. Because in addition to improving performance at work (Chiang & Hsieh, 2012), creating this perception allows employees to exhibit decreased cynical attitudes and behaviors towards the organization, adopt the organization as if it were their own organization, and devote themselves to its work (Kerse & Karabey, 2019). However, managers should give them the autonomy to make changes to the work they do as well as to create an organizational environment in which employees can organize their work based on personal interests and expectations. Creating this environment and ultimately the shift of the workforce towards crafting behaviors makes them fit with their work (Kerse, 2018) and more satisfied (Kerse, 2019b) as well as reduce boredom at work (Kerse, 2019a). More importantly, as seen in this study, it improves performance at work and therefore ensures that organizations maintain a competitive advantage and continue their lives.

To summarize the findings, the study obtained findings on the effect of manufacturing industry employees' perceptions of organizational support and job crafting behaviors that can guide organizations to influence job performance. Organizational support provided by organizations improves job performance because it increases happiness of employees and their motivation. However, this effect takes place with job crafting. Organizational support provided to the workforce enables them to exhibit job crafting behaviors, which is proactive behavior, and has an enhancing effect on their performance. Therefore, employees can be more efficient and productive by integrating their jobs with their own values and characteristics. This situation creates a working environment in which both sides are positively affected in an employee-organization context. Organizations achieve their objectives to the extent that they can maintain this positive working environment, which is ultimately reflected in the objectives of the organization.

Just like all other studies, this study has certain limitations. The first limitation is that the main sample of the study includes only employees working in the manufacturing industry in Konya. Another limitation is that the study consists of employees in only one industry and does not include employees working in other industries. Another limitation is the possibility that manufacturing industry employees cannot answer questions with sufficient care and attention due to the workload and the pandemic. Therefore, it may be recommended to conduct studies on employees under less workload after the pandemic.

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LEADER-MEMBER EXCHANGE AND UNETHICAL PRO-ORGANIZATIONAL BEHAVIOR: A MODERATED MEDIATION MODEL

Abstract

Purpose: In this study, drawing on social learning theory, a moderated mediation model was tested. This model examines organizational identification as the mediator and employee unethical tolerance as the moderator in relationships between leader-member exchange (LMX) and unethical pro-organizational behaviors (UPB).

Methodology: The research sample is comprised of 432 full-time employees of a private company operating in the service sector in Turkey.

Results: Consistent with the theoretical model, analysis results indicate that organizational identification mediated a positive relationship between LMX and UPB. Furthermore, results supported the moderated mediation model and showed that an indirect effect of LMX on UPB through organizational identification is stronger when EUT is high rather than low.

Conclusion: This study contributes to LMX and UBP literature by integrating research on organizational identification and employee unethical tolerance.

Keywords: Leader-member exchange, organizational identification, employee unethical tolerance, unethical pro-organizational behavior

1. Introduction

Unethical behaviors in organizations (e.g., fraud in accounting records, false or deceptive sales practices, violation of fair labor standards and human rights) have been the basis for many corporate scandals (e.g., the Enron scandal, the Volkswagen diesel emissions scandal, the Kobe Steel scandal) that are well-known to the public (Greenbaum et al., 2018; Treviño & Brown, 2005). These scandals have caused many billion-dollar companies to go bankrupt (e.g., Enron) or to suffer major losses (e.g., the Volkswagen case) (Umphress et al., 2010). While some of these scandals took place as a result of employees behaving unethically in their own interests

or to the detriment of the organization (Treviño et al., 2014), some of them are due to UPB (Umphress et al., 2010; Umphress & Bingham, 2011; Chen et al., 2016).

Researchers who examined the relationship between leadership and ethical behavior have supported the fact that leaders have an impact on ethical behavior of employees (Treviño et al., 1999; Effelsberg et al., 2014; Greenbaum et al., 2018). According to social learning theory (Bandura, 1971), individuals learn almost all their behaviors by observing, imitating, and finding role models (Bandura, 1971). Considering that employees see their managers as role models for the way they behave within the organization (Treviño & Brown, 2005), it is likely that employees with high-quality LMX will model unethical behaviors of their managers (Brown & Treviño, 2014). Employees may find it suitable for their own interest to imitate unethical behaviors of their managers (Greenbaum et al., 2018) because they receive more spiritual (e.g., social support, control, trust) and financial (e.g., decision-making autonomy, promotion, monetary support) resources through high-quality LMX (Tangirala et al., 2007).

According to Ashforth & Mael (1989), "people tend to classify themselves and others into various social categories, such as organizational membership, religious affiliation, gender, and age cohort" (p. 20). Workers in organizations may have different levels and types of identities. This study focuses on organizational identification in which individuals define themselves according to their membership in a particular organization. Organizational identification occurs when individuals use the defining characteristics of the organization to define themselves. Because employees perceived supervisors as an agent of the organization (Eisenberger et al., 2010), LMX should influence employees' identification with their organizations (Zhao et al., 2019). Previous studies (e.g., Riketta, 2005) have found that organizational identification is an important determinant of employee attitudes and behaviors towards the organization. From this point of view, organizational identification may be a potential mediator between LMX and UPB.

Furthermore, previous studies (e.g., Effelsberg et al., 2014; Greenbaum et al., 2018) show that employees with high-quality LMX are more likely to take their managers as a role model as to how they should behave and tolerate unethical practices within the organization. In this study, it is asserted that when employees overlook unethical business practices (i.e., they have a high level of unethical tolerance) with high-quality LMX, they are more likely to model themselves on their managers (Greenbaum et al., 2018), and that these employees are more likely to engage in UPB in comparison to those with low-quality LMX and low-level unethical tolerance.

The study aims to make some theoretical and practical contributions to the literature. First, drawing on social learning theory (Bandura, 1971), this study claims that LMX is an important determinant of employees' UPB. Previous studies have covered the effects of leadership on unethical behavior more within the scope of ethical leadership (e.g., Miao et al., 2019). Furthermore, very few studies have examined the effects of different types of leadership (transformational leadership, authentic leadership) on UPB (Effelsberg et al., 2014). In general, previous studies have found that employees ignore the direct impact of their exchange with managers on UPB, and to the best of my knowledge, no previous study has created a model which includes LMX, organizational identification, EUT and UPB together. Therefore, the findings of the current study are expected to help better understand previous studies on the relationship between leadership and UPB. Secondly, the findings of this study contribute to the discussion of whether high-quality LMX is always advantageous to organizations (e.g., Greenbaum et al., 2018; Bryant & Merritt, 2021). This study predicted that compared to employees with low-quality LMX, employees who have high-quality LMX are more likely to observe their managers and model themselves on their UPB. In line with this prediction, the study predicted that the positive effects of high-quality LMX can be reversed by role modeling of negative behavior causing behavior that is harmful to the organization. Third, the study predicted that organizational identification mediated the relationship between LMX and UPB. Thus, this study contributes to previous research (e.g., Treviño & Brown, 2004; Bryant & Merritt, 2021) on how LMX affects UPB by expanding on them. Finally, the study contributes to the literature on organizational ethics (Froelich & Kottke, 1991; Umphress et al., 2010) by predicting that EUT serves as an important boundary condition for the indirect effect of LMX on UPB. Thus, by expanding the organizational ethics literature, the study gives information about when and how EUT affects employees' UPB.

2. Theoretical background and hypotheses

2.1 LMX and UPB

The concept of LMX was explained by Graen & Uhl-Bien (1995) with a relationship-based approach. The relationship-based approach focuses on a dual relationship between the leader and the follower. According to the Graen & Uhl-Bien (1995), the leader does not interact with all of their followers in the same quality due to limited time and resources (Dansereau et al., 1975). By having high-quality exchange relationships with some followers referred to as in-group members, the leader gives them more resources, responsibility, support and rewards beyond their formal contracts (Scandura, 1999). High-quality exchange relationships between the leader and their followers are based on mutual trust and support (Scandura & Pellegrini, 2008), interpersonal attraction (Dansereau et al., 1975), and loyalty (Liden & Maslyn, 1998). On the other hand, the leader gives standard resources, responsibilities and rewards within the framework of official contracts to out-group members with whom they have lower-quality exchanges (Graen & Uhl-Bien, 1995).

Umphress & Bingham (2011) define UPB as "actions that are intended to promote the effective functioning of the organization or its members (e.g., leaders) and violate core societal values, mores, laws, or standards of proper conduct" (p. 622). They indicated that UPB is comprised of two elements. While the first element refers to presenting unethical behaviors such as violating hypernorms, the second element includes pro-organizational behaviors carried out for the benefit of the organization (Umphress et al., 2010; Umphress & Bingham, 2011). UPB has emerged as a special type of unethical behavior that has attracted the attention of organizational behavior researchers in recent years. However, in practice, UPB can be ignored, accepted, or encouraged by organizations because of its benefits to organizations. Studies have revealed that UPB will undermine the long-term interests of the organization and that certain structures generally thought to be beneficial to the organization, such as ethical leadership and transformational leadership, may encourage UPB under certain circumstances (Effelsberg et al., 2014; Miao et al., 2019).

Since leaders are important antecedents of employee attitudes and behaviors (Judge & Kammeyer-Mueller, 2012), they can help their employees establish "correct" standards of behavior in their organizations. Leaders have an important role in setting ethical standards in the organization, because they have the power to reward and punish employees to reinforce appropriate normative behavior (Treviño et al., 2000). Therefore, when employees observe their leaders engaging in unethical behaviors, they tend to think that they should do the same in an organizational context and cognitively convince themselves that such behavior is ethical (Zhang et al., 2018). Brown & Mitchell (2010) argued that the basis of unethical leadership questions whether leadership behavior encourages unethical behaviors or whether it is the source of followers' unethical behaviors. Some researchers (e.g., Effelsberg et al., 2014) have suggested that leaders' unethical behaviors can be modeled by employees through role model influence due to legitimacy or power of their position. This phenomenon can be better understood with social learning theory (Bandura, 1971), which argues that behavioral learning occurs more through observation. Namely, individuals observe the behaviors of others and the consequences of these behaviors in order to learn which behaviors are socially acceptable and appropriate. Thus, if a reliable role model (e.g., the manager or leader) engages in a specific behavior without negative consequences, the observer is likely to model that behavior (Kerse, 2019; Greenbaum et al., 2018). However, employees may sometimes be aware that the results will be negative, or that their actions are not ethical, and they may display some unethical behaviors just because their superiors have performed them, or in order to protect the resources they have (Zhang et al., 2018). Umphress & Bingham (2011) claimed that positive social exchange relations between managers and employees can encourage UPB. Considering that high-quality LMX represents a positive social exchange between parties (Graen & Uhl-Bien, 1995) and drawing on social learning theory, this study claims that the quality of exchange that managers develop with their subordinates is an important determinant of their UPB. Taken together, the following hypothesis is proposed.

Hypothesis 1: LMX is positively related to UPB.

2.2 The mediating role of organizational identification

Organizational identification is an important determinant used to explain work-related attitudes and behaviors (Riketta, 2005; Chen et al., 2016). There-

fore, organizational identification may be a potential mediator in the relationship between LMX and UPB. According to the group engagement model (Tyler & Blader, 2003), leaders increase the prestige of the members who follow them thanks to high-quality LMX (Liden & Maslyn, 1998). An employee who feels that his/her dignity has increased within the organization, increases his/her identification with the organization (Zhao et al., 2019), thus increasing the possibility of the employee engaging in extra role behavior such as UPB (Blader & Tyler, 2009). When employees identify with their organization, they define themselves as "good citizens" and act according to the interests of the organization (Zhao et al., 2019).

Umphress & Bingham (2011) claimed that organizational identification is an important antecedent of UPB. Organizational identification can allow employees to perceive UPB as behaviors that are necessary for the success of the organization. Ashforth & Mael (1989) considered organizational identification as a specific form of social identity. Tajfel (1974) states that social identity of an individual is "his knowledge that he belongs to certain social groups together with some emotional and value significance to him of his membership" (p. 72). In the light of this definition, employees who have high-quality LMX will feel valuable in the organization (Tyler & Blader, 2000) as they will receive more support, incentives, awards and resources beyond the provisions of the formal contract (Graen & Uhl-Bien, 1995). Therefore, it can be said that by seeing themselves as part of the organization, the probability of their identification with the organization will increase (Zhao et al., 2019). According to the group engagement model, LMX quality shapes employees' social identities and affects their attitudes and behaviors (Tyler & Blader, 2003). Employees with high-quality LMX see themselves as the elite and view their social identity accordingly. As stated previously, employees view managers as organizational agents (Eisenberger et al., 2010) and thus manifest their social identities within the organization by identifying with their organizations (Riketta, 2005). Employees who feel strong identification with their organization care more about the interests of the organization and do not hesitate to take risks for the benefit of the organization (Chen et al., 2016). Moreover, employees may engage in UPB that they know is not morally and/or legally appropriate, even if the consequences may be harmful to them (Umphress et al., 2010). The present study predicts that organizational identification may be a mediator in the relationship between LMX and UPB. It is therefore hypothesized that:

Hypothesis 2: The relationship between LMX and UPB is mediated by organizational identification.

2.3 The moderating role of EUT

Attitudes refer to individual evaluations of whether an object, concept or behavior is good or bad, pleasant or unpleasant (Ajzen & Fishbein, 2000). Unethical tolerance refers to employee attitudes about their tolerance for unethical practices in the organization (Froelich & Kottke, 1991). Some employees in organizations tolerate unethical behaviors (with high tolerance), while others may consider it to be unpleasant (low tolerance). According to Mudrack et al. (1999), individuals who are benevolent or relatively insensitive to injustice are likely to be more tolerant of unethical events. For example, some employees may have a higher tolerance of unethical behavior because they have worked in environments where unethical behavior had no negative consequences. Frequent repetition of unethical behaviors and the lack of any negative consequences may cause employees to perceive these behaviors as routine practices for performing tasks. Employees may even believe that unethical behavior is expected of them within the organization (Greenbaum et al., 2018).

Employees have specific responsibilities towards the organization, customers, shareholders, colleagues, and managers. As the number of these persons or institutions increases, so does the possibility of conflict between the parties (Froelich & Kottke, 1991). Previous studies (e.g., Greenbaum et al., 2018; Castille et al., 2018) have claimed that Machiavellian employees are more tolerant of UPB because Machiavellians believe that it is necessary to take unethical actions in order to protect the image of the organization and to gain personal benefit (Castille et al., 2018). As stated above, employee attitudes towards unethical organizational practices explain their tolerance of unethical situations (Mudrack et al., 1999). Individuals with a high tolerance of unethical situations try to perform unethical behavior and remain silent in case of unethical behaviors and events in their environment (Greenbaum et al., 2018). In line with these explanations, the present study predicts that EUT may be a moderator in the relationship between organizational

identification and UPB. For these reasons, the following hypothesis is proposed:

Hypothesis 3: The relationship between organizational identification and UPB is moderated by EUT, such that the positive relationship between organizational identification and UPB is weak when EUT is higher than when it is low.

The assumption that EUT can be a moderator in the relationship between organizational identification and UPB (H3) suggests a moderated mediation in which the indirect effect depends on the level of a moderator variable (Cole et al., 2008). Therefore, it is possible for EUT to conditionally affect the indirect impact of LMX on UPB through organizational identification. In other words, the indirect effect of LMX on UPB (via organizational identification) is assumed to be weaker when EUT is low, and stronger when EUT is high. Thus, the following hypothesis is proposed:

Hypothesis 4: EUT moderates the indirect effect of LMX on UPB through organizational identification, such that the indirect effect is weak when EUT is higher than when it is low.

Figure 1 Hypothesized research model

Source: Author

3. Methods

3.1 Sample and procedure

Research data was obtained from 432 full-time employees working at a private company operating in the service sector in Turkey by adhering to voluntary and confidential survey techniques. The surveys were sent to the organization managers by email, and distributed to the employees by the managers, then collected and shared to the researcher by email. The participants' mean age was 27.4 years, 58% of the participants were male, 58.4% had a bachelor's degree, and 41.8% had 4-6 years of organizational tenure with the leader. Finally, 92.4% of the participants were subordinates and others (7.6%) were managers.

3.2 Measures

Turkish versions of all measures were created by following Brislin's (1970) translation-back translation procedures to ensure the correct translation of all relevant items in the questionnaire.

LMX. LMX was measured using Graen & Uhl-Bien's (1995) seven-item LMX scale. Sample items include "My supervisor understands my problems and needs". Each item was assessed using a 5-point Likert-type scale (from 1-absolutely disagree to 5-absolutely agree). The scale coefficient was 0.95.

Organizational identification. Organizational identification was measured using Mael & Ashforth's (1992) six-item organizational identification scale. Sample items include "This organization's successes are my successes". Each item was assessed using a 5-point Likert-type scale (from 1-absolutely disagree to 5-absolutely agree). The scale coefficient was 0.87.

EUT. EUT was measured using Froelich & Kottke's (1991) 10-item EUT measure. Sample items include "It is sometimes necessary for the company to engage in shady practices because the competition is doing so". Each item was assessed using a 7-point Likert-type scale (from 1 - strongly disagree to 7 - strongly agree). The scale coefficient was 0.77.

UPB. UPB was measured using Umphress et al.'s (2010) six-item UPB measures. Sample items include "If it would help the organization, I would misrepresent the truth to make the organization look good". Each item was assessed using a 7-point scale (from 1-strongly disagree to 7-strongly agree). The scale coefficient was 0.90.

Control variables. Previous studies (e.g., Umphress et al., 2010; Effelsberg et al., 2014; Miao et al., 2019) revealed that some demographic variables have potential influence on employees' UPB. Consistent with previous research, employees' ages, gender, education, leader organizational tenure and positions were controlled in this study.

4. Findings

4.1 Descriptive statistics

Table 1 shows the means, standard deviation, and intercorrelation values for the variables in the study. As expected, LMX was positively correlated with UPB ($r = 0.84$, $p < 0.01$).

Table 1 Means, standard deviations and intercorrelations for variables

Scales	M	SD	1	2	3	4	5	6	7	8	9
1. Age	2.33	1.21	-								
2. Gender	1.48	0.50	-0.15**	-							
3. Education	2.43	0.73	-0.55**	0.15**	-						
4. Organizational tenure	2.54	1.02	0.67**	-0.05	-0.48**	-					
5. Job position	1.92	0.27	-0.12*	0.06	0.42**	-0.08	-				
6. LMX	3.62	1.01	0.14**	-0.01	-0.06	0.04	-0.02	(0.95)			
7. OI	4.01	0.87	0.15**	0.02	-0.11*	0.06	-0.10	0.71**	(0.87)		
8. EUT	2.51	0.92	-0.13*	0.01	0.10*	-0.16**	0.05	-0.44**	-0.47**	(0.77)	
9. UPB	3.82	0.84	0.14**	-0.02	-0.11*	0.07	-0.13*	0.65**	0.84**	-0.27**	(0.90)

Note: *p<0.05; **p<0.01; LMX = Leader-member exchange; OI = organizational identification; EUT = Employee unethical tolerance; UPB = Unethical pro-organizational behavior
Source: Author

4.2 Measurement models

The measurement model used in the research was tested with confirmatory factor analysis before testing the research hypotheses. Using the maximum likelihood method, whether the projected structures of the scales were supported by the data was analyzed using the alternative model strategy (Anderson & Gerbing, 1988). For this, the four-factor measurement model was compared with five alternative models using chi-square difference (ΔX^2) tests. The results showed that the model fit indices of the four-factor measurement model were better than other models (X^2 (324) = 1000, $p < 0.01$, RMSEA = 0.07, CFI = 0.94, SRMR = 0.07).

4.3 Hypotheses testing

The hypotheses were tested in two steps. In step one, the mediated relationship between LMX and UPB was tested using the simple mediation model (hypothesis 1 and hypothesis 2). In step two, the moderator variable EUT was included in the model in order to test whether the effect of organizational identification on UPB (hypothesis 3) and the indirect effect of LMX transmitted through organizational identification on UPB (hypothesis 4) differentiated depending on high and low levels of EUT.

Regression analysis results for the mediating role are given in Table 2. As seen in Table 2, LMX had a positive direct relationship with UPB ($\beta = 0.11$, $p < 0.01$). Thus, hypothesis 1 is supported. To further test the mediation hypotheses (hypothesis 2), the Hayes Process Macro was used. Furthermore, to test the significance of the mediator the bootstrap method was used. The results indicated that the indirect effect of LMX on UPB (via organizational identification) is significant ($\beta = 0.45$, $p < 0.01$). Thus, hypothesis 2 is supported. However, in order to be able to say that hypothesis 2 is fully supported, bootstrap confidence intervals (CIs) regarding the indirect effect of LMX on UPB should be examined (Preacher & Hayes, 2004). Since bootstrap confidence interval values (95% CI = .38 to .54) of the indirect effect do not contain zeros, it can be said that the indirect effect is significant. Thus, hypothesis 2 is fully supported.

Table 2 Regression results for the mediation effect

	Organizational identification			
	B	SE	t	p
Age	0.04	0.05	1.04	0.30
Gender	0.07	0.06	1.07	0.32
Education	0.11	0.05	2.38	0.02
Organizational tenure	0.02	0.04	0.40	0.69
Job position	-0.13	0.13	-1.05	0.29
LMX	0.61	0.03	18.84	0.00
	UPB			
	B	SE	t	p
Age	0.01	0.03	0.46	0.65
Gender	-0.03	0.05	-0.62	0.54
Education	0.14	0.04	3.82	0.00
Organizational tenure	0.01	0.04	0.35	0.73
Job position	-0.04	0.10	-0.36	0.71
Direct effect of LMX	0.11	0.04	2.98	0.00
Organizational identification	0.75	0.05	18.24	0.00
Total effect of LMX	0.56	0.03	16.33	0.00
	Effect	**SE**	**LLCI%95**	**ULCI%95**
Indirect effect of LMX on UPB via OI	0.45	0.04	0.38	0.54

Note: N=432; Bootstrap sample size = 5.000. LL = lower limit; CI = confidence interval; UL = upper limit; LMX = Leader-member exchange; UPB = Unethical pro-organizational behavior; OI = organizational identification
Source: Author

Hypothesis 3 and hypothesis 4 were tested using the Hayes Process Macro (Hayes, 2018). To reduce multicollinearity, all interaction terms were centered (Aiken & West, 1991). As indicated in Table 3, the interaction term between organizational identification and EUT was significantly related to UPB ($\beta = 0.12$, $p < 0.01$).

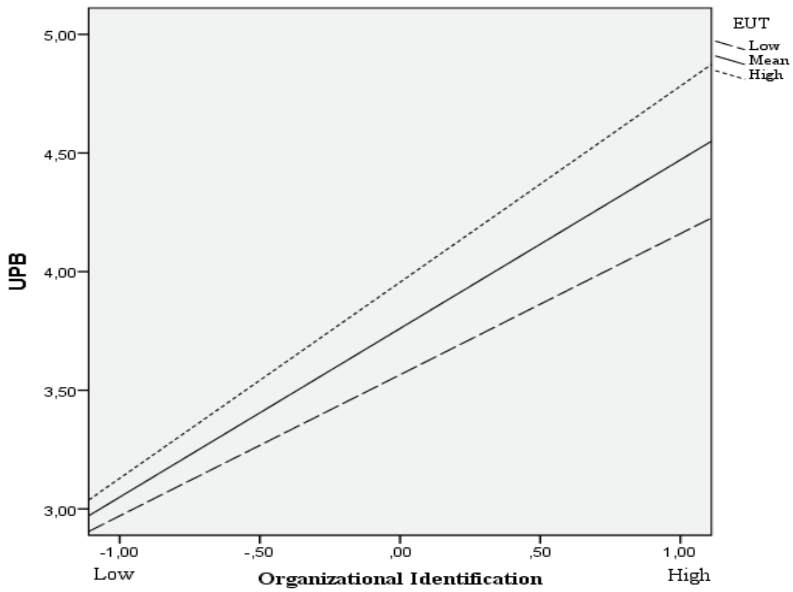
Table 3 Regression results for moderated mediation

	UPB			
	B	SE	t	p
Age	0.01	0.03	0.33	0.74
Gender	-0.03	0.05	-0.69	0.49
Education	0.11	0.03	3.16	0.00
Organizational tenure	0.04	0.03	1.19	0.24
Job position	-0.07	0.09	-0.73	0.47
LMX	0.16	0.03	4.93	0.00
Organizational identification	0.69	0.04	16.01	0.00
EUT	0.21	0.03	6.86	0.00
OIxEUT	0.12	0.02	5.37	0.00
	Conditional effect of OI on UPB			
EUT	*B*	SE	t	p
-1 *SD* (-.92)	0.60	0.06	10.73	0.00
M (.00)	0.71	0.04	16.45	0.00
+1 *SD* (.92)	0.83	0.05	20.94	0.00
	Conditional indirect effects at OI= *M* ±1 *SD*			
EUT	Boot indirect effect	BootSE	BootLLCI	BootULCI
-1 *SD* (-.92)	0.36	0.04	0.28	0.45
M (.00)	0.43	0.04	0.36	0.51
+1 *SD* (.92)	0.51	0.04	0.42	0.58
Index of conditional indirect effects	0.07	0.02	0.05	0.11

Note: SD = Standard deviation; SE = Standard error. Bootstrap sample size = 5.000. LL = lower limit; CI = confidence interval; UL = upper limit; LMX = Leader-member exchange; UPB = Unethical pro-organizational behavior; EUT = Employee unethical tolerance; OI = organizational identification
Source: Author

The results indicated that the relationship between organizational identification and UPB (Figure 2) was stronger for employees with high EUT (simple slope = 0.60, $p < .01$) than for those with low EUT (simple slope = 0.83, $p < .01$). Thus, hypothesis 3 is supported.

Figure 2 EUT moderator effect on the relationship between organizational identification and UPB



Source: Author

Furthermore, hypothesis 4 predicted that EUT moderated the mediated relationship between LMX and UPB through organizational identification. Since EUT was centralized (Aiken & West, 1991), a low value of EUT (-.92) was defined as the value with a distance of -1 standard deviation from the center, and a high value (.92) was defined as the value with a distance of +1 standard deviation from the center (see Table 3). The results showed that the conditional indirect effect of LMX on UPB was significant (β = .36, 95% CI = [.28, .45]; β = .51, 95% CI = [.42, .58]). Thus, hypothesis 4 is supported.

5. Conclusion

The findings of this study have contributed to the literature in various ways. The first contribution to the literature is that it reveals that LMX with positive outcomes for employees, managers and organizations are not always beneficial. Previous studies (e.g., Graen & Uhl-Bien, 1995; Scandura, 1999) focused on the positive sides of LMX, neglecting the negative sides. The current study contributes to the debate about whether high LMX is always beneficial (e.g., Greenbaum et al., 2018) by revealing that high LMX has a positive impact on unethical employee behavior.

Second, researchers (i.e., Chen et al., 2016; Umphress et al., 2010) have called for additional studies to investigate mediators that may help us better understand the formation of UPB. To address these calls, organizational identification is verified in this study as a mediator in the relationship between LMX and UPB. According to the group engagement model (Tyler & Blader, 2003; Blader & Tyler, 2009), employees can create a strong social identity with the group (in-group) thanks to high-quality LMX, and perform extra role behaviors (e.g., UPB) for the benefit of the organization. This study is important in terms of revealing how LMX affects UPB according to the group engagement model. Umphress et al. (2010) stated that the effect of organizational identification on UPB should be examined with different variables. In line with the suggestion of Umphress et al. (2010), this study predicted that LMX indirectly increases UPB by positively effecting organizational identification. The research findings confirmed that high-quality LMX that managers develop with their employees allows them to feel valued in the group and in the

organization, increasing in this way their organizational identification and indirectly increasing their UPB. This result is important in terms of shedding light on the claims that organizational identification can be harmful to the organization. Previous studies (e.g., Mael & Tetrick, 1992) focused more on the positive side, neglecting the dark side of organizational identification. In the present study, the finding that UPBs can be increased by increasing organizational identification of employees contributed to the claims about the dark side of organizational identification (e.g., Dukerich et al., 1998). An employee, who is strongly identified with their organization, may ignore or display these unethical behaviors that the organization unwittingly or consciously demonstrates (Chen et al., 2016).

Furthermore, the results indicated that the mediated relationship between LMX and UPB via organizational identification is stronger for employees with high EUT. This result is an important contribution to previous studies (e.g., Umphress et al., 2010) examining the relationship between organizational identification and UPB in terms of revealing that this relationship changes according to the level of EUT. In addition, the indirect effect of LMX on UPB through organizational identification differs according to low and high levels of EUT, as expected. Low-level EUT reduced the indirect effect of LMX on UPB by reducing the positive effect of organizational identification on UPB.

It is possible to reach some practical conclusions based on the findings of the study. In the research, managers were informed that the quality of their exchanges with employees affected their organizational identification and that they therefore demonstrated more UPB. Although high-quality LMX is desirable and encouraged in organizations (Graen & Uhl-Bien, 1995), it should be noted that employees can model negative behaviors due to their high-quality LMX (Greenbaum et al., 2018). Employees' role modeling of their legal or unethical behaviors, thanks to mutual trust-based exchanges with their managers, reflects the proverb, 'if you lie down with dogs, you get up with fleas'. Employees observing their managers' unethical behavior in organizations may cause changes in their ways of thinking about the possibility of being punished for unethical behavior, and lead them to recalculate the costs related to the benefits of similar behaviors (Zhang et al., 2018). Managers should also keep in mind that unethical behavior can cause great harm to the organization and employees in the long term. A manager's unethical behavior for the benefit of the organization may lead employees to follow similar actions. For this reason, the organization should regulate behavior of the leaders and thus prevent the spread of UPB within firms.

Employees who have high-quality LMX (in-group) contribute more to the outputs desired by the organization (Graen & Uhl-Bien, 1995). Therefore, employees who have high-quality LMX have more opportunities (e.g., social support, authority, resources, self-efficacy) than employees who have low-quality LMX (out-group) (Scandura & Pellegrini, 2008). Furthermore, employees' tendencies toward unethical behaviors can be reduced by ensuring that the human resources department properly applies the necessary employment procedures. For example, managers (or recruiters) could be trained on the characteristics of candidates with a Machiavellian personality. Training managers to identify candidates with these characteristics can help them reliably identify individuals prone to UPB (Castille et al., 2018). In addition, managers should be aware that promoting organizational identification risks encouraging UPBs, and this risk is particularly high for employees with high EUT.

5.1 Limitations and recommendations

In addition to the above-mentioned contributions, the study also has some limitations. The first limitation is that although the theoretical arguments support the causal design of the research model, the causality of the research results could not be determined sufficiently due to the fact that the research data were collected using the cross-sectional method (Levin, 2006). Future studies can adequately reveal the causality of their research findings by obtaining data using longitudinal or experimental methods. The second limitation is that UPB is evaluated according to employees' self-reported responses. Umphress et al. (2010) stated that self-reporting is appropriate because managers or colleagues do not have enough foresight to assess the intentions behind focal unethical employee behavior. Nevertheless, future studies can use UPB evaluations of managers and colleagues to reduce common method bias (Podsakoff et al., 2003).

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DEVELOPMENT OF SMART GOVERNANCE IN CROATIAN CITIES - THE SIZE OF A CITY AS A DETERMINANT OF SMART GOVERNANCE

Abstract

Purpose: The paper discusses the role and importance of smart governance as a modern form of urban development, identifies the key determinants of smart governance, analyzes models, evaluation and measurement indicators in smart and sustainable cities, and ranks 127 Croatian cities, regardless of city size.

Methodology: A comprehensive database was prepared for the preparation of the study, including ten indicators of key smart governance determinants related to political participation of citizens, delivery of quality services to citizens, and sustainable functioning of city administration, in line with a review of models and indicators from previous studies.

Results: The main goal of this research is to determine a correlation between the size of the city according to the number of inhabitants and statistically significant indicators of smart governance and, based on the value of the correlation coefficients, to determine the weights for the indicators in the process of city ranking. By aggregating the weighted z-scores, the Smart Governance Index was created for all Croatian cities and that index is not related to the size of a city.

Conclusion: Statistically significant indicators for the formation of the Smart Governance Index for 127 cities in Croatia are the indicators of political participation and sustainable functioning of city administration. It is necessary to include as many indicators as possible in the future period so that the ranking results are as relevant as possible.

Keywords: Smart governance, Hellwig's information capacity method, ranking, smart and sustainable city

1. *Introduction*

The paper highlights the importance of smart governance as one of the dimensions of a smart and sustainable city, i.e., the aim of this research is to evaluate the impact of a set of indicators through political participation of citizens, the provision of quality services to citizens, and the sustainable functioning of city management after a review of similar studies. Therefore, the first part of the paper presents a research gap, motives and reasons for research, and defines the hypotheses and research questions of the study. The sample in this

research consists of 127 Croatian cities to fill a gap in the scientific literature, which mainly lists large cities, county centers or only certain regions of the country, as Jurlina Alibegović et al. (2018) ranked the 25 largest Croatian cities and county centers by Urban Development Index. The Apsolon Strategy (2020) ranked 20 largest Croatian cities by the Digital Readiness Index. The motive for this research is to fill precisely this gap in order to give small and medium-sized cities the opportunity to evaluate and compare themselves with large cities, as this research includes the entire population of the cities in the Republic of Croatia (with the exception of Zagreb[1]). One of the motivations is also the fact that numerous small and medium-sized cities undertake a number of activities to provide quality public services to their citizens, which is why the study is guided by the following research questions (RQ):

RQ1: Do large Croatian cities achieve better results in terms of the Smart Governance Index?
RQ2: What is the relationship between the size of a city in relation to the number of inhabitants and statistically significant indicators of smart governance in the Republic of Croatia?

In the second part of the paper, the definitions of smart governance and all of its segments are presented according to the scientific literature. Then, a detailed overview of models and indicators from previous research in the dimension of smart governance is presented in *Appendix 1,* such as European Smart City Ranking [ESCR] - Griffinger et al. (2007), Triple Helix Approach [THA] - Lombardi et al. (2012), The Smart City Index Master Indicators [SCIMI] - Cohen (2014), City Keys - Bosch et al. (2017), as well as various organizations, such as the International Standardization Organization [ISO], the International Telecommunication Unit [ITU], the United for Smart Sustainable Cities [U4SSC], the World Council on City Data [WCCD], and other companies like Cisco, Microsoft, Ericsson, IBM, Siemens, Oracle, etc. A review of models and international standardization organizations refers to the identification of indicators that can be used to monitor progress of the city in terms of the quality of urban services, digital channels for interaction with citizens and legal entities in the city, rapid communication with citizens through social networks, citizen participation in the work of city administration through their participation in forming the city budget, warning of deficiencies in the physical environment, monitoring satisfaction with the introduction of new technologies, and defining and monitoring the performance of an individual city to determine its position and identify the best and worst places and activities undertaken for the purpose of improvement.

The methodological part of the paper presents the concept, an empirical model and explanations of the correlation analysis method developed by Hellwig (1969), which is known in the scientific literature as Hellwig's information capacity method. The method was applied to determine the relationship between the size of the city and the number of inhabitants and ten smart governance indicators. Based on the value of correlation coefficients, only four indicators were selected and weighted so that the Smart Governance Index could be created by calculating the weighted sum for each city.

The ranking of the cities and the interpretation and explanation of the research results are presented for the three groups of cities (i.e., large cities - more than 35,000 inhabitants, medium-sized cities - from 10,000 to 35,000 inhabitants, and small cities - up to 10,000 inhabitants) used in the model. The conclusions, recommendations and implications for future research are given in the last part.

2. Literature review

2.1 Determinants of smart governance

Smart governance is becoming an indispensable component of smart and sustainable cities, mostly as one of the dimensions of smart and sustainable cities.

According to the definition of a smart city provided by the International Organization for Standardization (ISO, 2014), a smart city is a new concept that uses a new generation of information technologies such as the Internet of Things, cloud computing, Big Data, and geographic information integration for easier planning, governance building, and smart city services.

A similar definition exists for smart governance as one of the most important dimensions of smart and sustainable cities, which includes activities related to transforming local government into a transparent, efficient, and open administration for its citizens using information and communication technologies, and formulating appropriate smart city policies (Gil-Garcia et al., 2014).

1 As the capital of the Republic of Croatia, the City of Zagreb is excluded from the analysis because in addition to city status, it also has county status, and the values of Zagreb indicators are incomparable with those of other cities (Official Gazette, 2020; Law on Local and Regional Self-Government - consolidated text).

There are many different views and perspectives on the concepts of smart city and smart governance. Some of them are very broad and encompass the essence of governance, but most definitions focus on the use of new information and communication technologies, especially in the literature of the last two decades.

In the early 21st century, Kliksberg (2000) defined smart governance as city governments finding intelligent and elegant solutions to complex administrative problems in local government.

Scholl & Scholl (2014) believe that smart governance is the umbrella term for many digital initiatives in the public sector that use new technologies to creatively connect the physical, digital, public, and private environments.

According to Meijer & Bolivar (2016), effective and efficient city governance depends on city authorities turning to innovative solutions to address the challenges of financing the development of a smart city while maintaining a strong citizen focus. Smart governance means making the right policy decisions and implementing them effectively. Smart governance emphasizes the need for smart decision making and involves the processes and implementation of those decisions. New technologies are used to strengthen management rationality by using more complete and better information in the decision-making process.

According to Andermatt & Göldi (2018), smart governance is not only about digitizing existing processes and services, but also about developing and establishing entirely new processes and public services in a participatory way for citizens.

The authors Juričić & Zekić (2018) believe that smart governance implies a new approach to managing all city resources using ICT tools and refers to people, processes, data, and technological solutions that aim to create a more sustainable and productive community. This includes establishing a transparent and publicly visible decision-making process, and the processes should be presented and made available to all stakeholders and ensure citizen participation in public actions. It is critical that public services provided to citizens be accessible and measurable in order to improve services and make them more cost-effective, accessible, and useful.

Some authors emphasize the role and importance of implementing city government policies and decisions since the transformation to smart governance, which means creating a smart administration that uses sophisticated information technologies to connect and integrate information, processes, institutions, and physical infrastructure to better serve citizens and communities (Meijer & Bolivar, 2016).

Research on public administration highlights various aspects of smart city administration and governance, such as e-government (Vinod Kumar & Dahiya, 2017), performance management, employee financing, leadership, and vision, but the activities are mainly related to the role of city authorities in providing better public services.

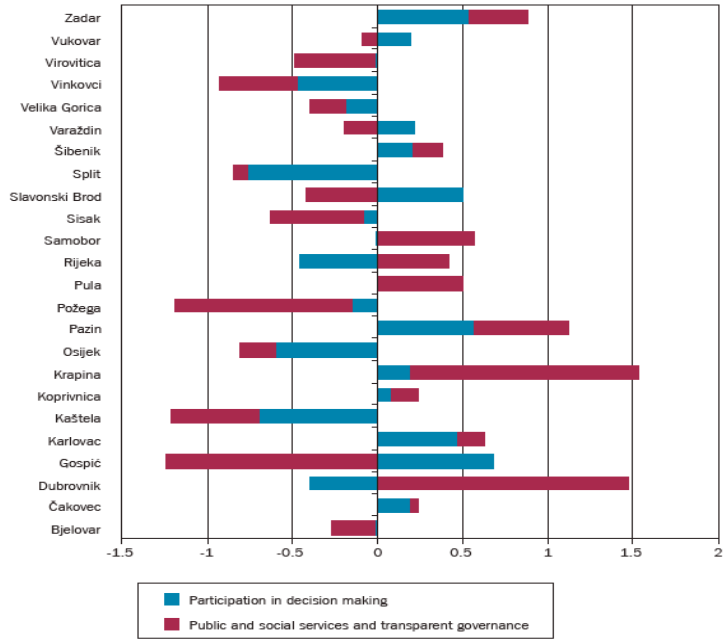
According to Bertot et al. (2016), modernization occurs through seven innovations in digital public services: transparent - citizens are aware of service decisions made by the government, participatory - citizens can participate in such government decisions, anticipatory - the government initiates service delivery to citizens, personalized - citizens choose how they want to receive services, co-created - the government and citizens participate in co-provision of services, context-aware - service providers are aware of the service context, and intelligent context - service providers use context awareness for better service delivery.

Komninos et al. (2021) presented the standardization of smart city government projects that include online citizen management services, public service co-creation, citizen applications, complaints, sending requests to the cities, a citizen database and profile platform, open data, data sharing with citizens and entrepreneurs, a GIS data center, digital payments, an integrated city management system, and a command center.

3. *Ranking in Croatia and in the world*

Croatian cities are on a particular upswing in terms of their development, and this is not the first time they have been ranked. A group of authors conducted research and ranked the 25 largest Croatian cities and county centers according to the ESCR model, focusing on urbanization and evaluation of individual cities represented by the Smart Urban Development Index (Jurlina Alibegović et al., 2018). It is interesting to note that similar indicators were used in this research and that the size of the city by population did not affect the position in the ranking of Croatian cities, because the best small Croatian cities are Krapina and Pazin, and the best large city is Zadar (Figure 1).

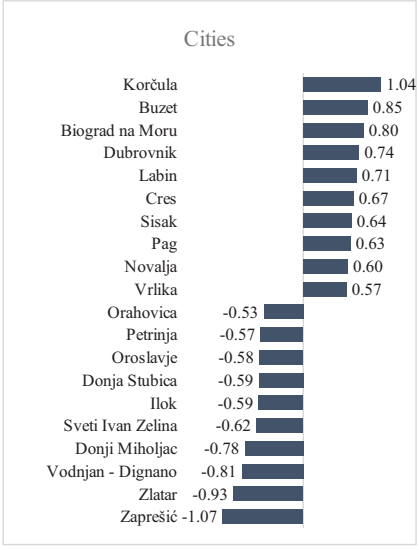
Figure 1 Ranking of 25 cities, smart governance dimension - ESCR model



Source: Jurlina Alibegović et al. (2018)

Babić (2021) created a model to evaluate the efficiency of 127 Croatian cities according to the method of equal weighting, and in the smart government dimension (Figure 2), according to seven indicators, most small Croatian cities (Korčula, Buzet, Biograd na Moru, Labin, Cres, Pag) and two large cities (Sisak and Dubrovnik) took the top position.

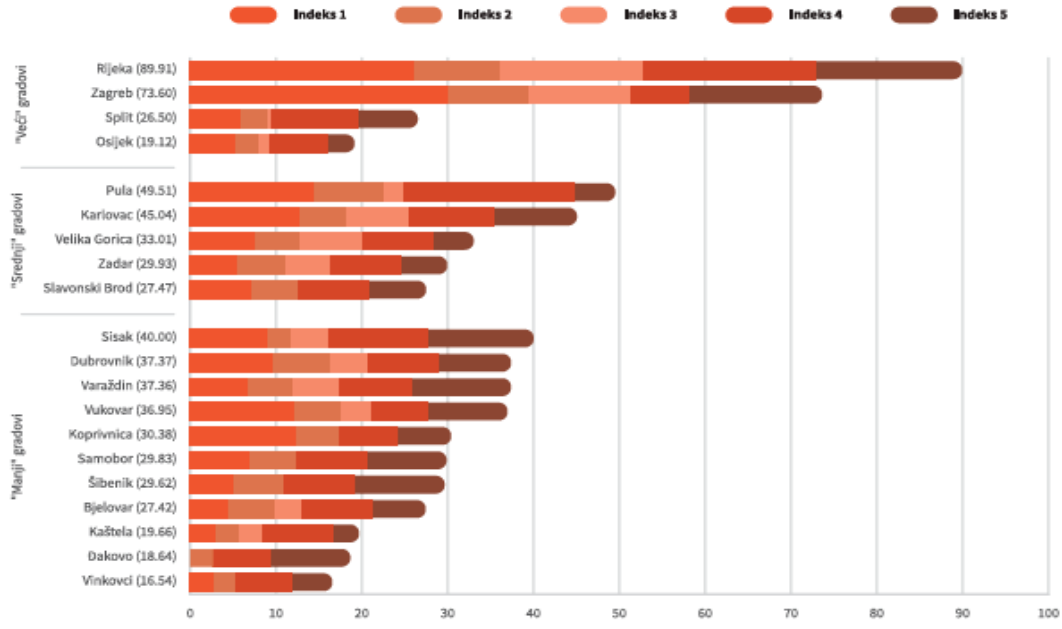
Figure 2 Ten best and worst cities - smart governance



Source: Babić (2021)

Every year, 20 largest Croatian cities are evaluated based on the Digital Readiness Index, which is a complex index consisting of the following five individual indices: availability and quality of e-services, service information and unique payment systems, availability of city data, citizen participation in decision-making, and communication channels between city administration and citizens (Apsolon Strategy, 2021). The city with the best rating in terms of the Digital Readiness Index is Rijeka. Since the conducted research refers to indicators that are most similar to the smart governance indicators, a realistic basis for extending research to all other cities was created so that they can be evaluated and compared with the best in the ranking.

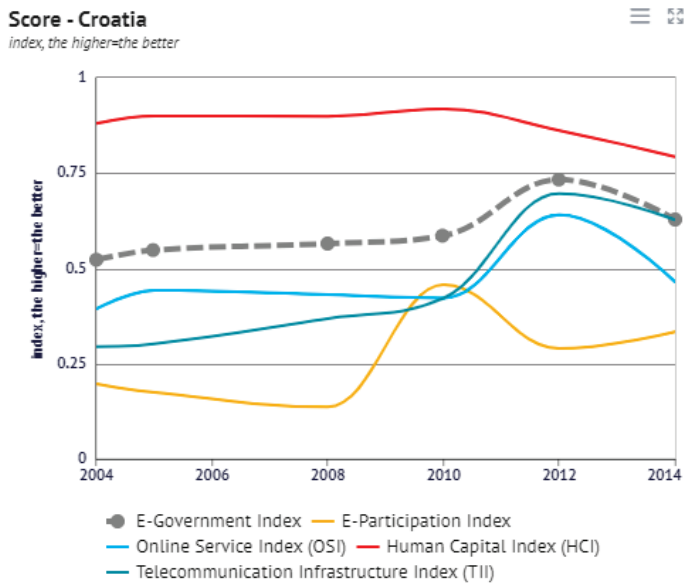
Figure 3 Ranking of the 20 largest Croatian cities - Digital Readiness Index



Source: Apsolon Strategy (2021)

Globally speaking, the ranking is conducted mainly in large cities. Every two years, the United Nations (2020) ranks 193 UN member states and their cities on the relative ability of their governments to use ICT to provide online services and engage their citizens in public policy through the E-Government Development Index [EDGI]. In addition to countries, cities are also evaluated; 40 cities in 2018, among which Moscow performed best, and 100 cities in 2020, with Madrid performing best. In addition to cities, the aforementioned index also ranks countries, and it is noticeable that according to the EDGI index, out of 193 countries, the Republic of Croatia rises from 51st place in 2003 to 39th place in 2020 (United Nations, 2020).

Figure 4 EDGI index - Croatia



Source: United Nations (2020)

4. An overview of models and indicators related to smart governance

In the phase of selecting suitable indicators for empirical research, the model, the structure of indicators, the basic purpose of the model and the scope of application were studied in order to create a model for evaluating the influence of individual indicators in the smart governance dimension. How successful Croatian cities are can be determined by well-defined standards that enable each city to develop in the desired direction.

Therefore, *Appendix 1* provides a detailed overview of the models and indicators used in previous research. Based on these models and indicators, Croatian models of smart governance are formed, including indicators of political participation (proportion of voters in local elections, citizen participation in budget preparation), economic transparency (budget transparency, a list of utilities, digital communication channels, household expenditure per capita), and sustainable functioning of city administration (digital forms for citizens, Wi-Fi, e-invoice, GIS).

It is important to note that almost all models are developed for a particular segment and research object, and most often the main segment is the size of the city and a particular territorial unit. For example, the ESCR model was developed for medium-sized European cities only, the U4SSC model adapted the number of dimensions to the city being evaluated, and the City Keys model used a structured data set as indicators to monitor the evolution of large cities over time. ITU focused its indicators on the technical component of the city, i.e., the impact of ICT technologies in all dimensions of highly developed cities, while ISO 37120 and 37122 included indicators developed for all cities regardless of their size and geographical location (Babić, 2021).

The frequency of occurrence of certain indicators in the smart governance dimension in almost all models speaks to the importance of these indicators and their influence on thinking about the level of intelligence and sustainability in the smart governance dimension.

This paper uses indicators based on the ISO 37120 (ISO, 2018) and ISO 37122 (ISO, 2019) standards, which apply to all cities regardless of their size and geographical location, creating a new framework for comparing cities based on available indicators for all cities in Croatia.

5. Methodology

All data for the creation of indicators are from 2019 and 2020. Taking into account the holistic approach and local specifics of Croatian cities, the model for ranking Croatian smart cities in the smart governance dimension consists of 10 indicators, i.e., three quantitative and seven categorical indicators.

These indicators are the proportion of voters in local elections - the State Electoral Commission of the Republic of Croatia (2021), budget expenditure per inhabitant and budget transparency, upon official request to the Institute of Public Finance (2020), digital communication channels, a list of city utilities, citizen participation in budget preparation, digital forms for citizens, GIS - author's insight into the websites of 127 Croatian cities, retrieved on 23 and 25 June 2021.

It is also important to note that the Wi-Fi indicator will be fulfilled by all Croatian cities after the accession and successful implementation of the European initiative WiFi4EU (Knezović, 2020), and the e-invoice indicator will also be fulfilled by all Croatian cities according to the 2019 legal provision (Law on Electronic Issuance of Invoices in Public Procurement, 2018). Descriptive statistics are presented in tables 1 and 2.

Table 1 Descriptive statistics of quantitative indicators of smart governance

Indicators	Smart Governance							
	Valid N	Mean	Median	Min	Max	Percentile 25%	Percentile 50%	Std.Dev.
Proportion of voters in local elections	127	46%	46%	29%	65%	42%	46%	7%
Budget expenditures per capita	127	6.126	5.471	2.542	14.426	4.493	5.471	2.428
Budget transparency	127	4.5	5	1	5	4	5	0.84

Source: Authors

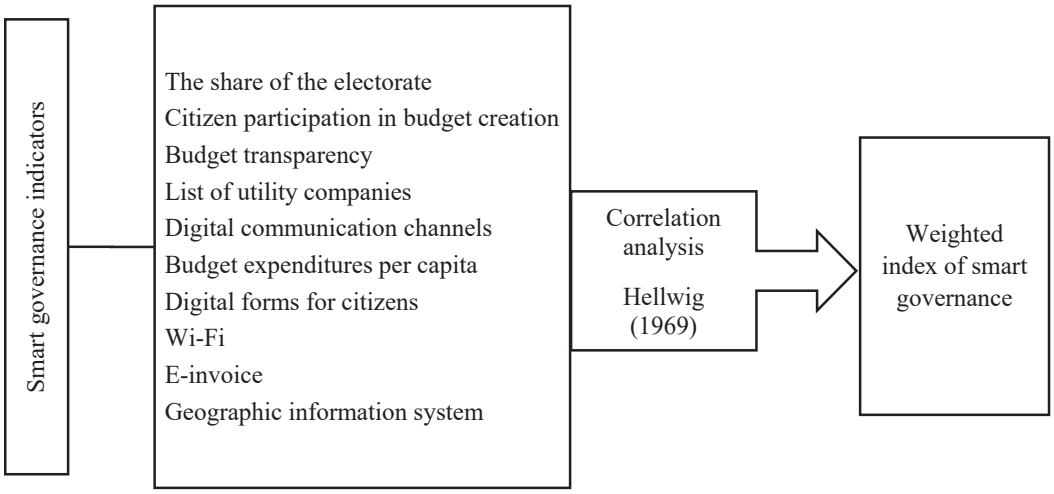
Table 2 Descriptive statistics of categorical indicators of smart governance

Wi-Fi			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	Have	127	100 %	100 %
E-invoice			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	Have	127	100 %	100 %
GIS			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	No	98	77 %	77 %
		Have	29	23 %	100 %
		Total	127	100 %	
Digital communication channels			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	No	23	18 %	18 %
		Have	104	82 %	100 %
		Total	127	100 %	
Citizen participation in budget creation			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	No	113	89 %	89 %
		Have	14	11 %	100 %
		Total	127	100 %	
List of city utility companies			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	No	35	28 %	28 %
		Have	92	72 %	100 %
		Total	127	100 %	
Digital forms for citizens			**Frequency**	**Percent**	**Cumulative Percent**
	Valid	No	35	28 %	28 %
		Have	92	72 %	100 %
		Total	127	100 %	

Source: Authors

Based on the presented descriptive statistics of the indicators, a smart government model for the creation of the Smart Governance Index was presented, which is the basis for ranking the cities.

Figure 5 Smart governance model



Source: Authors

Descriptive statistics and correlation analyses were calculated using Statistica software. Correlation represents a relationship between different phenomena represented by the values of two variables. In accordance with the presented research objective, we tried to investigate whether the size of the city by population is related to the values of the smart governance indicators, and based on the values of the correlation coefficients, we tried to interpret the importance of each indicator in the model.

Prior to correlation analysis, referred to as "information capacity" (Hellwig, 1969), all indicator values are standardized using the z-transformation method, which determines the universal unit of measurement and the relative position of the value in the overall distribution in relation to the average value, and accordingly, all indices are expressed as positive and negative values according to the formula:

$$z = \frac{x - \mu}{\sigma}$$

In addition to studying the relationship between the above indicators, correlation analysis is also used to assign weights in the ranking process (Booysen, 2002; Organization for Economic Co-operation and Development [OECD], European Union [EU] & Joint Research Center [JRC], 2008; Greco et al., 2019). This method uses correlation coefficients to determine the weights of the indicators. This ensures that the indicators with the highest correlation (Table 3) receive the highest weights, i.e., the weights of the indicators are proportional to the sum of the absolute values of the correlation coefficients from the correlation matrix (Hellwig, 1969; Ray, 2008). This is an objective weighting method that is widely used in scientific research. The basic requirement for an indicator to be included in the weighting procedure is that it must be statistically significant with respect to the assumed significance level of 0.05 (Barańska, 2019; OECD, 2008), i.e., McGranahan et al. (1970) consider that indicators that are not significant should be excluded from the model. Therefore, the model of this study is based on 4 indicators that are marked as statistically significant in Table 3.

Table 3 Correlation analysis of the endogenous population variable with ten smart governance indicators

Correlations (Spreadsheet2) Marked correlations are significant at p < .05000 N = 127 (Casewise deletion of missing data)	
Variable	**Population estimates 2019**
Proportion of voters in local elections	**0.323**
Budget expenditures per capita	0.140
Budget transparency	0.160
Digital communication channels	0.055
List of city utility companies	**0.183**
Citizen participation in budget creation	**0.206**
Digital forms for citizens	0.143
Geographic information system (GIS)	**0.271**
E-invoice	
Wi-Fi	

Source: Authors

It is important to note that the **Wi-Fi** network and **E-invoice** indicators are met in all Croatian cities and are therefore not included in the table.

The calculated correlations are used as a basis for further calculation of weighted z-values with significant variables. The values are calculated as follows:

$$w_i = \frac{|k_i|}{\sum_{j=1}^{5} |k_j|}, \text{ for i = 1, 2,..., 5,}$$

where $\sum_{i=1}^{5} w_i = 1$ to obtain the weighted sum as a final product.

Then, each indicator is multiplied by the obtained weight and we obtain a weighted sum for each city as

$$y_j = \sum_{i=1}^{5} w_i z_{ij} \text{ for j = 1, ..., 127.}$$

The obtained result represents the Smart Governance Index for each city and is the basis for ranking.

The performed correlation analysis shows a positive correlation between the size of the city, measured by the number of inhabitants, and four smart governance indicators, which were found to be significant and reached the highest correlation, namely proportion of voters in the last local elections (0.323), GIS (0.271), citizen participation in the creation of a budget (0.206), and a list of city utility companies (0.183).

Indicator weighting naturally leads to the last step in the formation of a composite index using the aggregation method. All standardized values of the indicators were multiplied by the weights that resulted from correlation analysis and aggregated into an index with positive and negative values. A detailed overview of the z-values of the four smart governance indicators and the values of the Smart Governance Index can be found in *Appendix 2.*

Using correlation analysis, Ray (1989) produced the Social Development Index [SDI] for 40 countries that includes 13 indicators of urbanization and industrialization, health status, nutritional level, educational level, and social communication. High cross-correlation coefficients of the variables resulted in weights according to which the SDI represents a combination of weighted variables in 40 countries.

6. Results and discussion

From the overview given in Chart 1, the number of positively and negatively rated cities is divided into three groups according to the number of inhabitants, i.e., the total number of positively rated cities is 60, and the number of negatively rated cities is 67, again confirming the hypothesis that the size of the city is not related to the smart governance indicators.

Chart 1 Positively and negatively rated Croatian cities

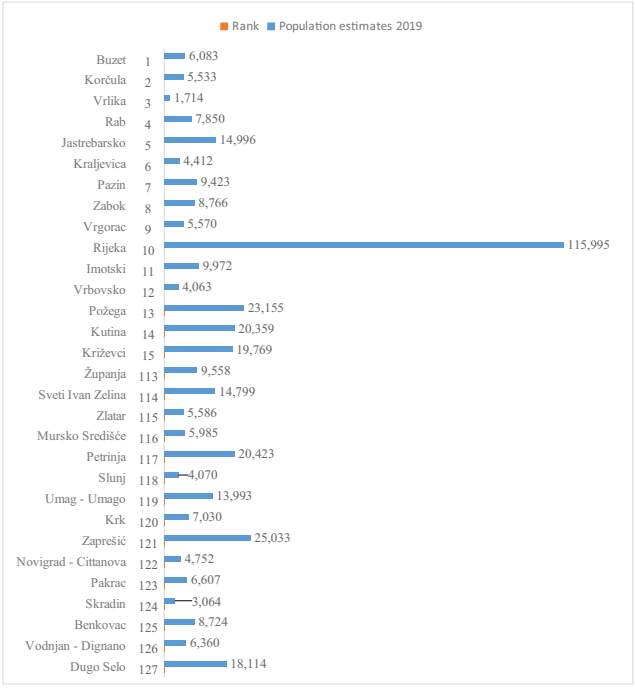
Source: Authors

In the category of large cities, there are 9 positively rated cities, and the research results overlap with the results obtained in previous studies by Apsolon Strategy (2020) - Figure 2. These cities are: Rijeka, Sisak, Dubrovnik, Split, Karlovac, Velika Gorica, Osijek, Bjelovar, and Pula - Pola.

The situation is almost the same in the category of medium-sized cities with 10,000 to 35,000 inhabitants, i.e., it is similar to the category of the smallest cities with up to 10,000 inhabitants.

To better understand the ranking, Chart 2 shows 15 best and 15 worst ranked cities. For all cities, Graph 2 highlights rank and population as endogenous variables.

Chart 2 Fifteen best and fifteen worst-ranked cities in the smart governance dimension



Source: Authors

All of the top 15 ranked cities achieved high levels of turnout in local elections (e.g., Buzet 54%, Korčula 58%, and Vrlika 57%). The top ranked cities also achieved high scores in citizen participation in the preparation of city budget indicators, mostly positive scores for categorical indicators such as GIS and the list of city utilities on the city websites.

The lower ranked cities scored below average on quantitative and categorical indicators, such as the proportion of voters in local elections, i.e., Benkovac 29%, Krk 32%, and Vodnjan - Dignano 35%.

It is noticeable that among the first 15 cities there is only one big city, Rijeka, while the rest are small Croatian cities. The City of Rijeka also ranks first among the 20 largest Croatian cities when it comes to the Digital Readiness Index in previous research (Apsolon Strategy, 2021).

In accordance with the research objectives, we can conclude that there is no correlation between the size of the city, measured by the number of inhabitants, and statistically significant indicators of smart governance.

Similarly, among the 15 lowest ranked cities, there is not a single large city, i.e., all cities are small or medium-sized. From the chart above, we can reconfirm that the size of the city, in terms of population, is not associated with a better ranking position, and that small and medium-sized cities take many initiatives in the field of smart governance. These index values justify the correlation analysis performed to determine a correlation between the size of the city by population and four statistically significant indicators of smart governance finding positive but mostly weak correlations with the endogenous variable.

Comparing the results shown in Chart 2 and the ranking shown in Figure 2, we see that there is much overlap in the results, regardless of the type of methodology and the number of indicators. Above are the Croatian small towns of Buzet and Korčula, below are Zaprešić, Vodnjan-Dignano, Pakrac, and others.

In all studies on previous results and in this study, two large Croatian cities, Rijeka and Dubrovnik, are among the best rated cities.

From the study conducted and previous research, we can conclude that it is necessary to implement a large number of initiatives to introduce new technologies and ICT solutions to enable the connection and digitalization of all actors to achieve savings and better quality of services to citizens, which has been confirmed by numerous studies.

Lopes (2017) conducted six interviews with people involved in smart city initiatives in Brazil, Singapore, Colombia, Portugal and Uruguay to find out what management models are implemented in smart cities, and to prove that smart cities and e-government represent a similar development path and that advanced technologies, innovations and smart governance are important prerequisites for the development of smart, creative, innovative and sustainable cities.

Based on a survey of 17 smart city experts and 60 citizens of Split, Čukušić et al. (2019) concluded that a strategic point of view should be the starting point for the implementation of smart solutions in smart cities and that it is necessary to monitor the development of innovations, and set clear goals by undertaking activities towards implementation in urban infrastructure, taking into account the priorities and needs of citizens. In addition, the authors proposed 59 smart solutions, such as digital licensing and business licensing, online retraining programs, disaster early warning systems, real-time crime mapping, predictive policing, etc.

Tomor et al. (2019) examined the relationship between ICT-enabled collaboration between citizens and policymakers in cities and concluded that while governments encourage online and offline citizen engagement, in practice they do not adequately support citizen participation, and that responsibility for the lack of collaboration lies with citizens and government leaders, regardless of the availability of ICT technologies for communication.

7. Conclusions and implications

In the conducted research, using Croatian cities as an example, we found that the size of the city, measured by the number of inhabitants, has no significant relationship with the values of smart governance indicators, which was confirmed in the ranking phase, when we aggregated the weighted values of the significant indicators to the Smart Governance Index. The study showed that small Croatian cities with up to 10,000 inhabitants hold a high-ranking position, and that the situation is similar at the lower end of the ranking, where mainly small and medium-sized cities are found, which confirmed the hypothesis that the size of the

city by the number of inhabitants does not affect a better ranking position, and that the Smart Governance Index is also not related to the size of the city by the number of inhabitants. Another objective of this study was also achieved, namely to allow small and medium-sized cities to evaluate and compare themselves with the top-ranked cities from previous studies.

The main scientific contribution of this study is the first complete analysis that includes all Croatian cities and new methodological guidelines for ranking cities.

The practical contribution of the study is reflected in the possibility of providing guidelines for local decision makers to increase the transparency of the economy, promote political participation and create more trust among citizens, as well as in additional investments in digitalization, which enables the collection and processing of large amounts of data with the help of ICT technologies.

The study has additional potential in terms of extending the analysis of the existing model with new indicators such as the number of online visits to the city open data portal, the average response time of the city system to relevant requests, etc. The applied method, like any other, has its advantages and disadvantages. The advantage is that weights were calculated for each indicator based on certain correlation coefficients to avoid subjectivity in assigning weights when calculating the Smart Governance Index. For future research that includes ranking, there is an opportunity to use multi-criteria ranking methods such as principal component analysis [PCA], factorial analysis, and data envelopment analysis [DEA] to determine the efficiency, maturity, and the functionality of smart governance, which is certainly an important scientific contribution.

There are unanswered questions in the implementation of smart solutions in smart cities, where both government and citizens play a key role, but also that progress depends on the strategic approach of those who manage. It is necessary to increase citizen engagement and support the development of new smart governance models, introduce new smart city governance indicators, and create rankings in the future to monitor progress of Croatian cities. There is a need to create a register of open data listing all implemented, ongoing and planned activities in the field of smart governance.

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Appendix 1 Detailed overview of the model, indicators, authors, and the year of the model

Model / Year / Authors	Description	Smart Governance Indicators
The European Smart Cities Ranking - ESCR Griffinger et al. (2007)	This model was developed for European medium-sized cities. In this model, the dimensions and indicators for 70 medium-sized cities were defined for the first time according to the number of inhabitants.	Participation in decision making Public and social services Transparent government Political strategies and perspectives
Triple Helix Approach - THA Lombardi et al. (2012)	To explore the concept of a smart city, the authors proposed to focus on the production of college and government knowledge and innovations patented by industry and universities as an index of intellectual capital.	Number of universities and research centers in the city Number of courses that can be fully downloaded from the Internet / Total number of courses Online availability of e-government (percentage of the 20 basic services that are fully available online) Percentage of households with computers Percentage of households with Internet access at home E-government use by individuals (percentage of individuals aged 16 to 74 who used the Internet to interact with the government in the past three months) Number of research grants funded by corporations, foundations, and institutes / No annual grants
The Smart City Index Master Indicators - SCIMI Cohen (2014)	This model represents an initiative of the Smart Cities Council to rank cities in terms of livability, feasibility, and sustainability indicators.	Proportion of government services that citizens can access online Existence of electronic compensation for citizens Number of Wi-Fi access points per km^2 Proportion of users with Internet download speeds of 2 Mbit/s Proportion of users with Internet download speeds of at least 1 gigabit/s Number of infrastructure components with built-in sensors (traffic, public transportation demand, parking, air quality, waste, H2O, public lighting) Integrated and unique real-time services (ambulance, emergency response, fire, police, weather, traffic, air quality) Open use of data Mobile applications based on open data Existence of an official city policy for the protection of citizen data
ITU - ITU -T Y.4901 / L.1601 International Telecommunication Unit (2016)	The authors identified Key Performance Indicators (KPIs) to establish criteria for assessing the contribution of ICT to the creation of smarter and more sustainable cities, and to provide cities with the means for self-assessment.	Transparency of data on budget, city plans, public procurement Proportion of city residents using online information and anonymous feedback mechanisms Existence of an application to assist visitors and tourists Existence of information literacy organizations for all city residents Existence of online reservations (e.g., selection of schools, reservation of public sports facilities, library services, etc.) ICT-enabled services and information to assist people with disabilities; NOTE - People with special needs here refers to people with disabilities, including older people with disabilities

Model / Year / Authors	Description	Smart Governance Indicators
CITY KEYS Bosch et al. (2017)	These indicators aim to monitor the evolution of a city towards an even smarter city. The temporal component, i.e., "development over the years", is an important feature.	Government project support A unified project team that includes all relevant experts and stakeholders Involvement of the city government in the development of the project, apart from the financial aspects A clear division of responsibilities for achieving the social and sustainability objectives Continuous monitoring and reporting Market orientation - to what extent is the project planned based on market analysis Involvement of professional stakeholders - to what extent were professional stakeholders outside the project team involved in planning and implementation Bottom-up - did the project idea come from the local community Involvement of the local community in the planning phase Involvement of the local community in the implementation phase Proportion of the population participating in Internet platforms
United 4 Smart Sustainable Cities U4SSC (2017)	This is a publication that provides cities with a methodology for capturing KPIs for Smart Sustainable Cities (SSC).	Public Wi-Fi Open data E-government E-procurement in the public sector
International Organization for Standardization (ISO) 37120 - Sustainable cities and communities - indicators for city services and quality of life (2018)	The World Council on City Data (WCCD) enabled certification of smart cities based on the guidelines and methodology of ISO 37120 and ISO 37122 standards for smart and sustainable cities.	Proportion of women elected as heads of city government departments Number of city government convictions for corruption or bribery Number of registered voters as a percentage of voting age Proportion of voters in local elections (as a percentage of registered voters)
International Organization for Standardization (ISO) 37122 - sustainable cities and communities (2019)		Percentage of publicly available city records Number of online visits to the city open data portal Proportion of city services available online Average city system response time to relevant emergency assistance requests Average disruption to IT infrastructure in the city

Source: Authors

Appendix 2 Croatian cities by the Smart Governance Index (Top-bottom ranking)

Cities	Population estimates 2019	Voter turnout in the last local elections	GIS	Citizen participation in budget creation	List of city utility companies	Smart Government Index (Descending)
Buzet	6,083	-0.52	-0.30	-0.07	-0.15	**-1.044**
Korčula	5,533	-0.10	0.11	-0.07	-0.15	**-0.211**
Vrlika	1,714	0.32	0.11	-0.07	0.51	**0.872**
Rab	7,850	-0.19	0.11	-0.07	-0.15	**-0.304**
Jastrebarsko	14,996	-0.05	-0.30	-0.07	0.51	**0.084**
Kraljevica	4,412	-0.15	-0.30	-0.07	-0.15	**-0.673**
Pazin	9,423	-0.29	0.11	-0.07	0.51	0.268
Zabok	8,766	0.18	0.11	-0.07	-0.15	**0.068**
Vrgorac	5,570	-0.29	-0.30	-0.07	-0.15	**-0.812**
Rijeka	115,995	0.04	-0.30	-0.07	-0.15	**-0.487**
Imotski	9,972	0.41	-0.30	-0.07	-0.15	**-0.115**
Vrbovsko	4,063	0.50	0.11	-0.07	-0.15	**0.393**
Požega	23,155	0.04	-0.30	-0.07	-0.15	**-0.487**
Kutina	20,359	0.09	0.11	-0.07	-0.15	**-0.025**
Križevci	19,769	0.22	0.11	-0.07	0.51	**0.779**
Delnice	5,437	-0.15	-0.30	-0.07	-0.15	**-0.673**
Čazma	7,190	-0.15	0.11	-0.07	-0.15	**-0.257**
Ploče	8,841	0.41	0.11	-0.07	-0.15	**0.300**
Novska	11,455	-0.15	-0.30	0.59	0.51	**0.657**
Ivanec	13,080	0.04	0.11	-0.07	0.51	**0.593**
Mali Lošinj	7,876	-0.19	-0.30	-0.07	-0.15	**-0.719**
Sinj	24,348	-0.29	0.11	-0.07	-0.15	**-0.397**
Pag	3,731	-0.05	0.11	0.59	-0.15	**0.501**
Gospić	11,761	0.13	-0.30	-0.07	-0.15	**-0.394**
Senj	6,162	-0.15	0.11	-0.07	0.51	**0.407**
Opuzen	3,111	0.18	0.11	-0.07	-0.15	**0.068**
Sisak	42,326	0.13	-0.30	-0.07	-0.15	-0.394

Cities	Population estimates 2019	Voter turnout in the last local elections	GIS	Citizen participation in budget creation	List of city utility companies	Smart Government Index (Descending)
Dubrovnik	44,743	-0.24	-0.30	-0.07	-0.15	**-0.766**
Labin	10,794	0.04	0.11	-0.07	0.51	**0.593**
Bakar	8,160	-0.19	0.11	-0.07	-0.15	**-0.304**
Split	169,577	0.04	0.11	-0.07	-0.15	**-0.071**
Karlovac	51,063	0.04	0.11	-0.07	-0.15	**-0.071**
Solin	26,578	0.04	0.11	-0.07	-0.15	**-0.071**
Krapina	11,816	0.27	0.11	-0.07	-0.15	**0.161**
Vis	2,068	0.22	0.11	-0.07	-0.15	**0.114**
Čakovec	27,757	-0.33	0.11	-0.07	-0.15	**-0.443**
Crikvenica	10,692	-0.15	-0.30	0.59	0.51	**0.657**
Metković	16,296	-0.43	0.11	-0.07	0.51	**0.129**
Hrvatska Kostajnica	1,967	0.09	0.11	-0.07	0.51	**0.639**
Cres	2,907	-0.01	0.11	-0.07	-0.15	**-0.118**
Velika Gorica	62,550	-0.19	0.11	-0.07	-0.15	**-0.304**
Supetar	4,457	0.18	0.11	-0.07	-0.15	**0.068**
Osijek	101,117	-0.10	0.11	-0.07	0.51	**0.454**
Varaždinske Toplice	5,729	0.41	0.11	-0.07	-0.15	**0.300**
Novi Vinodolski	4,783	-0.24	0.11	-0.07	0.51	**0.314**
Pleternica	9,382	0.04	0.11	-0.07	-0.15	**-0.071**
Knin	11,513	0.09	0.11	0.59	-0.15	0.640
Lipik	5,038	-0.43	0.11	-0.07	-0.15	**-0.536**
Bjelovar	37,948	0.32	0.11	-0.07	0.51	**0.872**
Kutjevo	4,985	-0.66	0.11	-0.07	-0.15	**-0.768**
Novalja	4,109	0.04	0.11	-0.07	0.51	**0.593**
Đurđevac	7,686	0.27	0.11	-0.07	-0.15	**0.161**

Cities	Population estimates 2019	Voter turnout in the last local elections	GIS	Citizen participation in budget creation	List of city utility companies	Smart Government Index (Descending)
Sveta Nedelja	18,558	-0.01	0.11	-0.07	-0.15	**-0.118**
Pula - Pola	56,349	0.41	0.11	0.59	-0.15	**0.966**
Orahovica	4,586	-0.47	0.11	0.59	0.51	**0.747**
Vrbovec	14,063	0.13	0.11	0.59	-0.15	**0.687**
Ogulin	12,717	0.64	0.11	-0.07	-0.15	**0.533**
Grubišno Polje	5,381	0.64	-0.30	-0.07	-0.15	**0.117**
Biograd na Moru	5,878	0.55	-0.30	-0.07	-0.15	**0.024**
Otočac	8,842	0.64	0.11	-0.07	-0.15	**0.533**
Pregrada	5,988	0.60	-0.30	-0.07	-0.15	**0.070**
Omiš	14,661	-0.10	-0.30	-0.07	-0.15	**-0.626**
Prelog	7,546	-0.05	-0.30	-0.07	-0.15	**-0.580**
Lepoglava	8,631	-0.43	0.11	-0.07	0.51	**0.129**
Novi Marof	12,071	-0.01	-0.30	-0.07	0.51	**0.131**
Varaždin	46,269	-0.33	-0.30	-0.07	-0.15	**-0.859**
Čabar	3,131	0.27	0.11	-0.07	-0.15	0.161
Belišće	9,435	0.13	0.11	-0.07	0.51	**0.686**
Otok	5,056	-0.10	0.11	-0.07	-0.15	**-0.211**
Klanjec	2,628	-0.38	0.11	-0.07	-0.15	**-0.489**
Daruvar	10,371	-0.80	0.11	-0.07	-0.15	**-0.907**
Opatija	11,042	0.18	0.11	-0.07	-0.15	**0.068**
Hvar	4,493	0.18	-0.30	-0.07	-0.15	**-0.348**
Trogir	12,944	-0.29	0.11	-0.07	-0.15	**-0.397**
Poreč - Parenzo	17,833	0.69	0.11	-0.07	-0.15	**0.579**
Kaštela	40,894	-0.43	0.11	-0.07	-0.15	**-0.536**
Ivanić-Grad	13,705	-0.19	0.11	-0.07	-0.15	**-0.304**
Nova Gradiška	12,287	0.04	0.11	-0.07	-0.15	**-0.071**
Glina	6,718	-0.38	0.11	-0.07	-0.15	**-0.489**

Cities	Population estimates 2019	Voter turnout in the last local elections	GIS	Citizen participation in budget creation	List of city utility companies	Smart Government Index (Descending)
Đakovo	25,063	-0.15	0.11	-0.07	-0.15	**-0.257**
Vinkovci	33,489	-0.29	0.11	-0.07	-0.15	**-0.397**
Komiža	1,484	-0.33	0.11	0.59	-0.15	**0.222**
Drniš	6,126	0.04	-0.30	-0.07	-0.15	**-0.487**
Samobor	37,905	0.22	-0.30	-0.07	-0.15	**-0.301**
Ludbreg	7,450	-0.01	-0.30	0.59	-0.15	**0.132**
Garešnica	8,831	-0.33	-0.30	-0.07	-0.15	**-0.859**
Beli Manastir	8,235	-0.19	0.11	-0.07	-0.15	-0.304
Šibenik	44,275	-0.05	-0.30	-0.07	-0.15	**-0.580**
Makarska	14,362	0.04	-0.30	-0.07	-0.15	**-0.487**
Nin	2,943	0.04	0.11	-0.07	-0.15	**-0.071**
Stari Grad	2,887	-0.15	0.11	-0.07	-0.15	**-0.257**
Trilj	8,251	-0.33	0.11	-0.07	-0.15	**-0.443**
Duga Resa	10,552	-0.52	0.11	-0.07	-0.15	**-0.629**
Ozalj	5,993	-0.01	0.11	-0.07	-0.15	**-0.118**
Popovača	10,860	0.18	0.11	-0.07	0.51	**0.732**
Obrovac	3,649	-0.70	0.11	-0.07	0.51	**-0.150**
Našice	15,180	-0.15	0.11	-0.07	-0.15	**-0.257**
Koprivnica	29,758	-0.19	0.11	-0.07	-0.15	**-0.304**
Vukovar	22,401	0.09	0.11	-0.07	-0.15	**-0.025**
Buje - Buie	4,878	0.04	0.11	-0.07	0.51	**0.593**
Donja Stubica	5,948	-0.15	0.11	-0.07	0.51	**0.407**
Oroslavje	5,951	-0.10	0.11	-0.07	0.51	**0.454**
Valpovo	10,339	0.18	-0.30	-0.07	-0.15	**-0.348**
Ilok	5,256	0.36	0.11	-0.07	-0.15	**0.254**
Slavonski Brod	53,083	-0.24	0.11	-0.07	-0.15	**-0.350**
Donji Miholjac	8,432	-0.01	0.11	-0.07	-0.15	**-0.118**

Cities	Population estimates 2019	Voter turnout in the last local elections	GIS	Citizen participation in budget creation	List of city utility companies	Smart Government Index (Descending)
Rovinj - Rovigno	14,464	0.50	0.11	- 0.07	- 0.15	0.393
Kastav	11,021	0.88	0.11	- 0.07	- 0.15	**0.765**
Zadar	75,627	0.50	0.11	- 0.07	0.51	**1.058**
Virovitica	19,689	- 0.33	0.11	- 0.07	- 0.15	**-0.443**
Vodice	9,345	0.36	0.11	0.59	0.51	**1.584**
Slatina	11,925	- 0.10	0.11	0.59	- 0.15	**0.455**
Županja	9,558	- 0.29	- 0.30	- 0.07	- 0.15	**-0.812**
Sveti Ivan Zelina	14,799	- 0.01	- 0.30	0.59	0.51	**0.796**
Zlatar	5,586	- 0.01	0.11	- 0.07	- 0.15	**-0.118**
Mursko Središće	5,985	- 0.47	0.11	0.59	- 0.15	**0.083**
Petrinja	20,423	- 0.38	0.11	- 0.07	- 0.15	**-0.489**
Slunj	4,070	- 0.24	- 0.30	- 0.07	- 0.15	**-0.766**
Umag - Umago	13,993	- 0.43	- 0.30	- 0.07	- 0.15	**-0.952**
Krk	7,030	- 0.05	0.11	- 0.07	0.51	**0.500**
Zaprešić	25,033	0.55	0.11	0.59	- 0.15	**1.105**
Novigrad - Cittanova	4,752	0.83	- 0.30	- 0.07	- 0.15	**0.303**
Pakrac	6,607	0.64	0.11	- 0.07	- 0.15	**0.533**
Skradin	3,064	0.74	0.11	- 0.07	- 0.15	**0.625**
Benkovac	8,724	- 0.19	0.11	- 0.07	0.51	**0.361**
Vodnjan - Dignano	6,360	- 0.15	- 0.30	- 0.07	- 0.15	**-0.673**
Dugo Selo	18,114	0.09	0.11	- 0.07	- 0.15	**-0.025**

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DRONE LAST MILE DELIVERY: AN ASSESSMENT OF THE VIABLE MARKET AND SECURITY POTENTIAL OF DRONE DELIVERY

Abstract

Purpose: the paper includes a review of the literature in the field of drones, drone technology, possible implementation in the field of the last mile concept, legislation, suitability of technology in the field of security, weather conditions, social acceptance and later focuses on checking the possible implementation of drones according to the set parameters.

Methodology: for the purposes of research and obtaining answers to the posed research question and hypotheses, we used the method of literature review in the selected field, panel data analysis, conducted interviews with experts in the field of delivery drones in the Republic of Slovenia, and conducted secondary research.

Results: the results show an assessment of the possible implementation of drones based on the analysis of the obtained data and interviews. We determined a realistic assessment of the potential of delivery drones, in which we included several vital aspects necessary for implementation.

Conclusion: it was found that the current technology is not yet fully adequate, and significant technological improvements are also needed. It is also necessary to plan integrated urban spatial solutions that will enable safe and efficient delivery in the supply chain. Namely, delivery with drones is currently ineffective due to flight safety, harmful sound emissions and the inability to fly in bad weather conditions. Based on a literature review and a survey among large logistics companies, it was found that there are still many barriers to implementation due to legal norms and regulations, which are currently very constructive. It is unlikely, however, that parcel delivery will take off in an urban environment soon, as there are still many unknowns. With proper planning and use of suburban consolidation centres, e-vans, e-cars and bicycles are currently economically viable for last mile delivery.

Keywords: Drones, last mile, urban logistics, parcel delivery

1. Introduction

In recent years, we have witnessed rapid urbanisation and development. The result is an above-average load on the urban environment, excessive pollution, road congestion, and reduced mobility efficiency. The current use of conventional drives is among the main contributors to carbon dioxide emissions, which increase the greenhouse effect to the greatest extent and represent a severe impact on natural systems (IPCC, 2014). It is known that the possibility of unrestricted use of the World Wide Web is changing the habits of retailers and offers new challenges and opportunities to transform consumers' shopping habits (Wolfinbarger & Gilly, 2003). The way of understanding the concept of supply chains is changing, and due to the above-average increase in sales, new transport problems are also appearing. Currently, the most important problem of transport logistics is the delivery of the first and last mile (Airborne Drones, 2017). Logistics as an industry represents an essential segment of the economy, as it generates between 10 and 12% of the gross domestic product in developed countries, which also applies to Slovenia. The contract logistics market is one of the fastest-growing industries, with expected annual growth of up to 15%. The economic importance of logistics is also reflected in data on the share of its costs in the sales value of goods. According to research, it averages around 8-10%, and in some industries, even up to 30%. The importance of logistics is therefore growing unstoppably, and its usefulness is expanding into various fields (Svašek, 2007). The industry's consistent growth and continuous development mainly present new logistical challenges for sustainable logistics, transport, and delivery of goods to city centres (Basu & Muylle, 2002). Kellerman et al. (2020) focus on the economic benefits of using drones for delivery, while the social and environmental impact of drones is under-reported in most scientific literature. Indeed, many types of research are focused only on the use of different delivery models or the economic efficiency of implementation (Di Puglia Pugliese et al., 2020; Marinelli et al., 2018). However, it is necessary to realise that drones are becoming one of the most researched and potentially useful technologies of the 21st century (Kellerman et al., 2020).

The delivery of packages with the help of unmanned aircraft has proven to be potentially promising in the concept of last-mile delivery. The use of drones represents a faster, cheaper, and more environmentally friendly solution compared to traditional delivery methods (Yoo et al., 2018). According to Deloitte Touche Tohmatsu Limited (2015), the use of drones and unmanned vehicles will play a significant role in the supply chain in the future. Chaturvedi et al. (2016) predict that 80% of deliveries will soon be made by driverless vehicles.

From the point of view of logistics, the delivery itself causes disturbances even at the place where the goods are delivered. Delivery traffic often requires more space due to loading and unloading, storage and packaging (Dablanc, 2007). The concept of the last mile in connection with drones will become a trend soon, as the demand for delivery increases. This is how delivery with drones is becoming interesting, as more people want home delivery of packages. Doole et al. (2020) estimate that the number of packages increased in 2018 and 2019 by more than 10% each year. This growth in the number of packages is a global trend and is primarily due to the increasing popularity of e-commerce (Yoo & Chankov, 2018). With the growing number of online shoppers, parcel delivery is also increasing, as most goods purchased online are delivered directly to customers (Aurambout et al., 2019).

The use of unmanned aerial vehicles in transport and their potential application benefits in this field have sparked a genuine research fervour focused on the strategic and operational challenges associated with unmanned aircraft. Thus, it can be seen that most of these studies investigate versions of the travelling salesman problem and the vehicle routing problem.

The implementation of drones in urban areas is becoming more and more likely. The goal is to direct the current road transport of goods into the air. According to some concepts, cities will build consolidation centres in the suburbs. Their purpose is to consolidate or combine packages and prepare them for delivery within the urban city environment. A smartphone and GPS application will allow the user to order and track a drone delivery to a specific location where they can also pick up the shipment. Therefore, delivery by drone presents many advantages from the point of view of the retailer as well as the consumer. New technology also presents new logistical challenges. With the possible implementation of delivery by drones, delivery times will be shortened due to the use of airspace. In addition, there is less chance of the cargo being damaged during transport and manipulation (Airborne Drones, 2017). According to Lovelace Jr. (2016), drones rep-

resent excellent potential for cost savings. In 2025, 80% of food deliveries are expected to be carried out by drones and driverless vehicles, and delivery costs are expected to decrease by up to 50% (Aysev et al., 2017; Bouton et al., 2017).

In the field of drone development, the number of public and private research laboratories has also increased in recent years. They are developing human-friendly and accessible drones that can fly autonomously indoors, outdoors, and near people and urban areas. Current development is aimed at miniaturisation and cost reduction of sophisticated electronic components (microprocessors, sensors, batteries, wireless communication units, control) and increasing transport capacity. Improvements allow companies to prototype and commercialise drones (Floreano & Wood, 2015). In addition, there is much interest in the field of electromagnetic spectrum sensing (infrastructure maintenance inspections, extensive environmental impact assessment). The air project is successfully aimed at the use of drones for the delivery of commercial products. Some applications may cross boundaries; air and water quality samples can be collected for laboratory analysis or assessed on-site with onboard sensors (Gallacher, 2016).

The use of drones is based on sophisticated technology that is successfully developing and already offers advanced solutions today. Currently, technology research is focused on (Cohn et al., 2017):

- flight autonomy. Drones can already operate entirely autonomously without the help of the user. In the next five years, the responsiveness of the system and the dynamic guidance of the flight without the use of hands (handoff) should be further improved;
- battery capacity. The rapid development of batteries represents an added value in using drones. The quality of lithium-ion batteries is improving every year by 5 to 8%, and their lifespan is expected to double by 2025. The improvements will allow the drones to fly for more than an hour without recharging;
- technology of detection and prevention (Detect and avoid). The development of the mentioned technologies is currently in a phase of rapid development. In the future, these systems will prevent drones from colliding and steer them away from obstacles;
- integrated air traffic management (ATM) systems. Due to the potential risk of collision, drone flights are currently permitted below the altitude reserved for commercial aircraft. Thus, development is focused on recognition and communication with air traffic control systems;
- location technology. Drones must recognise their location even in a possible anomaly and GPS failure. Densely populated urban areas and remote locations present a problem in terms of inactivity or displaying the wrong location. Therefore, future integration of air traffic and location recognition systems with drones is necessary.

Nowadays, the professional use of drones is already present in the field of geography and geodesy because, with the help of drones, we can obtain high-quality and high-resolution images from the air. In agriculture, they can be used to monitor the quality of plant products. Construction companies use them to monitor construction progress, and in mining, we can use drones to obtain accurate volumetric data on excavations. Drones are also becoming a fixture in the energy and infrastructure industry, as they can be used to inspect pipelines, roads, and cables in inaccessible areas (Floreano & Wood, 2015).

When we talk about transport with the help of drones, today, they already offer safe landing and take-off near buildings and people in urban areas. The mentioned feature represents a novelty in package delivery, and the road infrastructure we know today will no longer be needed to deliver goods. In the future, drones will enable fast and efficient delivery of goods anywhere and anytime. The concept of e-business and Industry 4.0 will come to life with the implementation of drones. In the future, the use of drones will represent a critical supporting element in the development of underdeveloped countries. By using drones, we can already improve the quality of services in congested urban areas and remote uninhabited areas where the use of classic transport is reduced or impossible. Drones enable rapid delivery of medical supplies, food, and medicine to inaccessible areas. Firefighters, the police, and the military are also aware of the benefits of using it (Floreano & Wood, 2015). The retail giant

Amazon was the first company on the global market in 2013 to introduce a drone, Prime Air, whose purpose is to deliver packages and reduce delivery times in major cities to 30 minutes. The company started a revolution in package delivery as competing companies also began to realise the advantages and opportunities offered by the implementation of drones (BBC NEWS, 2013). As a result, the DHL company prepared a pilot program to introduce drones for package delivery purposes (Figure 1), followed by the Google company with the "Wing" project and UPS, which is engaged in research into the movement of packages between distribution centres and airports.

1.1 Drone operations

There are several models of dealing with the Drone Delivery System. For example, Marinelli et al. (2018) consider a delivery system where drones, in conjunction with trucks (Figure 1), fly from a truck to a location and return to the truck after dropping off a package. Thus, from the point of view of such treatment, we are talking about the emotional problem of the travelling salesman. Also, the author claims that such a method is currently the most effective delivery for drones.

Figure 1 Delivery system with drones, in conjunction with trucks – City of Celje

Source: Authors

In the scientific literature, establishing a specific node – hub where goods are delivered and further distributed by drones is often mentioned (Goodchild & Toy, 2018). The so-called hives have the characteristic of a back-storage. Aurambout et al. (2019) believe that such a hinterland must have a relatively large number of addresses in its vicinity to be economically competitive. Doole et al. (2020) define a system where vans deliver goods to a hub (Figure 2), and from this hub, the goods are delivered to the destination. Murray & Chu (2015) believe that the size of such a hinterland largely depends on the distance that drones can fly on a battery charge. Such a system of back-end centres can also be combined with traditional delivery trucks, where the trucks still deliver to houses convenient for the route, while the drones serve other locations.

Figure 2 The goods are delivered to the destination from the hub – the City of Celje

Source: Authors

1.2 Public acceptance, security and privacy

There are empirical public opinion surveys that examine various issues related to drones. Faulkner Rogers (2013) examines public approval of using drones with weapons. Reason Wong & Mulligan (2016) highlights privacy concerns and the use of drones for surveillance purposes by law enforcement agencies. Research has shown that acceptance for most drone use in the European Union is high. This is especially true for research and security. The acceptance of drones for package delivery is much lower, with 49% of people perceiving it as a good or good thing and 21% as a bad or horrible thing (Kennisinstituut Voor Mobiliteitsbeleid, 2017). However, Clothier et al. (2015) expect that the general attitude towards the adoption of drones will change a lot in the future, as there is a lack of public knowledge about the safety and interference issues, as well as the added benefits. Nentwich & Horváth (2018) believe that restrictions on the use of drones will be determined by society. Also, privacy will play an essential role in the adoption of drones. Namely, the problem is represented by recreational drones, which represent a potential threat in the field of privacy as they are equipped with a camera. Lidynia et al. (2017) note that privacy is an essential criterion at this stage.

Improper use or even abuse can endanger lives. We can apply the principles of security and security analysis to any device or system we use or the organisation that makes it (products or manufacturers) and identify the risk. Lavaliee (2019) believes that the future large-scale integration of unmanned systems into the airspace may cause problems:

- in the field of general safety (if they are not used appropriately and cause damage);
- in the field of privacy and personal data protection (because it can be used for photography, recording, data collection...);
- in the area of liability and insurance of third parties (in case of accidents); and,
- in the field of environmental issues (e.g. noise). Therefore, at the level of integration of drones into the airspace, we must take into account the necessary legal, political and technical provisions.

It is also necessary to face dangers such as (Lavaliee, 2019):

- Danger during take-off and landing;
- Risk of failure of critical components;
- Risk of collision;
- Danger due to excessive exposure to noise;
- The risk of the illegal invasion of privacy;
- Fire hazard.

In addition, there are other possibilities for damage that can be caused by remote aircraft systems, namely (Macnish, 2019):

- Civic inactivity: Individuals may become afraid to express their dissatisfaction with a system and participate publicly in rallies, demonstrations, and petitions if they suspect or know that their photo will be stored in police files;
- Social "sorting": Stereotyping, stigmatisation, discrimination; it is entirely possible that certain social groups and communities would be more under control, observed, as the stigma of "criminals" would cling to them;
- Imbalance in the distribution of costs: Someone may also bear the high costs of state control more than anyone else. This would further contribute to the socio-cultural division of society;
- Paternalism: State paternalism means that someone as a "parent" takes care of you and protects you - but for your own good;
- Social fatalism: Paternalism can lead to the "surrender to fate" of individuals because they would realise that since they are protected by the state, they cannot do anything or influence anything themselves;
- Behavioural Uniformity: Individuals in such a controlled system will not want to expose themselves, or do anything that would cause them to "stand out" to attract attention;
- Reduction of trust: It is often said that if you are not doing anything wrong, you do not need to hide anything - when being monitored;
- Fear of surveillance: With increased surveillance comes more fear (of exposing even non-criminal acts).

1.3 Drone regulations

The European Aviation Safety Agency handles the regulation of the aviation sector in the EU. It is responsible for the operations of various aircraft in the EU; EASA is responsible for aircraft over 150 kg and under 150 kg, previously the responsibility of individual member states (Molina & Montagud, 2018). Rijksoverheid (2021) divides all drone flights into three different categories. Thus, there is a category of low, medium, and high risk. We refer to these categories as EASA (2019) open, specified, and certified categories.

EASA (2019) has also published a brochure with recommendations for the management of drones. These are as follows:

- Possession of suitable insurance;
- Check the drone before the actual flight;
- Check the restrictions of the individual areas where the drone will be operated;
- Keep the drone in line of sight at all times;
- Maintain a suitable distance between the drone, people, animals and other aircraft;
- If the drone is flown near people, its speed should be reduced, keep it horizontal - distance to them, but never less than 5 meters;
- Operating the drone in accordance with the restrictions issued by the manufacturer; follow the manufacturer's instructions;
- Urgently notify the national aviation organisation if the drone is involved in an accident with serious or fatal consequences, or if the accident affected the flight crew;
- Do not make changes to the drone that are not supported by the manufacturer;
- The drone must not fly more than 150 m above the ground;
- The drone must not be flown near airports, helipads and other pilot areas, about aircraft, as well as not in areas where it could endanger public safety, or about areas where prisons, military bases, power plants, etc. are located;
- The drone must not fly over large groups of people;
- The drone may not record videos, take photos, or record sound of individuals without their prior permission;

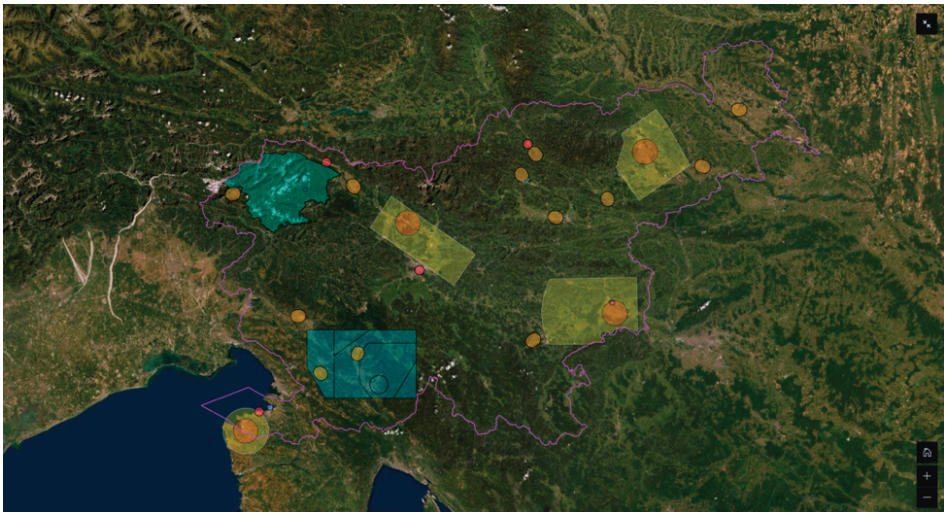
- If we fly a drone over land or property of individuals, we must take into account a distance of at least 20 m; if less, we must have their permission;
- Respect for the privacy of individuals;
- The drone must not carry dangerous substances or objects;
- Plan your flight;
- Check the restrictions of individual areas and get to know the area where you want to fly;
- Check weather conditions;
- Verify the electronic identification and geo-awareness system.

All regulations in the Republic of Slovenia derive from the adopted legal acts of the European Union Aviation Safety Agency (EASA). Commission Implementing Regulation (EU) 2015/947 sets out the rules and procedures for the operation of unmanned aircraft and is directly applicable in all EU member states. In addition to the regulation, the Slovenian Regulation on the Implementation of the Implementing Regulation of the Commission (EU) on Rules and Procedures for the Management of Unmanned Aircraft (Official Gazette of the Republic of Slovenia No. 195/20) and the Delegated Regulation of the Commission (EU) 2019 also apply to unmanned aircraft (drones) /945 of 12 March 2019 on unmanned aircraft systems and operators of unmanned aircraft systems from third countries (C/2019/1821) (EASA, 2019).

It is important to point out that member states must establish a register of unmanned certified aircraft and a register of operators. The register must be digital and interoperable, and the competent authorities of the member states are obliged to give each other access to the register (CAA, 2022).

Figure 3 shows a map of zones (CAA, 2022) with limited low-flying or no-fly zones. Orange dots represent no-fly zones, while yellow areas represent low-fly zones. The green area represents the national park, where flying is also restricted, and the marked blue zone represents the zone where military activities occur. Flying is prohibited during specific periods. The map also contains red zones where flying is wholly prohibited due to industrial facilities of national importance.

Figure 3 Drone flight zones in Slovenia



Source: CAA (2022)

2. Methods

The goal of this research is to determine to what extent drones will be useful from the point of view of the concept of the last mile in the Republic of Slovenia. Thus, we will build a theoretical framework, look for solutions and make proposals related to the introduction of drones, examine the compliance of the introduction regarding legislative regulations and whether delivery in the urban area can be im-

plemented. By creating a multi-factor model and interviewing experts and delivery companies, this research provides detailed insight into what factors are most limiting to drone delivery. These factors will then be presented and used to assess the feasibility of the implementation. We will also present their potential in the coming years.

The main research question is: *To what extent will delivery drones be introduced as part of the last mile delivery traffic in the Republic of Slovenia in the coming decade?*

We also set the following hypotheses:

H1: *The use of drones has great potential for use in the last mile concept.*

H2: *Companies and experts perceive opportunities for the implementation of drones.*

2.1 Estimation of delivery drone potential

Based on the collected theoretical data, we will determine the possibility of implementing drones in connection with the concept of the last mile. Thus, it is necessary to justify the expediency of the implementation of drones in relation to the number of delivered packages in the Republic of Slovenia. Weight, weather conditions, flight zones, and possible prohibitions must be included when determining performance and rating. Thus, with the help of the literature and subsequent calculations, we will present the obtained results.

2.2 Qualitative approach – the future of drone delivery in Slovenia

According to Steen (2016), an analysis of innovation and industrial change should be based on a combination of retrospective data. Thus, interviews with companies are a suitable method for data collection. Furthermore, Nentwich & Horváth (2018) recommend combining the views of companies and experts when reviewing drone implementation scenarios. Thus, we included companies experimenting with drones in Slovenia and experts with knowledge in the field of delivery drones in the analysis.

In the field of companies, we included Pošta Slovenije and ElevonX in the interview. Both companies are pioneers in the field of drone delivery in Slovenia. In the field of science and research, we included the Professor of Sustainable Logistics and Assistant Professor of Sustainable logistics and transport in the interview. All interviews were conducted in person at companies and the University of Maribor.

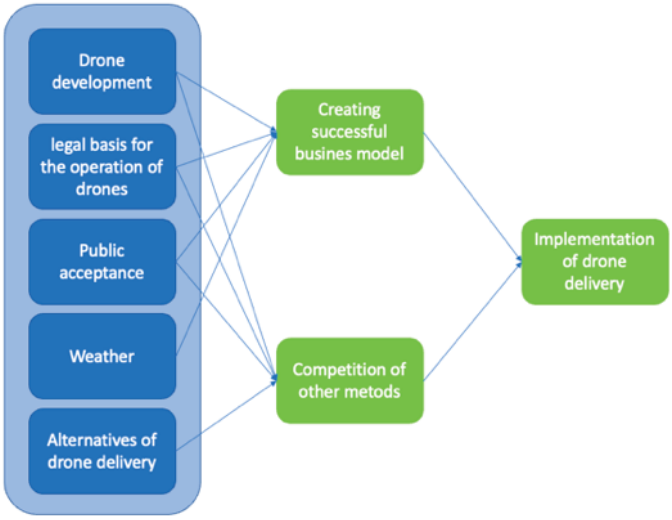
The questions in the interviews were semi-structured. Also, the order of the questions was adjusted due to the interview. The questions we asked followed in the existing order:

- Have you already done research on the use of drones in the last mile area?
- What is your position in the company or University?
- Have you supervised studies by students conducting drone research in this area?
- How does your work relate to the use of drones?
- Do you actively follow the developments in the field of delivery drones?
- What are the main limitations that may limit the potential of drones in last mile delivery?
- What international developments do you see in the field of drone delivery?
- Justify how the safety of drones can be improved to be suitable for delivery in urban areas?
- How do you expect people's acceptance to develop if a regular drone service were introduced?
- What do you expect from the future of drones as delivery vehicles?
- Do you think drone delivery has economic potential?
- Is development going faster or slower than you expected a few years ago?
- In what environment would delivery drones currently be appropriate?
- In what environment do you expect the first drone delivery networks?
- When do you expect drone delivery to be economically feasible?
- According to the current legislation, establishing delivery networks with drones is impossible. Do you expect that there will be more room for the use of drones in the future?

2.3 Building the conceptual model

When building the conceptual model (Figure 4), we took theoretical knowledge into account. Within these categories, the theoretical framework identified several aspects that could play a role in delivery. By creating a multi-aspect framework, it is possible to see the effect of these defined aspects on the total number of possible drone deliveries in the Republic of Slovenia.

Figure 4 Multi-Factor Model



Source: Authors

3. Analysis

3.1 Estimation of drone potential in Slovenia

The parcel transfer market is a segment of the postal services market where the reception, routing, transport, and delivery of parcels are carried out. The essential function of the parcel service is the transfer of goods between the sender and the addressee, which may or may not have a considerable value. Parcel shipments are up to 31.5 kg, the contents of which are goods. In addition, as a universal service, the transfer of packages up to 10 kilograms in domestic traffic and up to 20 kg for packages arriving from other EU member states is carried out (AKOS, 2020).

There were 15.4 million shipments on the domestic parcel market in 2019, which is a 6.2% increase compared to the previous year. The number of packages has been steadily increasing since 2015, growing by 50% from 2015 to 2019, and the cumulative package growth from 2011 to 2019 was 64.5% (AKOS, 2020).

3.2 Weight

Drones operating in urban areas have an estimated payload of around 2.2 kilograms (Doole et al., 2020). Weight is summarised based on data from Amazon Prime Air (Lovelace, 2016). According to Doole et al. (2020), 86% of packages are lighter than 2.2 kilograms. If such a weight is given to a standardised commodity, it can be adjusted to this demand. Based on the obtained data (AKOS, 2020), we can assume that 13.24 million (86% of 15.4 million) packages would be eligible for drone delivery by weight in the Republic of Slovenia.

3.3 Weather

Doole et al. (2020) believe that weather conditions also mention the problem of drone delivery. The Kennisinstituut Voor Mobiliteitsbeleid (2017) identifies three different weather aspects that play an essential role. These conditions are precipitation, extreme temperatures, and wind. According to Bergsma (2021), weather condi-

tions have been found to affect the potential of drone delivery services. In Table 1, we obtained statistical data on weather conditions in the Republic of Slovenia.

Table 1 Weather data according to the possibility of flight restrictions

Weather factor 2021	Days	Percentage
Temperature < 0	69	18.9%
Rain	149	40.8%
Wind speed > 8 m/s	42	11.5%

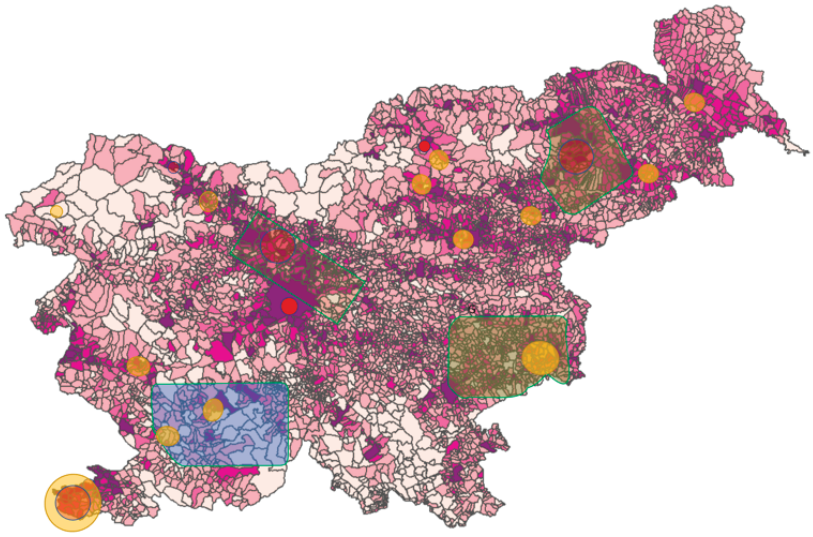
Source: Arso Meteo (2022)

Based on the obtained results, we found that drones could fly in the Republic of Slovenia on 28.8% of the days of the year, according to weather conditions. Thus, it can be argued that weather conditions significantly limit the potential of drone deliveries.

3.4 Limitations by no-fly zones

According to data (SiStat, 2022), there are currently 2,865,000 registered addresses in the Republic of Slovenia. We mapped these addresses (Figure 5) with the help of ArcGis and found that 31% of prohibited and low fly areas of all addresses in urban areas lie in prohibited areas or partial flight bans. Of these, 23% (prohibited areas) are addresses where drone delivery is impossible. On the other hand, we also note that 82% of addresses in rural areas are suitable for drone delivery.

Figure 5 Display of flight restriction zones based on pact delivery addresses



Source: Authors

3.5 The future of drone delivery in Slovenia – expert view

Pošta Slovenije conducted the first test flight with an unmanned aircraft in cooperation with the Slovenian company OneDrone, which is the first Slovenian operator of unmanned aircraft of the highest category and enables the implementation of aerial operations in the most demanding conditions. The start-up company ElevonX, a manufacturer of unmanned aerial vehicles or complete systems, also participated. The start-up developed the ElevonX SkyEye modular unmanned aerial system and brought it to series production. Pošta Slovenije

performed the first test flights with unmanned aerial vehicles. In this way, it is preparing for when it can deliver urgently needed shipments to places where conventional vehicles cannot deliver them so quickly and efficiently. Given the current trends in delivery, we are no longer far from being able to make deliveries with drones in logistics instead of test flights. Furthermore, we want to be actively involved in creating regulations governing the flying and management of drones in Slovenia, with the explicit goal of finding new business opportunities.

The interviewed companies highlighted several different aspects that need to be improved. They highlighted the problem of GPS distortion due to physical obstacles in the field. The drone's stability when landing due to the package is also a problem. They also highlighted the problem of technology that enables safe and dynamic flying. The interviewees also believe that drone operations will not be as limited in the future as they are today. Thus, they believe that delivery by drones will become a reality soon.

The interviewed companies believe that technology has enabled delivery by drones for a long time. However, the current regulations governing airspace pose a problem. Currently, there is not much room for manoeuvring in the European area for mass production deliveries.

They also highlighted the potential of using drones in delivery for various purposes. They believe that the initial deliveries will be aimed at the delivery of laboratory samples from remote areas, the delivery of medical devices, the delivery of goods from ships to land, and later, with intelligent regulations, the delivery of online purchases to end customers can also be expected.

Also, the companies' experts note that the public's reaction is positive. They think that the public generally supports the first test delivery that they carried out. However, they pointed out that in conversations with the public, they noticed specific issues related to safety and noise. Thus, they believe development and research should improve safety and reduce noise emissions.

Interviewees believe it will take quite some time before the first working drone networks can become a reality. Therefore, we were interested in where the interviewees see opportunities for a successful business model with delivery drones. Interviewees conclude that it will take at least a few years before a drone network can be operational. This is how companies generally see the potential for these services. Therefore, they believe that investing in drone experiments will yield positive results. However, they state that delivery by van or bicycle is already a very efficient system, and the cost of operating drones is still higher than existing methods. Hence, drone delivery is unlikely to be adopted for simple package delivery anytime soon.

According to the interviewees, it becomes clear that the development of drones is still in its early stages. Thus, we cannot confidently say that the public will agree with the implementation. Also, there will still be many steps to be taken technologically. However, due to possible improvements in this area, this aspect is probably not a significant limitation in the development of drones. It was also noted that currently, the most critical obstacles in the field of legislation are the ones that prevent commercial drone delivery services from flying. New legislation was introduced in the Republic of Slovenia in January 2021, but even with these new rules, the legislation will probably continue to inhibit the development of drones.

It should be noted that drones are currently more expensive to operate compared to other delivery methods, such as vans or bicycles. Therefore, we believe that the first implementations of drones are limited to niche functions where high-priority, high-value products need to be delivered. We also consider the widespread use of drones to deliver food and packages an unlikely scenario.

4. Results

In the following section, based on the obtained theory and results, we will answer the research question: *To what extent will delivery drones be introduced as part of the last mile delivery traffic in the Republic of Slovenia in the coming decade?*

We will answer this question with a combination of the results of tests and calculations, which were created based on an analysis and review of the literature. It is clear from the theoretical work that several factors will shape the implementation of drones for commercial delivery purposes in the next decade. At this point, it is necessary to highlight three key factors. These are legislative barriers, technological capacity, and social acceptance of the presented technology. Based on the literature review, it was determined that the key to implementation is positive acceptance by society. We find it easier for society to adopt drones for medical emergencies than for commercial delivery purposes. We also note that many improvements are needed for technological capabilities, as there are still quite a

few problems in the field of sensors, battery capacity, and the behaviour of devices in terrible weather conditions. We also note that legislative obstacles due to the new regulations are still partially undefined and point to the ambiguity of the very possibility of implementing drones in everyday life. The results indicate that several factors related to delivery drones must change before this technology becomes a reality. Efforts by the European Union to harmonise drone regulations in member states may significantly increase the potential number of packages suitable for drone delivery.

One of the significant limitations of the implementation of drones in the delivery system is weather conditions, which harm the implementation. Namely, due to the geographical location of the Republic of Slovenia, we can claim from the obtained results that at least part of the year, which is quite rainy, represents a problem in the implementation of drones. This particularly highlights the reliability of future drone delivery. An essential aspect of why weather reliability should be considered is because one of the primary motivators for potential drone delivery companies is the maximum efficiency and predictability that delivery companies strive for. Until there are technological improvements related to weather conditions, drones will not be able to meet the criteria of good economic use, and it is unlikely that these companies will use drones on a large scale. Therefore, technological improvements in weather resistance would be crucial to adopting drones for delivery. Doole et al. (2020) expect that in the future, drone technology will be so advanced that the number of days a drone could not operate due to weather conditions would be zero.

It is also necessary to highlight the areas of flight that currently limit delivery in certain areas. In this case, patience is also required for technological improvements because otherwise, the legislation will remain restrictive, and flying will be limited. The analysis shows that urban areas are likely to be particularly affected by the prohibition zones. This can pose an additional problem for the implementation and potential of drones when a drone network requires a high population density in its environment to be effective. Aurambout et al. (2019) and Doole et al. (2020) expect that, from the point of view of implementation, technical perfection and legal regulation will be a condition before the introduction of drones becomes economically justified. With this in mind, it is clear that extending the current no-fly zones for low-risk drones to delivery drones would preclude widespread use. It is also necessary to highlight that the number of addresses not part of these zones is quite large. However, in this case, the drone networks are fragmented, which would significantly limit their effectiveness when we talk about the last mile of delivery. If the legislation is not adapted to support such operations, Slovenian airspace is not suitable for delivery by drones. However, as new drone regulations are constantly changing and upgrading based on market demands, these no-fly zones can also change significantly. How this plays out will significantly impact the potential of delivery drones over the next decade. Despite the limitations caused by the mentioned aspects, the calculation still showed that almost 82% of all packages delivered by the six major delivery companies would currently be suitable for delivery by drones.

In the following section, we will check the hypotheses we have set for the research purposes.

H1: *The use of drones has great potential for use in the last mile concept.*

Based on the theoretical work, we notice that more and more authors highlight the economic potential of last-mile delivery with drones. We find that drones will lead to a reduction in time and cost in the last mile. However, several technological barriers currently limit the potential. Based on the interviews, it is also becoming apparent that widespread adoption is, at best, a distant future scenario, although drone deliveries are already being tested today. As found in the analysis, current drone technology and legislation still severely limit the implementation of drones for commercial delivery purposes. While these factors do not prevent all drone delivery operations, they still prevent widespread use for now. Based on the results, it is likely that the role of these limiting factors will diminish with further development of technology and legislation.

We note that in delivery, niche roles in high-value functions such as healthcare are likely to be introduced. Such niche features could work as a blueprint for drone delivery operations in other areas. However, the execution depends on whether drones are more competitive than other current delivery methods. The results of this research show less potential for drones concerning the concept of the last mile than the literature described in the theoretical framework. One reason is that many researchers envision specific technological improvements to

drones that are not currently on the market. Thus, it is uncertain whether this predicted technology development will occur. Also, additional developments in drone security could significantly increase the cost of operating drones, making them much more challenging to operate, especially when we talk about the last mile concept. The interviews made it possible to detect concerns about implementing this technology in cities. Namely, city centres are very unsuitable for the operation of drones, as there is currently no suitable infrastructure for safe and efficient package disposal. In countries with poorer infrastructure, competition from other delivery methods is likely less of a factor, and the potential for drones may be more significant.

H2: *Companies and experts perceive opportunities for the implementation of drones.*

Interest in the field of drone delivery in Slovenia is on the rise. Based on interviews with experts and companies, we found that a competitive environment is being created, but currently, such delivery is only in the test phase. The interviewees believe that much time will pass, and many more tests will be needed for the idea to be implemented in reality. The surveyed companies highlighted several different aspects that need to be improved. They pointed out the problem of GPS distortion, the current instability of the drone when landing due to the package, the problem of technology that enables safe and dynamic flying, and the problem of legislation and public perception.

Nevertheless, experts and companies in the Republic of Slovenia believe that the operation of drones in the future will not be as limited as it is today. Thus, they believe that drone delivery will soon become a reality. Experts highlighted the potential of using drones in delivery for various purposes. They believe that the initial deliveries will be aimed at the delivery of laboratory samples from remote areas, the delivery of medical devices, the delivery of goods from ships to land, and later, with intelligent regulation, the delivery of online purchases to end customers can also be expected. It is also necessary to highlight the investment in drone experiments, yielding positive results. We also note that delivery by van or bicycle is already very efficient in urban environments, but the cost of operating drones is still higher than existing methods. Therefore, it is unlikely that drone delivery will be adopted for simple package delivery any time soon.

5. Conclusion

Setting up a drone delivery system in urban areas raises many questions. They are related to privacy, security, environmental risks and the direct impact of drones in connection with urban delivery and transportation. The industry was the first to recognise the possibilities of using drones in civil airspace, and ideas about the transportation of shipments emerged. In addition to transportation, the industry has recognised other advantages in the form of activities that were recently performed only by manned aircraft. Thus, we can claim that the industry is aware of the importance of the exposed technology, but full implementation will require a lot of invested energy, both in the technical and legal fields. Namely, as we have already pointed out, there are quite a few obstacles to the implementation in the full sense. This is also related to privacy, security, other environmental requirements, and legislation. Over the past ten years, the number of noise restrictions has doubled as part of the restriction (Antoine & Kroo, 2002). Commercial use of drones is restricted in much of the world, but the U.S. The Federal Administration and the European Aviation Safety Agency are developing regulations to enable greater commercial use (EASA, 2019). There are also issues related to infrastructure. The widespread adoption of drones to replace the current delivery of parcels in cities could also affect the complete transformation of the energy system in the future. Thus, upon possible introduction, the entire demand for current derivatives, which are implemented for the purposes of current transport use, would change. However, the current energy system is also unsuitable and unsustainable for possible mass use (Stolaroff et al., 2018).

In addition, we found that the implementation of drone delivery will also strongly depend on the terrain, geographical location, weather and weather influences. The Republic of Slovenia has strong geographical and weather diversity, so conducting research in smaller areas, e.g., according to regions would be advisable. We have also found that there are no studies regarding the adoption of drone technology in the Republic of Slovenia, so we propose to carry out a study with surveys among the general population in the Republic of Slovenia in the future to find out whether the public will agree with the implementation.

Understanding these issues forces decision-makers and the public to face integrated energy and environmental solutions today, which in the future will deliver the first package to our doorstep with the help of a drone.

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THE ROLE OF SUPPLIER SATISFACTION SURVEY IN BUILDING PARTNERSHIPS

Abstract

Purpose: The main goal of this paper's research was to determine the role and justification of surveying supplier satisfaction in building partnerships.

Methodology: To collect primary data, qualitative research was used, which was conducted in several phases. The study tested nine key criteria modelled on the work of Vos et al. (2016). The sample of key suppliers was determined from a non-probability sample of experts from eight strategic suppliers who agreed to participate in the research. A qualitative approach was used due to the small sample and the desire to apply a different approach since the authors used a quantitative approach in most of the analysed papers.

Results: Research has shown that the key criteria for supplier satisfaction are reliability, communication, and operative excellence of the customer they work with.

Conclusion: Any long-term and successful business relationship implies the satisfaction of all parties in the relationship. The concept of supplier satisfaction research is a business practice of a modest number of companies. Despite this, the research participants confirmed that there are solid arguments and interest in introducing this type of research and its continuous implementation. The recommendation is the systematic introduction of supplier relationship management and, as part of that, the introduction of the practice of conducting supplier satisfaction surveys.

Keywords: Supply chain management, supplier relationship management, supplier satisfaction survey

1. Introduction

Satisfaction is the basis of the success of every relationship. In business management, significant attention is paid to satisfaction, especially to the satisfaction of customers and employees. It is common practice in most companies to conduct customer satisfaction surveys and employee satisfaction surveys regularly.

In business practice, there are few examples of companies that recognised the importance of supplier satisfaction and ventured into supplier satisfaction research, i.e., evaluating their own competencies and operations from the suppliers' perspective. This area began to receive attention in the last decade of the 20th century, but it is still insufficiently researched in the scientific and business community.

The most comprehensive research on this topic was conducted by Maunu (2003), Essig and Amann (2009), Hüttinger et al. (2014) and Vos et al. (2016). The methodology in this paper is adapted from the research of Vos et al. (2016).

The subject of this research paper is the investigation of supplier satisfaction and the criteria that influence supplier satisfaction. The main goal of the paper is to determine the justification and purposefulness of conducting supplier satisfaction research and to investigate the degree of supplier satisfaction according to criteria based on the synthesis of existing literature and interviews with procurement experts. The research results will try to contribute to understanding the importance of satisfaction of all supply chain members, emphasising supplier satisfaction.

Performance measurement is important for every business activity, and the goal of measurement is to identify and correct deficiencies and work on improving performance to achieve the most successful business results. Without measuring and monitoring progress, it is impossible to achieve desired results. Satisfaction in a business relationship can be defined as a positive affective state resulting from the evaluation of all aspects of business relationships between companies (Anderson & Narus, 1984, as cited in Maunu, 2003). Satisfaction research experienced its expansion in the second half of the twentieth century and focused mainly on customer and employee satisfaction research (Essig & Amann, 2009).

A long-term customer relationship is based on good relations, i.e., customer satisfaction. Wong (2000) emphasises the importance of cultivating a culture of collaboration with suppliers. He points out that business excellence can be achieved by integrating customer satisfaction with supplier satisfaction and that customer satisfaction is a consequence of supplier satisfaction. Although there is an analogy between customer satisfaction and supplier satisfaction, these two concepts cannot be identified, and one cannot speak of a mirror process because customer satisfaction research belongs to the lower part of the value chain, while supplier satisfaction research belongs to its upper part (Essig & Amman, 2009). Customer and consumer satisfaction research is mainly in the marketing domain, while supplier satisfaction research intertwines marketing, management, and supply chain management.

Supplier satisfaction is the latest part of the continuous evolution of supply chain management that has evolved from chain structuring, a focus on costs, and a focus on product customisation. Recent findings have led to a recent shift in focus to close collaboration with chain participants and synchronisation of operations with an emphasis on collaboration with suppliers (Maunu, 2003). In contrast to the classic view of marketing, which implies a struggle for customers, research related to suppliers and their satisfaction talks about reverse marketing, i.e., the struggle of buyers for competent suppliers. This trend is a consequence of current developments in modern supply chains in which there is a reduction in the number of suppliers and dependence on suppliers due to the increasing prevalence of outsourcing (Vos et al., 2016). Namely, to reduce costs, companies reduce their network of suppliers. In their efforts to focus on their core business, they use outsourcing for all activities beyond their primary business. The result of such developments is that the power position of suppliers is getting stronger, and they are the ones who choose their partners. Maunu (2003) also draws attention to the concept of reverse marketing, in which there is a change in the conventional supplier-customer relationship. While in traditional marketing the initiative comes from the supplier, in reverse marketing, the initiative is taken by the customer. Due to the increasing dependence on suppliers, companies need to partner with suppliers and ensure their satisfaction.

2. Overview of relevant supplier satisfaction surveys

The first studies that mentioned the concept of supplier satisfaction dealt with satisfaction in the customer-supplier relationship but most concentrated exclusively on customer satisfaction. At the beginning of the century, the Journal of Purchasing and Supply Management, one of the most prominent journals in the field of supply chain management, paid attention to this problem by analysing ten published surveys of customer-supplier satisfaction (Arkader & Frossard Ferreira, 2004; Cousins & Spekman, 2003; Gelderman & Van Weele, 2003; Jahns et al., 2006; Large, 2005; Mőllering, 2003; Paulraj et al., 2006; Rabade & Alfaro, 2006; Tyan & Wee, 2003 and Wagner & Schwab, 2004). All ten studies focused on satisfaction in the relationship from the customer's perspective, while the supplier's satisfaction was almost neglected (Essig & Amann, 2009).

Although research on supplier satisfaction from the suppliers' perspective is still an under-researched area, judging by the number of analysed studies, it is possible to conclude that increased interest in this topic occurred at the beginning of this century. Therefore, the analysis of relevant research in the continuation of the work includes works from the beginning of the 21st century to the present day. Most supplier satisfaction research is based on the relationship between manufacturing companies and their strategic suppliers. Other relationships between supply chain participants are rarely explored in scientific papers. Previous research on the satisfaction of supply chain participants has mainly concentrated on the perspective of one of the chain participants, the customer or the supplier. However, some studies tried comparing cooperation views from both perspectives, such as Nyaga et al. (2010) and Hüttinger et al. (2014). In their research from 2009, Essig and Amann synthesised previous research that dealt with the concept of supplier satisfaction. The first surveys of supplier satisfaction have already pointed to the importance of cooperation between buyers and suppliers, as their relationship impacts a whole range of relationships in the supply chain. Below is a brief review of several significant surveys of supplier satisfaction.

Research by Wong (2000) showed that cooperation with suppliers undoubtedly affects customer satisfaction. The research suggests it is essential to work closely with suppliers, develop a collaborative culture, commit to working towards supplier satisfaction and adopt an open attitude when interacting with suppliers. Companies that cultivate a culture of cooperation with suppliers also cultivate a culture of cooperation with their customers. Such a way of working not only leads to satisfied suppliers but also to higher customer satisfaction. Wong expanded his 2000 research with new findings from the 2002 survey. 139 supply chain managers participated in this survey. They helped identify factors that influence the success of the partnership relationship and once again confirmed the findings from the first survey that partnership with suppliers leads to a higher level of customer satisfaction. It is important to emphasise that the respondents in this research were not suppliers but managers who cooperate with suppliers daily. The research developed a comprehensive model for maintaining a successful business by partnering with suppliers. The model is based on the theory of cooperation and competition of the American social psychologist Morton Deutsch, which suggests that goals aimed at cooperation rather than goals aimed at competition and constructive discussions lead to effective teamwork. Wong (2002) extended the theory of cooperation and competition to supplier-customer relationships, proving that commitment to supplier satisfaction, developing collaborative goals, and constructive discussions lead to higher levels of supplier satisfaction and greater engagement. A satisfied and engaged supplier is a prerequisite for a satisfied customer and the company's success.

Maunu (2003) defined supplier satisfaction research as a management tool that helps companies to improve and further develop internal and external processes in the supply chain. The goal is to measure the quality of the supplier-customer relationship to gain insight into how the supplier sees the customer from a business and communication perspective. It is one of the most comprehensive studies, consisting of three research rounds lasting nine years. The research was conducted in the IT industry. Representatives of the business and academic community participated in the research. The research resulted in the formation of nine dimensions of supplier satisfaction divided into two categories: (a) business and (b) communication. The business dimension included the following: (1) profitability, (2) adherence to agreements, (3) involvement of suppliers at an early stage of development, (4) business continuity, and (5) forecasting and planning. The communication dimension included: (1) roles and responsibilities, (2) openness and trust, (3) feedback and (4) company values (Maunu, 2003).

Benton & Maloni (2005) investigated how the dimension of supply chain power affects suppliers' satisfaction in the chain. The research tested factors that proved to be relevant in customer-supplier relations: (1) cooperation, (2) commitment, (3) trust, (4) compliance, (5) conflicts and (6) conflict resolution. In earlier studies (Brown et al., 1995; Maloni & Benton, 2000), it was shown that the power variable has a significant effect on the previously mentioned factors. The research was conducted on the example of the automotive industry in the USA, where five manufacturers have 85% of the market share and their supplier bases number over a thousand partners. Manufacturers depend primarily on their suppliers to maintain their position and keep up with the industry in terms of quality and technology; therefore, the balance of power in the chain

and the satisfaction of all participants in the supply chain are of utmost importance. The research results showed that the relationship is much more important to suppliers than the performance and results of the business and that the performance and results derive from the relationship.

Essig & Amann (2009) consider supplier satisfaction a prerequisite for a quality buyer-supplier partnership. Their research aims to define supplier satisfaction and offer a tool for measuring satisfaction. They propose the Supplier Satisfaction Index as a tool for measuring supplier satisfaction. It is a tool that contains 36 indicators divided into three dimensions and six factors. The first dimension refers to the strategic level of satisfaction and is related to the indicator of the intensity of cooperation. The second dimension implies the operational level of satisfaction and includes factors such as ordering and invoicing/delivery. They called the third dimension the accompanying dimension of satisfaction, which refers to factors such as communication, conflict management and a general view of cooperation. Essig and Amann defined supplier satisfaction as the supplier's feeling that the buyer's intentions are honest and sincere and the supplier's contribution to the buyer-supplier partnership.

Hüttinger et al. (2014) point out that the tendency to reduce the number of suppliers has influenced the formation of entirely new relationships in supply chains. Today suppliers choose customers with whom to cooperate, and customers fight for favour and preferred status with suppliers. The central research question of their work is: What factors motivate suppliers to treat some customers more favourably than others? This research stands out because the work used a combined approach of qualitative and quantitative research, and both buyers and suppliers were included in the research. The research was conducted among suppliers belonging to the automotive industry. The attractiveness of the customer, the satisfaction of the supplier and the privileged status of the customer are singled out as variables that influence the preferential relationship of the supplier towards the customer. Through focus groups of experts from the procurement department, eight criteria were identified and analysed that could influence the variables: (1) growth potential, (2) innovation potential, (3) operational excellence, (4) reliability, (5) supplier support, (6) supplier involvement, (7) communication, and (8) relationship behaviour. Research has shown that the key criteria for supplier satisfaction are growth potential, reliability, and relationship behaviour.

Research by Vos et al. (2016) partly relies on research by Hüttinger et al. (2014). In that research, the ever-present concept of reverse marketing (according to Leenders & Blenkhorn, 1998) was highlighted among researchers dealing with supply chain management. In addition to the criteria investigated by Hüttinger et al. (2014), the authors of this research decided to introduce the dimension of profitability to strengthen the model with an additional criterion. Their study further analysed the importance of preferred status in the relationship between buyer and supplier. The research showed that growth potential, reliability and profitability are prerequisites for supplier satisfaction, regardless of the product type or form of procurement. The positive influence of relationship behaviour was found to be relevant only for direct procurement.

Most research highlights the fact that supplier satisfaction is an almost unexplored topic that has become very important and should be given attention in the academic and business community.

3. Methodology

The research was conducted in a successful company that operates in the wholesale trade industry in the field of lighting and electrical materials. The industry was chosen because of the competitive climate, which forces companies to rethink their supply chains and supplier relationship strategies on a local and global scale. In such a vivid business environment, the relationship with suppliers can be both a beneficial and restrictive part of business development and influence everyday operations on a large scale. Based on the literature review, building mutual trust and satisfaction of suppliers brings some stability and resilience in supply in volatile markets. Also, it deepens relationships with suppliers, brings new potentials for joint innovation in business processes, and enhances the mutual will to share ideas and knowledge on market trends, customer needs and potentials to build new streams of value creation. Therefore, supplier satisfaction research in this particular industry can result in valuable conclusions on drivers and influential factors of supplier relationship strategies in a highly competitive supplier market.

The research took place in four phases. The research on supplier satisfaction touches both the sphere of marketing management and the sphere of supply chain management. In the first phase, literature from the field of satisfaction research and the field of supply chain management was analysed. In the second phase, interviews were conducted with four purchasing managers to comment on knowledge gathered in the literature and to single out key criteria of supplier satisfaction based on the synthesis of literature and practical knowledge. In the third phase, interviews were conducted with eight strategic suppliers who expressed their willingness to participate in the research. Only the suppliers with whom the company does direct procurement are included in the research. The key suppliers were selected according to the criteria defined in interviews conducted with purchasing department managers. With most suppliers, the company has contracted selective distribution as a form of cooperation. Suppliers selected were those with continuity of cooperation of no less than five years, an annual turnover of less than EUR 100,000.00, and long-term plans. Included are suppliers rated as innovative, who invest intensively in development and with whom the company can compete in the market in the long term. An important criterion in the selection was flexibility in cooperation in the sense of openness to special agreements (e.g. products adapted to the Croatian market, consignment agreement, bonuses for given sales and other goals), thanks to which the company achieves an additional competitive advantage.

In the last, fourth stage, the collected data was analysed. The basis for identifying key supplier satisfaction criteria is the supplier satisfaction survey by Vos et al. (2016). The rationale for choosing this research topic is that it is one of the recent studies providing an overview of previous studies, but also because the criteria analysed in that research proved relevant for the research used in this paper. It is important to note that the research by Vos et al. (2016) is based on criteria extracted from the example of manufacturing companies, and it will be interesting to show how these criteria are reflected in the example of cooperation between buyers and suppliers, more precisely manufacturers and distributors in the wholesale trade of technical products.

In the study by Vos et al. (2016), nine supplier satisfaction criteria were singled out: (1) growth potential, (2) innovation potential, (3) operational excellence, (4) reliability, (5) supplier support, (6) supplier involvement, (7) communication, (8) relationship behaviour, and (9) profitability. The criteria mentioned above were used in interviews with four purchasing managers of a wholesale company whose strategic suppliers were included in the third phase, in the supplier satisfaction survey. Interviews with procurement department experts were conducted based on the interview from the research by Hüttinger et al. (2014). The interview included managers of procurement of typical assortments that the wholesale companies of the analysed industry have in stock and managers of procurement of specific assortments of products ordered for projects.

The respondents were asked to:

- define the characteristics of strategic suppliers based on which key suppliers will be selected for participation in the research,
- determine which of the nine supplier satisfaction criteria by Vos et al. (2016) they consider applicable in the daily business with their key suppliers and elaborate their opinion,
- identify additional criteria that they consider essential for supplier satisfaction but are not represented in the template,
- group established characteristics, dimensions, and criteria into categories.

The respondents were asked to analyse supplier satisfaction criteria from a recent Vos et al. (2016) study and single out those that apply to business practice. These were amended by criteria that the respondents considered relevant according to their experience. All respondents agreed that the criterion of profitability should not be taken into account because there is a high probability that suppliers will not answer questions related to this criterion completely honestly; therefore, this criterion was excluded.

4. Research results

All respondents are employees of manufacturing companies in the professional lighting and electrical materials industries, are based in the European Union, or are representatives of manufacturing companies from the EU for the Croatian market. Half of the respondents are foreign citizens, mainly

export directors or sales directors for Croatia and neighbouring countries, while the other half are Croatian citizens employed in representative offices of foreign companies in Croatia or company owners from Croatia representing individual companies and foreign-owned manufacturers.

Below is an analysis of the criteria that, in the research presented and in the group interview of experts from the procurement department, proved to be relevant for supplier satisfaction. For each criterion, respondents were asked to determine how important it is for their satisfaction. They were offered the following options: a) very important, b) important, but not crucial and c) unimportant. For each criterion, respondents were asked to determine how satisfied they were with that criterion in cooperation with their customers. They were offered the following options: a) very satisfied, b) satisfied, c) neither satisfied nor dissatisfied, and d) dissatisfied. Each criterion was additionally tested in depth through the argumentation of the supplier's answers; the synthesis follows below.

(1) Growth potential

According to Hüttinger et al. (2012), growth potential implies the supplier's ability to grow together with the customer and create new market opportunities through joint efforts. Experts from the procurement department of the trading company from the second phase of the research named specific variables of growth potential: turnover growth, profit growth, market share growth, assortment expansion, territorial coverage, and brand development. To the general question of how important the growth potential in cooperation with the customer is to them, most respondents answered that growth potential is very important. At the same time, the smaller part stated that growth potential is important to them but not decisive. None of the respondents answered that growth potential is not important. Respondents agreed that the growth of turnover, profit and market share are not the only important prerequisites for a successful partnership, but that they are part of the package of prerequisites for successful cooperation and survival of the company. Most respondents see the development of growth potential in joint action through project cooperation or partnership cooperation in classic wholesale. Respondents have a high opinion of cooperation on projects, which in their experience, results in quality projects, deepening cooperation between partners and a better market position. Respondents further indicated that growth could be accelerated by expanding the existing assortment, introducing added value through services in addition to existing products and expanding territorial coverage. In addition to those measurable categories, respondents also singled out one "intangible" criterion that contributes to growth: investment in the brand's value and recognition. Most respondents confirmed that they are satisfied with the criterion of growth potential in cooperation with the customer. When asked to elaborate on which segments related to growth potential they are satisfied with and where they see an opportunity for progress, most respondents declared that they are satisfied with overall performance, while a more specific focus and better setting of business priorities is needed for an overall better impression. More precisely, respondents recognised room for improvement of growth potential in expanding the assortment, developing the product mix, expanding the base and type of customers, expanding the project base, better presence and visibility in the field, and launching a B2B platform and an online store. Respondents suggested it is important to change the way of thinking and shift the focus from pressure on prices to selling more complex products and systems that will enable a better price difference and more profit for both partners.

(2) Innovation potential

Hüttinger et al. (2012) described innovation potential as the supplier's opportunity to generate innovative products thanks to exchanging ideas and knowledge with the customer. Experts from the procurement department of a trading company see the potential for innovation in their industry in the application of the latest technologies in design, monitoring trends in lighting and lighting management (e.g., Smart Cities), monitoring investor preferences and participating in innovative projects. When asked about the potential of innovation and the importance of innovation for their customers, most supplier representatives answered that it is important to them but not decisive. The elaboration of answers and sub-questions below indicates that innovation is more important to suppliers who work with the customer on projects than to suppliers related to the traditional wholesale trade. When asked if they consider their customer innovative, most respondents stated that innovation in busi-

ness operations could best be expressed through sales skills and marketing activities. When asked if they were satisfied with this criterion for the customer, all participants expressed themselves in the affirmative. When asked if they consider their partner's employees to be technically innovative and in which areas, the suppliers who deliver products for the warehouse pointed out that the products they market are not overly revolutionary or innovative. Therefore, the employees are not particularly innovative and cannot show great innovation. Suppliers who deliver more technically advanced solutions in lighting and lighting management noted that the staff of the project department, which employs mostly engineering staff, is very innovative and open to innovation, while the sales staff has room for improvement in innovation.

(3) Operational excellence

Hüttinger et al. (2012) describe operational excellence as the supplier's perception of the customer's operational processes as efficient and that those processes facilitate their cooperation. The experts from the purchasing department agreed with this definition. In their opinion, the criteria of operational excellence in trade activities are reflected in the following: the planning process (delivery deadlines), the ordering process (timeliness), the warehouse process and warehouse optimisation, other logistics processes, and marketing processes. Most respondents assessed the operational excellence criteria as very important because their customers mostly have the status of distributors and act as an extended arm of suppliers on the market. The planning process proved important for the project part of the work and the classic wholesale business. With projects, it was crucial to monitor all project phases to communicate quality deadlines to the supplier. For the warehouse of wholesale products to be optimal, it is important to monitor the product turnover to plan the needs in time and communicate them to the supplier. Most suppliers expressed their satisfaction with the planning process of the analysed customer. In the process of placing orders, it is of great importance that it is timely and that it considers that the deadlines for the production of certain products, especially project ones, are longer than the deadlines for high-demand products. Most respondents are very satisfied with this process at the customer's end. With placing orders, requirements related to the delivery date are also attached. Most respondents declared that the customer's demands regarding delivery terms are acceptable and realistic. Logistical processes include procedures for receiving products, requirements for labelling products, and flexibility in receiving products. Most respondents rated this process as average but sufficient for quality business and cooperation needs. Suppliers are satisfied with the product storage process. The majority rated the respondent as average but at a satisfactory level. The research confirmed the opinion of experts from the purchasing department that warehousing is a process that is more important to suppliers who deliver specific warehouse products than to suppliers with whom the customer collaborates on projects. The research participants rated operational processes in the marketing department highly. The marketing activities of the buyer and the supplier in the trade are often joint activities that the supplier partially covers financially through marketing bonuses, so it is in the supplier's interest that the activities are carried out with quality. Most respondents expressed their satisfaction with the processes in the marketing department. Some suppliers see room for improvement in better preparation and planning, which will contribute to less pressure with implementation deadlines and a better overall effect. Some of the smaller suppliers mentioned that the marketing processes are at a high level and that it is sometimes difficult for smaller organisations to follow them. Most respondents rated the operational competencies of the employees high, emphasising the importance of good two-way communication as a prerequisite for the operational competencies of the employees to be at a satisfactory level.

(4) Reliability

According to procurement experts, reliability implies compliance with contractual obligations, fulfilment of formal and informal agreements, the image of the customer on the market, the corporate culture of the company, and the like. Hüttinger et al. (2012) say that reliability implies the supplier's perception that the customer works consistently and reliably and that they stick to the agreement. All participants rated this criterion as very important in cooperation with the customer. Respondents were asked to rate their customer's compliance with contractual obligations. Most suppliers declared that they were very satisfied with this aspect of cooperation. However, they also agreed that the

provisions of the contract are respected because the contract provides for certain non-compliance sanctions. Suppliers see room for progress in this business segment in fulfilling agreed bonuses and sales goals that are sometimes not achieved in full amount and/or potential. Respondents also referred to honouring informal agreements. Few of the respondents stated that informal agreements almost do not exist and that their companies insist on formal agreements in written form. Nevertheless, most respondents agreed that informal agreements are an integral part of business and that it is impossible to formalise all the details. Although most suppliers expressed satisfaction with the cooperation regarding this criterion, they pointed out that informal agreements are sometimes forgotten and often need to be repeated. Due to the lack of written form and evidence, informal agreements can be a point of contention and various misunderstandings, so most respondents conclude that it is vital that the essential determinants of the relationship are formally defined. Payment habits are often part of formal contracts and sometimes informal agreements, but they are certainly a reflection of the partner's reliability. Respondents were also asked for their opinion on the importance of the image of their customers on the market. All respondents agreed that the customer's image is very important to them because the customer, among other things, conveys their corporate messages and values to the market. A negative image reflects negatively on the partnership because it affects the supplier's business. This criterion achieved satisfaction ratings among most respondents who participated in the research.

(5) Supplier support

Supplier support is described by Hüttinger et al. (2012) as the buyer's effort and engagement to help develop the supplier's capabilities and performance in a particular market. This criterion in trade is defined by experts from the procurement department of a trading company as a form of mutual understanding, respect for partners and looking in the same direction in terms of strategy. Procurement experts see supplier support in transferring the supplier's fundamental ideas and values, dedicated work on developing and presenting the supplier's brand/brands, and involvement in the placement of new ideas, products, assortments, etc. This criterion is very important because the distributor is often an extended hand to the supplier in the market. The market often completely identifies the distributor with the supplier or manufacturer. This is especially true in relationships where the distributor is the only partner or one of a few partners on the market. A smaller number of research participants rate the supplier support criterion as very important, while most respondents consider it important, but not crucial.

When asked about satisfaction with this criterion, a small number of respondents declared they were very satisfied, while the majority said they were satisfied. The research showed that suppliers with whom the customer works for a more extended period are significantly more demanding in terms of seeking support and openly express higher expectations. Suppliers with whom the customer works for a shorter period expressed a higher level of satisfaction with this criterion. Therefore, it can be concluded that a more extended period of cooperation brings better results but, at the same time, places greater demands and business challenges on the partners. As aspects with which the suppliers are satisfied, they point out that the analysed customer provides them with logistical support in presenting their values, brands, the placement of novelties in which significant funds have been invested, organisation of novelties presentations, etc. As problems, some respondents pointed out that sometimes the ideas of the buyer and the supplier do not coincide, so it is necessary to compromise, which requires time and patience. Suppliers see room for improvement in even more engaged work and activities for end customers and investors, work on better territorial coverage, and better visibility and presence of the brand.

(6) Supplier involvement

Hüttinger et al. (2012) describe supplier involvement as the extent of direct involvement and participation of supplier's employees in the customer's new product development team. Experts from the procurement department see the involvement of suppliers in trade activities in working on joint projects, joint product development in accordance with feedback from the market, promotions and presentations of novelties, informing suppliers about short-term and long-term plans, etc. Experts from the procurement department pointed out that they do not include all suppliers equally in their activities. They are more inclined to cooperate with sup-

pliers with fewer market partners. Suppliers with a more significant number of partners or distributors on the market are significantly less involved in their activities and share only basic information with them for fear that certain internal information will reach their competitors who are also part of the supplier's partner network. Most respondents consider the criterion of supplier involvement as very important for a quality relationship and business in general, and a smaller number of them as important but not crucial. Suppliers in the trade of technical products are most often involved in presentations, promotions, professional events, training, joint projects, equipping exhibition spaces, cooperation in developing new products for specific market needs, humanitarian activities, etc. Most respondents believe that they are included in the processes in a timely manner, while fewer respondents think they are not included early enough to contribute to the effect of a particular job or project. Most respondents are not satisfied with exchanging information on short-term and long-term plans. Suppliers declare that they are sometimes informed about short-term plans but rarely about long-term ones. When asked about the room for improving satisfaction with this criterion, most suppliers answered that there is room for improvement in the trust segment. Most suppliers pointed out that there is still a reserve in sharing information and exchanging data. Some information is shared reluctantly, for example, data on the structure of turnover or the structure of customers. They see room for progress in the feedback on completed projects and in the reward segment at promotions (they want more detailed statistics). Suppliers point out that they want more information about strategic plans to get involved with ideas or participate directly.

(7) Communication

The communication criterion of Hüttinger et al. (2012) is the availability of a person who works intensively on shaping and improving the process of information exchange and the willingness of the customer to develop structured communication with the supplier. Experts from the procurement department cite these important aspects of communication: availability, clarity of lines of communication, regularity of contacts and annual/quarterly meetings, formal and informal gatherings, exchange of feedback, etc. Most respondents rated this criterion as very important, and one assessed it as important but not decisive. Only one respondent stated that he was very satisfied with the general communication in the relationship with the customer; most of them pointed out that they were satisfied. The criterion of communication is the criterion for which most respondents expressed suggestions for improvement using specific examples. When asked about the segments of communication with which they are satisfied and those with which they are not satisfied, suppliers answered that they are mostly satisfied with communication at the operational level. What they are not happy with is the availability of strategic-level contacts. Part of the suppliers stated they occasionally need to communicate with senior management, but that level of communication often remains unavailable, or it takes much effort to get a meeting. Regarding communication with operational-level employees, some respondents stated they sometimes lack flexibility in communication, and that operational-level employees should work on exchanging feedback (e.g., feedback on received offers).

(8) Relationship behaviour

The behavioural criterion in relation to Hüttinger et al. (2012) is a customer-supplier relationship in aspects such as solidarity, flexibility, and reciprocity. Experts from the procurement department single out the following important aspects: working atmosphere in the team, friendliness of operational and strategic level employees, professionalism of operational and strategic level employees, conflict management, etc. Most research participants rated these criteria as important but not crucial. In general, the respondents rated the working atmosphere and customer relationship behaviour with high marks; more precisely, all respondents stated they were satisfied. The suppliers gave the customer high marks for kindness, solidarity, flexibility, and professionalism at the operational and strategic levels. Lower marks were awarded for conflict management. Part of the suppliers, mainly those who work with the customer for a shorter period, claim there are no serious conflicts and that they are successfully resolved; however, it is noticeable that conflicts are more present in cooperation with long-term suppliers. A few suppliers indicated a problem with conflict resolution and expressed dissatisfaction with the assessment of this category. According to dissatisfied suppliers, there is much room for improvement in conflict management, and the prob-

lems they mentioned are as follows: conflicts are recurring, for some conflicts, there are no satisfactory solutions for both parties, conflicts at the strategic level sometimes have too much influence and burden colleagues at the operational level.

Research results confirm that the concept of supplier satisfaction is poorly represented in business practice.

Suppliers expressed the highest level of satisfaction in the customer relationship for the following criteria:

(1) relationship behaviour,

(2) reliability,

(3) operational excellence.

The lowest level of satisfaction refers to the supplier inclusion criterion, which suppliers found to be a consequence of an insufficient level of trust and sometimes a mismatch in strategies. Respondents agreed that supplier satisfaction research could contribute to a better understanding of the need for supplier involvement.

All respondents agree that the introduction of supplier satisfaction surveys would be beneficial for all supply chain participants. Suppliers see the benefits of this concept in the opportunity to express an opinion and resent ideas because the satisfaction of both parties in the relationship is a prerequisite for partnership and optimal business results. The importance of introducing supplier satisfaction research into daily operations was confirmed not only by suppliers but also by experts from the purchasing department, and the analysed scientific literature also indicates the need to introduce supplier satisfaction research. The work indicated the necessity of paying attention to supplier satisfaction and the importance of introducing supplier satisfaction research into business.

5. Research limitations and future research recommendations

Research limitations can be divided into limitations related to the theoretical aspect and limitations related to the research aspect of the work. Compared to research and studies on customer and consumer satisfaction, the concept of supplier satisfaction is significantly less represented in professional marketing literature. Scientific papers and professional literature in Croatia rarely deal with this topic. The research was conducted on a small sample, on the example of eight suppliers; however, the results and insights are very valuable for future research, as it is still an under-researched area. The recommendation for future scientific research is to connect the academic and business communities. The sample should be larger and more representative. It would certainly be interesting to conduct a satisfaction survey from the customer and supplier perspective and to compare and analyse the results of such a survey. Interviews with suppliers showed that the interest in suppliers' opinions could positively affect future partnership relations, which is a prerequisite for progress and continuity of good business results.

6. Conclusion

Any long-term and successful business relationship implies the satisfaction of all parties in the relationship. In a highly dynamic and changing business environment, it is essential to take care of numerous business details and nurture the relationships of all supply chain participants. Although customer satisfaction and creating greater value for the customer is always the focus of the business, research shows that customer satisfaction is influenced by a whole range of relationships in the supply chain, including supplier satisfaction. In modern management, suppliers become a strategic company resource and are a source of competitive advantage. Numerous customer satisfaction studies have been conducted in the academic and business community, while supplier relations and satisfaction have been almost ignored. This paper confirmed the assumptions that, even though the strategic function of procurement has been recognised for decades, research on supplier satisfaction as part of supplier relationship management is given attention by a narrow circle of researchers.

Nevertheless, it is noticeable that interest in this topic has been growing in the last decade. The concept of supplier satisfaction research is a business practice of a modest number of companies. Despite this, the research participants confirmed that there are strong arguments and interest in introducing this type of research and its continuous implementation. The paper presents key criteria influencing supplier satisfaction from relevant literature and research. By synthesising these criteria and based

on business practice, procurement experts defined supplier satisfaction criteria in the relationship between manufacturers and wholesalers who were participants in the research part of the work.

Three key criteria of supplier satisfaction in the relationship between manufacturer and wholesaler in the conducted research stand out: (1) reliability, (2) communication and (3) operational excellence, which achieved the goal of the work, i.e., key criteria that influence supplier satisfaction were identified. It is recommended to systematically introduce supplier relationship management and the practice of conducting supplier satisfaction surveys. Researchers and practitioners believe that conducting a satisfaction survey sends a message of trust to the supplier that will result in a better understanding of the relationship and improve business results.

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Preliminary communications

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Intra-Africa immigrant entrepreneurship for intra-African trade and economic development: Towards a borderless Africa

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Skills required of professional accountants: Evidence from labour market in Croatia

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INTRA-AFRICA IMMIGRANT ENTREPRENEURSHIP FOR INTRA-AFRICAN TRADE AND ECONOMIC DEVELOPMENT: TOWARDS A BORDERLESS AFRICA

Abstract

Purpose: This paper aims to conceptualize intra-Africa immigrant entrepreneurship and provide evidence of its impact on intra-African trade and economic development. Immigrant entrepreneurship is often regarded as a key driver of international trade and economic development around the world; yet very little is known about intra-Africa immigrant entrepreneurship and its role in intra-African trade and economic development in Africa.

Methodology: This paper applied a systematic review of literature methodology to provide insights into the role of intra-Africa immigrant entrepreneurship on trade and economic development of both host and home countries. Recommendations on how intra-Africa immigrant entrepreneurship can be used to promote intra-African trade and economic development are reviewed.

Results: Policy guidelines that may increase the positive impact of immigrant entrepreneurs within the context of intra-African trade include immigration policies that attract high impact entrepreneurs, non-discriminatory support for high impact immigrant entrepreneurs as well as policies to strengthen the role of free trade agreements such as the African Continental Free Trade Area (AfCFTA).

Conclusion: We conclude that African regional integration to promote intra-Africa immigrant entrepreneurship development is a conduit for Africa's long-term and sustainable economic development. Evidence of the positive impact of intra-Africa immigrant entrepreneurship on intra-African trade and economic development is scant. At the same time, the notions of intra-Africa immigrant entrepreneurship are not well documented in the literature. This paper provides arguments for the promotion of intra-Africa immigrant entrepreneurship as a tool to increase intra-African trade and economic development.

Keywords: Economic development, intra-African trade, intra-Africa immigrant entrepreneurship

1. Introduction

Many countries around the world have seen increasing growth of immigrant entrepreneurship (Dheer, 2018; Kerr & Kerr, 2018). At the same time, the role of immigrant entrepreneurship is held in high regard especially in developed nations (Desiderio, 2014; Kerr & Kerr, 2018). In the United States of America, immigrant entrepreneurship accounts for over 25% of all firms (Kerr & Kerr, 2018) with over 51% of all start-ups worth over US$1 billion having been started by immigrants (Anderson, 2016). Similarly, Desiderio (2014) noted that many developed countries such as Canada, Australia, New Zealand, and the United States recognize the value of immigrant entrepreneurship as drivers of economic competitiveness and innovation. As a result, these countries have taken deliberate steps to attract productive immigrant entrepreneurship. For example, special visas and entry requirements to attract immigrant entrepreneurs have been established (Anderson, 2016; Desiderio, 2014). Drawing on the lessons from developed nations, Africa could benefit from immigrant entrepreneurship.

Immigrant entrepreneurship has been reported to benefit both host and home countries (Desiderio, 2014; Tengeh & Nkem, 2017). Tengeh & Nkem (2017) opine that immigrant entrepreneurship provides a conduit for economic development through tax contributions and creating employment opportunities for both immigrant entrepreneurs themselves and the natives. Besides, immigrant entrepreneurs have been hailed for producing useful products and services that benefit local customers and improve efficiency of local companies. For example, companies such as Uber have transformed travel in many cities, while other companies such as AppDynamics, Cloudera, CloudFlare, Tanium, Actifio, Mu Sigma, and others help U.S. companies to maintain strong information technology systems to compete in the global marketplace (Anderson, 2016). Furthermore, high-skilled immigrants contribute to innovations and introduce new products to the host economies.

The over-representation of immigrants as founders of high-impact companies, patent applicants, and biotech companies is an indication of enormous contributions of immigrant entrepreneurship in economies around the world (Fairlie & Lofstrom, 2015). In South Africa, studies such as Kalitanyi & Visser (2014) revealed that immigrant entrepreneurs transfer their entrepreneurial skills to the native South Africans, hence increasing the pool of entrepreneurial activity in the country. Furthermore, Berghoff (2020) confirmed that the intercultural experiences and knowledge as well as the high pressures to succeed in a foreign country stimulate entrepreneurship and innovation among immigrants. Consequently, immigrants have been noted to be highly entrepreneurial, contributing to economic development and innovation to the benefit of both their host and home countries (Lofstrom & Wang, 2019; Ngota et al., 2019). This is an indication of how valuable immigrant entrepreneurship is to the progress of economies.

International trade is another area that has been reported to benefit from immigrant entrepreneurship (Fairlie & Lofstrom, 2015). Immigrant-owned businesses tend to have higher levels of exports than other firms because they are tied into business networks in their home countries. Furthermore, due to international language proficiencies and other cultural ties with businesspeople in their home or other countries, immigrant entrepreneurs can expand into international markets. Fairlie & Lofstrom (2015) observed positive contributions of immigrant entrepreneurs towards exports that flow to their co-ethnic networks in other countries. These co-ethnic networks promote bilateral trade by providing market information as well as by supplying matching and referral services. As a result, both the host countries and the home countries stand to benefit from immigrant entrepreneurship.

Given the significant benefits of immigrant entrepreneurship, Africa could benefit enormously from intra-Africa immigrant entrepreneurship by containing its benefits within the boundaries of the continent. Therefore, intra-Africa immigrant entrepreneurship may play a role in promoting the much-needed intra-African trade and economic development (Tralac, 2019). Against this background, this paper provides arguments for the promotion of intra-Africa immigrant entrepreneurship as a tool to increase intra-African trade and ultimately economic development.

This paper is structured as follows. Firstly, we provide theoretical perspectives in which we provide

a systematic review of the notions of immigrant entrepreneurship to provide a basis for our characterization of intra-Africa immigrant entrepreneurship. Theoretical perspectives on intra-African trade and economic development are also explored. We then explore the relationships between intra-Africa immigrant entrepreneurship, intra-African trade, and economic development. The paper then closes with concluding remarks and directions for further research.

2. Methodology

This paper presents a systematic review of literature to synthesize and compare empirical evidence from multiple studies that have investigated intra-Africa immigrant entrepreneurship with a view to ascertaining the nature of its impact on trade and economic development. Snyder (2019) describes a systematic review as a research method and process for identifying and critically appraising all relevant empirical evidence with the primary aim of answering a particular research question(s) or hypothesis. There are three fundamental questions we seek to address using this approach: Firstly, while immigrants are generally perceived to be relatively more entrepreneurial and therefore contributors of job growth, economic growth, and development in both sending and receiving countries, we seek to evaluate the consistency of this positive impact of migrant entrepreneurship on intra-African trade and economic development. Secondly, we seek to discover peculiarities or variables that have a significant positive effect on migrant entrepreneurship in the African context. In the process of review, we identify constraints that retard the contribution of immigrant entrepreneurs, and most importantly, discover areas for further analysis. Therefore, the following research questions guided our systematic literature search and review.

- What are the dominant perspectives in the literature regarding immigrant entrepreneurship?
- What is the potential impact of immigrant entrepreneurship on intra-African trade and economic development?
- What are the factors that can enable and those that hinder the contributions of immigrant entrepreneurship in Africa?

Various peer reviewed journal articles, book chapters, working papers and official reports such as the World Development Indicators (WDI), International Organisation for Migration (IOM) and United Nations Economic Commission for Africa (UNECA) reports were consulted. The following key words were used to search for the literature on Google Scholar:

- Immigrant entrepreneurship in Africa,
- Immigrant entrepreneurship, intra-African trade, economic development, and
- Contributions of immigrant entrepreneurship in Africa.

The literature search was filtered to cover a period of 10 years, i.e., only articles published in the period 2011-2021 were considered, and the preferred language of publication was English.

3. Results

The findings of this study seek to address the fundamental questions in this paper. This includes the perspectives on the nature and the role of immigrant entrepreneurship, the impact of immigrant entrepreneurship on intra-African trade and economic development and the variables that constrain and enable immigrant entrepreneurship in the African context.

3.1 Immigrant entrepreneurship in perspective

There are four major themes that could be identified following our systematic literature review of perspectives in immigrant entrepreneurship. These are classified into perspectives on conceptualization of immigrant entrepreneurship, motives for immigrant entrepreneurships, contributions of immigrant entrepreneurship, and challenges of immigrant entrepreneurship. Table 1 below provides a summary of the findings on the perspectives on immigrants, followed by explanations.

Table 1 Perspectives on immigrant entrepreneurship

Perspectives	Major arguments/dominant views	Sources
Conceptualization of immigrant entrepreneurship	There are multiple conceptualizations of immigrant entrepreneurship; however, the common defining characteristics relate to the following: • immigration status, • business activity in countries besides one's own country of birth, and • time frame for business activity.	Aaltonen & Akola (2014) Khosa & Kalitanyi (2015) Tengeh & Nkem (2017)
Motives for immigrant entrepreneurship	The motives for immigrant entrepreneurship are mainly explained in terms of the push and pull factor theory, and the dominant motives are: • pursuit of economic opportunities in other countries (pull factors), and • political and economic hardships in home countries (push factors).	Musara & Nieuwenhuizen (2021)
Contributions of immigrant entrepreneurship	The major contribution of immigrant entrepreneurship can be classified into the following three main themes: • knowledge and skills transfer, • social and economic gains in terms of the introduction of new products, employment creation, poverty alleviation and economic growth, and • remittances that benefit home countries in a circular manner.	Griffin-EL & Olabisi (2018) Kerr & Kerr (2020) Charmaine & Piper (2012) Kalitanyi & Visser (2014) Musara (2019) Ngota et al. (2019)
Challenges of immigrant entrepreneurship	In addition to common challenges facing entrepreneurs, immigrant entrepreneurs experience the following unique challenges: • immigration restrictions, • discrimination, • cultural diversity, • language barriers, and • general business challenges. These challenges inhibit their full potential contributions.	Tengeh & Nkem (2017) Musara & Nieuwenhuizen (2021)

Source: Authors

3.1.1 Conceptualizations of immigrant entrepreneurship

There are multiple conceptualizations of immigrant entrepreneurship in the literature (Aaltonen & Akola; 2014; Khosa & Kalitanyi, 2015; Tengeh & Nkem, 2017). In these multiple definitions, the key features defining immigrant entrepreneurship relate to persons moving from one country to another, business activities by these persons in a country other than their own country of birth, and the time frame for business activities in the host country. For example, Tengeh & Nkem (2017) defined an immigrant entrepreneur as a newly immigrated individual who set up a new business in the host country for the purpose of economic survival and their sustenance. Similarly, Aaltonen & Akola (2014) defined an immigrant entrepreneur as a person who has immigrated to a new country and started a new business. What can be deduced from these definitions is that immigrant entrepreneurship relates to the process in which foreign-born business owners establish businesses in another country. Therefore, an immigrant entrepreneur is an individual who has migrated from their country of origin (home country) to settle or do business in another country (host country). In other cases, an immigrant entrepreneur does not settle in the host country but may establish and run their business remotely while settled in their home country or elsewhere in the world.

3.1.2 Motives for immigrant entrepreneurship

The reality in the current global world is that people are constantly on the move, placing internation-

al migration as a key feature of the modern open society (Aliaga-Isla & Rialp, 2013). This constant movement of people across international boundaries for one reason or another gave rise to, among others, the concept of immigrant entrepreneurship, a source of socio-economic vitalization (Aliaga-Isla & Rialp, 2013). There are several motivations for the rise of immigrant entrepreneurship. In our review of the extant literature, we observed that these motivations can be categorized into two main themes, namely pursuit of better economic opportunities and a push by political and economic hardships in home countries (Musara & Nieuwenhuizen, 2021).

3.1.3 Contributions of immigrant entrepreneurship

Increasing recognition of immigrant entrepreneurship and its contributions to socio-economic growth and regional developments spawned a plethora of publications dealing with immigration, ranging from participation in labor markets, their employment creation through creating new businesses, skills, and knowledge transfer, as well as the expansion of markets (Khosa & Kalitanyi, 2015). The role of immigrant entrepreneurship is held in high regard among various scholars (see, for example, Charmaine & Piper, 2012; Kalitanyi & Visser, 2014; Ngota et al., 2019; Musara, 2019). Ngota et al. (2019) postulated that immigrant entrepreneurship plays a critical role in intra-African trade, skills transfer, and therefore economic development. Similarly, Kalitanyi & Visser (2014) provide evidence of the important role of immigrant entrepreneurship in terms of entrepreneurial skills transfer and the resultant increase in the much-needed entrepreneurial activity on the African continent.

Ngota et al. (2019) pointed out that, despite a wide range of literature related to entrepreneurship in general in both developed and developing countries, the peculiarities of immigrant entrepreneurship have not been studied. Similarly, Devine and Kiggundu (2016) call for studies on the role of intra-Africa entrepreneurship as well as intra-Africa diaspora entrepreneurship, those who move from one African country to start a business in another. Collectively, these studies (Devine & Kiggundu, 2016; Ngota et al., 2019) are a clarion call for extensive investigations into the role of intra-Africa immigrant entrepreneurship.

To address this literature gap, Ngota et al. (2019) focused their study on how African immigrant entrepreneurial skills can be transferred to their local/native South African employees. Charmaine & Piper (2012) investigated the challenges facing immigrant entrepreneurs and the various opportunities that can flow from supporting immigrant entrepreneurs. In another study, Musara (2019) investigated the business models of successful immigrant entrepreneurs to facilitate the transfer of such knowledge and business model skills to native South African entrepreneurs. These studies (Charmaine & Piper, 2012; Musara, 2019; Ngota et al., 2019) suggest the need for the development and support of immigrant entrepreneurship to achieve a positive collective continental development trajectory.

3.1.4 Challenges of immigrant entrepreneurship

A plethora of literature confirms that immigrant entrepreneurs are not immune to the common challenges facing entrepreneurs in general. These common challenges include access to finance, access to markets, crime, corruption, bureaucracy, and lack of skills, among others. However, due to their foreignness, immigrant entrepreneurs experience additional challenges such as immigration documentation, discrimination, xenophobia, cultural and language barriers (Khosa & Kalitanyi, 2014; Musara & Nieuwenhuizen, 2021). However, studies such as Musara & Nieuwenhuizen (2021) observed that some successful immigrant entrepreneurs use their resilience and international experiences to overcome both common challenges and unique challenges facing immigrant entrepreneurs. This implies the need for further in-depth studies to uncover insights into the coping mechanisms of immigrant entrepreneurs dealing with both common challenges and additional challenges they face. Understanding these coping mechanisms will not only benefit native entrepreneurs, but also increase our understanding of how to develop a broader entrepreneurial ecosystem for the benefit of the host nations and the African continent at large. While the role of immigrant entrepreneurship around the world has been extensively explored in the Western world, very little is known about intra-Africa immigrant entrepreneurship and its relations to intra-African trade and economic development.

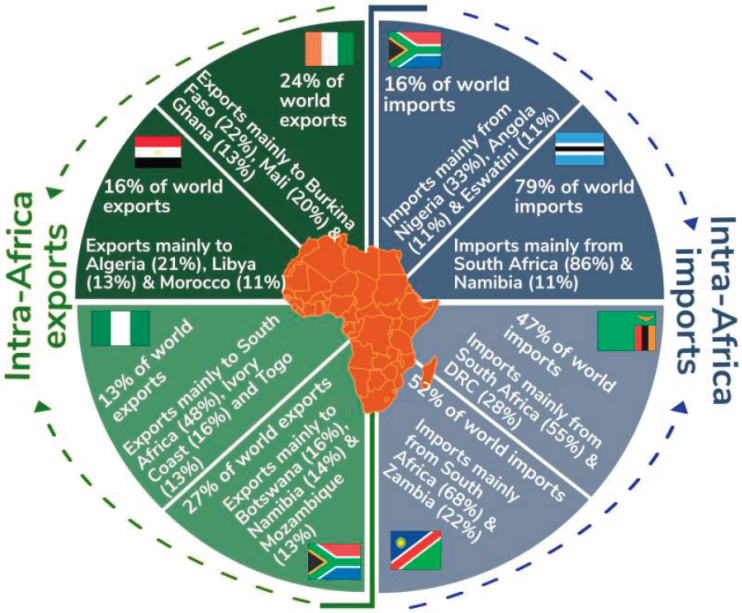
3.2 Intra-African trade and economic development

While conceptualizing intra-African trade is straightforward, economic development in the African context remains an elusive concept. Gumede

(2020, p. 13) pointed out that "*The pursuit of development in Africa has been informed by conceptions and endeavors undertaken by other regions. Permutations of development and underdevelopment are often viewed through Eurocentric lenses*". Such permutations of development have been criticized for their pursuit of development by underdevelopment, in which Western countries have pursued development of their own countries by the exploitation of the African continent's resources. The Eurocentric concept of development centered on the Western-imposed metrics of good governance and respect for human rights have been used to judge the level of development in Africa (Gumede, 2020); yet Africa collectively shares a fundamentally different social and economic history that is far from the Western countries. Acknowledging that the characterization of development in the African context is elusive, controversial and an ongoing debate, for the sake of this paper, we view African development from the broad lenses of Amartya Sen's capability approach (Dalziel et al., 2018), which views development in terms of general improvements of the quality of lives on the African continent.

Calls and suggestions for the pursuit of an African-centered development trajectory are inexhaustible in the literature (see, for example, Parshotam, 2018; Rogerson, 2019). One of such calls that resonates with the objectives of this paper is a call for the promotion of intra-African trade as a conduit for intra-Africa development (Parshotam, 2018). The AfCFTA was established in response to these calls (Anyanwu, 2014; Parshotam, 2018). Disappointment with the progress of multilateral trade negotiations in the World Trade Organization (WTO) gave birth to increasing interest in African regional integration and trade negotiations (Anyanwu, 2014). Thus, the establishment of the AfCFTA at the 10th extraordinary Summit of the AU Assembly on 21 March 2018 in Kigali, Rwanda, exhibits Africa's commitment and efforts to promote intra-African trade (Obeng-Odoom, 2020). While the current state of intra-African trade paints a bleak picture (see Figure 1), scholars such as Mold (2018) and Obeng-Odoom (2020) are confident that the AfCFTA has the potential to boost intra-African trade. Such an establishment provides avenues for addressing the underdevelopment challenges facing the African continent. This flows from classical and neoclassical theories of trade generating a common view that free trade benefits all through trickle-down economic growth (Obeng-Odoom, 2020).

Figure 1 2018 Intra-Africa exports and imports



Source: Tralac, 2019

The African continent needs more intra-African trade to facilitate continental economic development (Tralac, 2019; African Export-Import Bank, 2018). Thus, promoting intra-Africa immigrant entrepreneurship provides an impetus for more intra-African trade that will be beneficial to the broader continent through trickle-down economic growth. Gumede (2020) argued Africa's development requires "patriotic entrepreneurship" which applies the creation of pan-African enterprises, thus suggesting intra-Africa immigrant entrepreneurship. At the same time, Okafor and Udibe (2020) support the view that intra-African trade through intra-Africa immigrant entrepreneurship can foster a new and positive paradigm for Africa's collective development. Thus, intra-African immigrant entrepreneurship can play a significant role in the implementation and achievement of the goals of the AfCFTA.

3.3 Intra-Africa immigrant entrepreneurship, international trade, and economic development

Drawing from the extant literature, we formulated six (6) hypothesized relationships related to the notions of intra-Africa immigrant entrepreneurship, intra-African trade and economic development.

Table 2 Tabulated synthesis of hypothesized relationships between immigrant entrepreneurship, international trade, and economic development

Hypothesized relationships	Selected sources	Supported / Not supported
Migration financial flows support economic development.	African Development Bank (2021) World Bank (2019) Akoutou et al. (2015)	*Supported* Migration financial flows are the largest source of external financial flows to Africa exceeding official development assistance (ODA) and foreign direct investment (FDI). In Lesotho, financial inflows from migration are close to 30 percent of GDP (Akoutou et al., 2015). These financial flows are relatively more stable and less volatile in comparison to private debt and equity flows. Home countries in particular benefit through increased financial flows, investment, trade, and transfer of skills and technology resulting in poverty reduction. In the context of intra-regional trade, these benefits circulate within the region thereby promoting Africa as a whole.
Financial flows from IE and migration are more generally correlated with development indicators.	Akoutou et al. (2015)	*Supported* Financial flows are positively correlated with increased household investments in education, entrepreneurship, and health, all of which have high social return in most circumstances. They also contribute significantly to poverty reduction and to other SDGs. However, there is evidence that remittances can assist and have assisted many African countries in ensuring the availability of hard currency, improving countries' credit worthiness for external borrowings, and increasing internal aggregated demands.
Migrant entrepreneurs have potential to contribute to the development.	Naudé et al. (2017)	*Supported but not automatic for all* The authors argue that different entrepreneurships have different success rates and different kinds of entrepreneurship therefore have different implications for development. There are no automatic mechanisms by which they lead to the development, particularly when the context of country heterogeneity is taken into account.
As the innovative force behind the object of exchange, entrepreneurship is the key factor in international trade.	Lungu (2020)	*Supported* Entrepreneurs are key players in international trade since they are the creators of the exchange object. Considering this view, we are modest to propose that local entrepreneurship, if augmented by innovative and high impact immigrant entrepreneurship, generates relatively more gains to intra-African trade and regional development.
	Alemayehu (2020)	*Supported* Contrary to adoption of blanket entrepreneurial policies, Alemayehu (2020) advocates for a shift towards high impact entrepreneurship (HIE) policies to stimulate the capacity of Africa to produce high value and quality products and services with emphasis on diversified offerings. This focus on HIE would allow member states to source differentiated products and services from fellow member countries at relatively low cost, cementing thereby interdependence of African member states.

Hypothesized relationships	Selected sources	Supported / Not supported
Beyond removal of tariff and non-tariff barriers, entrepreneurship is the critical factor needed to foster regional integration and sustainable regional development.	UNCTAD (2019)	*Supported* Entrepreneurship was among the factors identified by UNCTAD as critical requirements beyond preferential tariff liberalization. Given that infra-Africa trade is lowest in comparison to other regions in the world, we submit that emphasis should be directed at promoting regional trade while scaling down external trading partnerships. In its place, overreliance on external trading partnerships must be carefully substituted with promotion and support for highly innovative African immigrant entrepreneurship at national and regional levels.
Entrepreneurship promotes international trade via the innovation channel.	Hessels (2007)	*Supported* We hypothesize that IE promotes IT via the innovation channel with varying levels of impact which are dependent on the extent of innovation orientation of IEs. Hessels (2007) found a positive feedback loop between innovation and international activity. Their study found that innovative SMEs are more likely to export and import than non-innovative SMEs.

Source: Authors

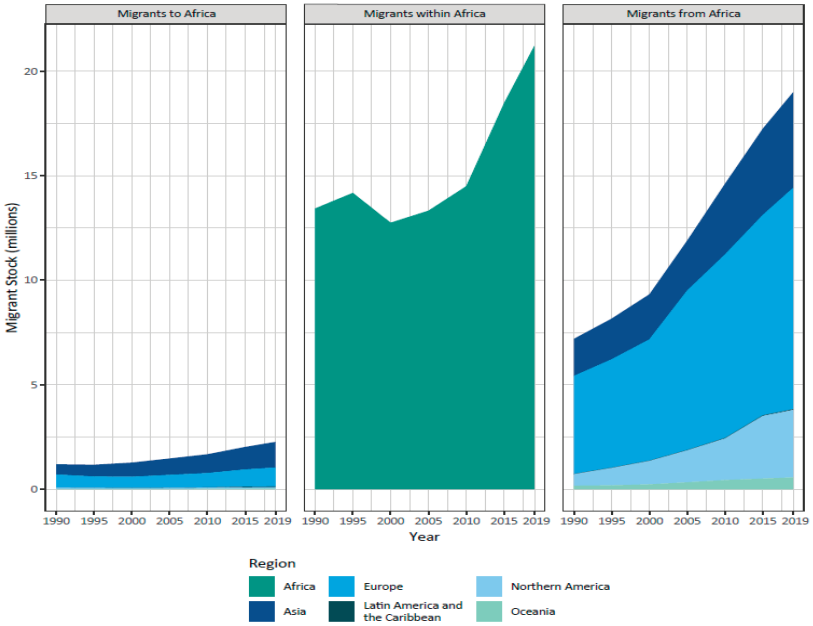
Lungu (2020) asserts that although economic literature did not explicitly approach the role of entrepreneurship in international trade, it is not to imply a neutral or minor role. The author connects entrepreneurship to economic growth by suggesting that economic growth levels are relatively higher in the fields where entrepreneurs cooperate, and concludes that entrepreneurship, international commerce and economic development are interconnected variables which explain the current state of international trade. In keeping with this view, we therefore submit that the gains to intra-African trade and hence regional development are relatively more pronounced where the culture of immigrant entrepreneurship is promoted at national, international and regional levels.

To the extent that entrepreneurship is a key contributing factor in stimulating economic growth and hence development locally, we hypothesize that innovative immigrant entrepreneurship, if supported sufficiently by all concerned stakeholders, is a critical enabler of international trade, regional growth and hence development. This view is supported by UNCTAD (2019) asserting that African regional integration, which merely emphasizes removal of tariff and non-tariff barriers, cannot deliver on the regional goals of sustainable development. Among other factors, the UNCTAD report identified entrepreneurship as a critical requirement beyond preferential tariff liberalization.

While people migrate for a variety of reasons ranging from political, economic, environmental, and social, Ravenstein's (1889) laws of migration state that the major reason why people migrate is economics, that is, migrants move to seek better jobs and better financial and entrepreneurial opportunities at a place different from their home location. Vandor and Franke (2018) state that in many countries immigrants are more likely to become entrepreneurs than their native counterparts. The authors argue that by nature immigrants are likely to be more risk-taking than the native-born population since immigration itself is a risky undertaking.

Digging into migration literature reveals an imbalance in the volume of intra-African studies relative to other regions in the world. We find that a repertoire of studies on immigrant entrepreneurship is relatively more concentrated on non-African regions, predominantly in the US, Europe, and East Asia. When it comes to Africa, South Africa dominates in terms of research that has been conducted on the current subject for obvious reasons, given its progressive economy and position in the region. An important reason germane to this study is the fact that South Africa remains the most significant immigration destination with about 4 million international immigrants estimated to be currently living in the country (IOM, 2020).

Figure 2 Migrants to, within and from Africa 1990-2019



Source: United Nations Department of Economic and Social Affairs (UN DESA), 2019

Table 3 Intra-Africa migration directions

Region	Number of outgoing migrants	Main areas of destinations
East Africa	6.9 million	Kenya, Ethiopia, Uganda
West Africa	6.1 million	Côte d'Ivoire, Nigeria
Southern Africa	4 million	South Africa
Central Africa	3.1 million	DRC, Cameroon, Angola
Northern Africa	1.6 million	Libya, Egypt

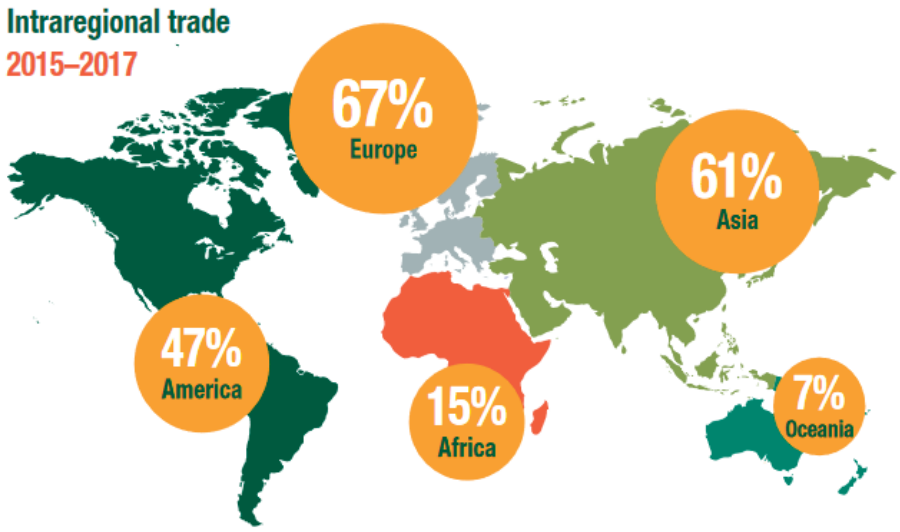
Source: European Commission (2018) as cited by the European Union (2020, p. 6)

The intra-Africa migration outlook shows that within the African continent, East and West Africa account for the majority of countries of origin for the largest number of outgoing international migrants as well as the most frequent destinations for incoming international migrants. In Southern Africa, South Africa is the main destination for immigrants from neighboring countries such as Zimbabwe, Malawi, Mozambique, Eswatini, Lesotho and Zambia, including other destination countries such as Botswana, Zambia and Angola. The migration data portal (2021) identified industrial developments, mining sectors and oil wealth (in Angola) as the main pulling factors for both unskilled and skilled labor migrants in the Southern African region in particular.

Immigrant entrepreneurship as a subject of academic discourse and policy debate has gained importance and interest among academics and policy analysts in recent years. The first reason is that intra-Africa migration has been increasing significantly since 2000 as illustrated in Figure 2. In 2019, the International Organization for Migration (IOM, 2020) reported an estimated 21 million Africans living in another African country, an increase of 2.5 million people compared to a total of 18.5 million

recorded in 2015. Secondly, IOM (2020) noted that international migrants as entrepreneurs and investors create job opportunities and promote innovation and technological change. This view is supported by a study conducted by Wadhwa (2009), which analyzed US data spanning the period 1995-2005, who found that immigrant-founded tech businesses created 450,000 jobs and generated $52 billion in revenue.

Figure 3 Intra-regional trade (2015-2017)



Source: UNCTAD, 2019

As illustrated in Figure 3, relative to other regions, Africa remains a marginal player in global trade. However, UNCTAD (2019) pointed out that there is evidence suggesting that the volume and value of intra-African trade are likely to be underestimated due to the prevalence of informal trade. There is hence a possibility that intra-African trade can reverse the current trend illustrated in Figure 3, in which Africa trades more with the rest of the world than it trades with itself. According to UNCTAD (2019), intra-African trade was estimated at around 15% during a three-year period spanning 2015-2017 compared to Europe (67%), Asia (61%), America (47%) and Oceania (7%). Africa needs to trade more with Africa to boost intra-regional trade, and increase cross-border trade to ensure that African skills and technologies are utilized internally, and the benefits of trade are reaped within the continent.

Promotion of intra-African trade and immigrant entrepreneurship catalysed by the implementation of the AfCFTA holds great potential to accelerate employment and economic growth, diversify the sources of growth and thus create livelihood opportunities for many Africans. A critical tenet of the AfCFTA is centred on removing tariffs and trade barriers to free trade and deepen intra-African trade and regional integration (African Export-Import Bank, 2018). This is particularly important under the current circumstances to guarantee and speed up economic recovery of African countries given the magnitude of economic collapse caused by COVID-19. One study conducted by UNCTAD (2018) using computable general equilibrium (CGE) modelling estimated a 1.2% increase in employment that may result from the adoption of the AfCFTA. In support of a similar notion, Naudé et al. (2015) argue that removal of discriminatory barriers against migrant entrepreneurs holds great potential in promoting development in both sending and receiving countries. In South Africa, an empirical study by Chaskalson (2017) revealed that a 1% increase in immigration had a positive effect of between 0.003% and 0.01% on employment, suggesting that immigrants possibly create job opportunities where they settle. We are therefore convinced that success of economic reconstruction and recov-

ery of African economies is partially dependent, among other things, on collaboration and integration of Africa in economic trade and on mobilising efforts towards a borderless Africa.

Kimenyi et al. (2012) state that although intra-African trade is not the only panacea for development, it remains important for several reasons. It can boost the volume of exports and imports within the region and therefore lift economic growth. It can improve economies of scale, enhance efficiency, competitiveness, and terms of trade. Given 2020 economic events of commodity and energy price volatilities on global markets triggered by COVID-19, intra-African trade may provide an important buffer against global volatility and exogenous shocks. Citing the example of Kenya, the African Export-Import Bank (2018) claims that intra-African trade acts as a mitigant against harsh external shocks. Moreover, given projections of significant future shortfalls of tax revenues predicted for Africa, promotion of immigrant entrepreneurship to increase intra-African trade through removal of trade barriers and discriminatory obstacles targeted at immigrants may just be the solution to boost government revenues and achieve the much-needed development in Africa.

4. Summary of major findings

Table 4 presents a summary of the findings of this paper.

Table 4 Summary of the findings related to the research questions

Research question	Findings
What are the dominant perspectives in the literature regarding intra-Africa immigrant entrepreneurship in Africa?	Our review of literature revealed that there are mixed perspectives (both positive and negative) regarding the role of immigrant entrepreneurship in Africa. The negative perspectives relate to the challenges that immigrant entrepreneurs experience, while the positive perspectives point at enormous contributions that immigrant entrepreneurs can bring in terms of skills transfer, employment creation as well as social and economic gains related to employment creation, poverty alleviation and economic growth. Most of the articles point at the positive impact, and even greater benefits can be achieved if more immigrant entrepreneurship is supported at international level.
What is the impact of immigrant entrepreneurship on intra-African trade and economic development?	As evidenced by studies from other parts of the world, such as Kerr & Kerr, (2020), Naudé et al. (2017), among others, immigrant entrepreneurship could have a potential positive and sustainable impact on intra-African trade and economic development. The potential positive gains of intra-African trade and economic development could be contained within the African continent if favorable trade and immigration policies are in place. There is a concern that the gains could be threatened by other international bilateral trade agreements that could function as leakages.
What are the constraints that retard the contributions of immigrant entrepreneurship in Africa?	Immigrant entrepreneurs experience additional challenges which retard their potential contributions to both host and home countries. The challenges experienced by immigrant entrepreneurs such as discrimination, xenophobia and restrictive immigration, and international trade laws have a potential impact on collective economic development of the African continent.

Source: Authors

Several good practices emanating from integrating migrant entrepreneurs in other African economies are identified in the literature. For example, the practice by immigrant entrepreneurs of partnering with local entrepreneurs is cited by Mouelle and Barnes (2018) as an important practice that is beneficial to both parties in terms of transferred knowledge and entrepreneurial expertise and competences, reduced operating costs and access to government funding. Furthermore, visa regimes that are conducive to immigrant entrepreneurs and support mechanisms such as access to finance and other resources could be established to attract and promote the growth of immigrant entrepreneurship (Anderson, 2016).

5. Implications for research, practice, and society

Through the lens of a systematic literature review methodology, this study sought to highlight the dominant perspectives in the literature regarding the nature and role of immigrant entrepreneurship and its potential impact on intra-African trade and economic development, as well as to identify enabling factors including constrains that inhibit contributions of immigrant entrepreneurship in Africa.

The finding that entrepreneurship, and in particular immigrant entrepreneurship, has a potential impact on international trade and economic development deserves the attention of scholars, immigrant entrepreneurs and policy makers alike. For scholars, this is a call for further empirical investigations to reveal the extent to which immigrant entrepreneurship contributes to intra-African trade and the ultimate potential towards economic development.

For immigrant entrepreneurs and other practitioners, an exposition of their impactful contribution should serve as motivation towards the approaches and kind of entrepreneurial activities they ought to focus their attention on. Thus, efforts towards high-impact immigrant entrepreneurial activity should be encouraged. It is envisaged that immigrant entrepreneurs and other practitioners will be inspired to do more for the betterment of their nations and the African continent at large. The lack of African context-specific empirical data on the impact of intra-Africa immigrant entrepreneurship on intra-African trade and economic development should however not deter policy makers from giving attention to the notions of immigrant entrepreneurship. Evidence from other countries such the USA, Australia, and Canada (for examples, see Desderio, 2014; Kerr & Kerr, 2020) could be used to guide policies to support intra-Africa immigrant entrepreneurship.

6. Areas for further research

Investigations of the nature and scope of immigrant entrepreneurship that have an impact on intra-African trade and economic development are required. In pursuit of generating empirical data on the hypothesized relationships formulated in this paper, we envisage to conduct a series of multi-staged Delphi studies as part of a more comprehensive research project. The envisaged project involves collection and analysis of both quantitative and qualitative data from a panel of experts, immigrant entrepreneurs and selected policy making bodies. Furthermore, longitudinal studies could be conducted to track the long-term impact and direction of intra-Africa immigrant entrepreneurship on intra-African trade and economic development.

7. Conclusion

There are important considerations that can be drawn from our assessment of intra-Africa immigrant entrepreneurship, intra-African trade and intra-Africa development. We therefore recommend several policy guidelines that may augment the potential impact of immigrant entrepreneurs within the context of intra-African trade and development. Of particular importance is the realization of the potential positive effect of removing discriminatory barriers against immigrant entrepreneurs in promoting development in Africa for both home and host countries. Based on the best scenario evidence we have examined, we have demonstrated and are convinced with reasonable confidence that immigrants create economic opportunities for their countries of origin as well as for those in which they settle. However, in the interest of collective benefit and a broader objective, we are motivated that the gains of intra-African trade, whichever direction they take, whether in favor of home or host countries, will be localized within the African region.

Secondly, an inclusive approach is needed, one that is non-discriminatory against immigrants in providing start-up capital and ongoing credit facilities to immigrant entrepreneurs. This is corroborated by various African studies that identified lack of financial access to be among the key obstacles slowing the progressive impact of immigrant entrepreneurship. This is further supported by initiatives such as the AfCFTA and BIAT (Boosting Intra-African Trade), which call for removal of tariffs and trade barriers in Africa.

We conclude by arguing that industrial development and trade policies that foster intra-Africa immigrant entrepreneurship are critical if the African continent is to achieve its collective development agenda. African continental integrations through intra-Africa entrepreneurship, intra-African trade and collective development efforts are unavoidably necessary for sustainable socio-economic development. A borderless Africa that trades with itself to achieve the collective gains of its internal riches is therefore imminent.

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SKILLS REQUIRED OF PROFESSIONAL ACCOUNTANTS: EVIDENCE FROM LABOUR MARKET IN CROATIA

Abstract

Purpose: The main purpose of this paper is to develop a further understanding of professional accountants' attributes and professional skills required by employers. This paper analyses the requirements of the labour market of the Republic of Croatia using the framework derived from IFAC's International Education Standard (IES) 3 from 2015 to identify the specific dimensions of professional skills in job advertisements.

Methodology: This study uses a qualitative data collection method to analyse the required professional skills of professional accountants from the accounting employers' perception. We have used Internet research to collect primary data and analyse job advertisements. Content analysis was used to analyse job advertisements.

Results: The evidence suggests that employers mostly required professional accountants with attributes categorised as the organisational skills dimension. They were followed by attributes categorised as the intellectual skills dimension, the interpersonal and communication dimension, and the personal dimension. Taking into account the professional skills dimension, a professional accountant is required to possess the ability to use appropriate information technology (IT), teamwork skills, responsibility, the ability to work independently, be analytical and committed to learning, since those were most highly ranked attributes in the collected job advertisements.

Conclusion: This study revealed a 'profile' of a professional accountant considering the requirements of employers regarding professional skills. Future research should take into consideration further analysis regarding the required skills using different data sources and explore the required skills within different accounting related professions and various sectors and sizes of accounting employers.

Keywords: Professional accountants, professional skills, labour market

1. Introduction

Professional accountants play a very important role since they serve the information needs of a variety of business stakeholders by providing a broad range of financial and non-financial information. It is argued that the accountancy profession "contributes to an efficient economy that creates value to society" (IFAC, 2019, p. 7). Professional accountants are strategic support to management (Belfo & Trigo, 2013, p. 538) and information providers (Doost et al., 2011, p. 62). To fulfil their roles, professional accountants have to demonstrate their competence consisting of technical knowledge as well as professional skills and professional values (IFAC, 2019, p. 10). The accountancy profession is facing many challenges due to altering stakeholder demands as well as legislative and regulatory changes. Changing labour market conditions are causing the evolution of many skills and knowledge required for many jobs. The newest report released by the World Economic Forum (WEF, 2020, p. 4) on opportunities in the emerging labour market states that there is a demand for a "broad variety of skills, inclusive of both disruptive technical skills but also specialised industry skills and core business skills". According to accounting industry research, accountant job descriptions will continue to evolve, especially concerning constant regulatory changes and information technology challenges (Thompson Reuters, 2018; Tsiligiris & Bowyer, 2021).

Professional skills play an important role in the achievement of the overall competence of professional accountants (Crawford et al., 2011) and are an increasingly important area in accounting research, especially in the area of accounting education. This topic can be addressed from different points of view, and previous studies have been conducted on different focus groups, such as accounting educators, students, and accounting employers. Employers' perspective is of special importance since they dictate the profile of professional accountants that are in demand in the labour market. Although various studies have been conducted in the last three decades (Jackling et al., 2013; Bunney et al., 2015; Webb & Chaffer, 2016; Tan & Laswald, 2018), it is argued that there is still a need to conduct further empirical research, since to date there has been little agreement between academic or professional accounting bodies regarding the list of skills accounting professionals should possess. Jackling & De Lange (2009, p. 370) see "the mixture of skills" necessary for future accountants that enable them to "solve the diversity of business challenges".

The main purpose of this paper is to develop a further understanding of professional accountants' attributes and professional skills required by employers. This paper analyses the requirements of the labour market of the Republic of Croatia, responding to calls from previous research (Tan & Laswald, 2018; Tempone et al., 2012; Chaplin, 2017) for further research regarding employers' perceptions of attributes required of professional accountants in different contexts. Most recent studies have mainly been conducted in countries with strong inputs of the accounting industry and professional accounting bodies in designing accounting programmes, such as Australia (Leong & Kavanagh, 2013). In the Republic of Croatia, a framework for accounting education is still developing. Recently, efforts have been made by the academic community to further develop and improve higher education and occupational standards in the field of accounting within the research project "Excellence and efficiency in higher education in the field of economics - E4" (active from 2019 to 2022), which included several national universities as project members. One of the aims of the Accounting working group within the aforementioned project was to develop a Master of Business Economics qualification standard. Within the Croatian Qualifications Framework (CQF), which "regulates the entire qualifications system at all levels of education", there are occupational standards in the CROQF Register for financial forensic accountants (from 2017), bookkeepers (from 2019), and heads of accounting (from 2021). Furthermore, most recent studies have conducted interviews or survey questionnaires with employers (Webb & Chaffer, 2016; Chaplin, 2017; Tempone et al., 2012; Low et al., 2016; Nicolaescu et al., 2017; Atanasovski et al., 2018, etc.) to find out their perspective on desirable skills of accounting professionals. In most cases, researchers identified "oral and written communication skills, teamwork skills, critical thinking, and problem-solving skills, the ability to use information technology, commitment to life-long learning and ethical attitude as important skills" from the employers' viewpoint (Barišić et al., 2021, p. 24).

Previous studies used different frameworks or no frameworks to systematically analyse skills, which makes generalisations difficult. This study focuses on the analysis of job advertisements of the Croa-

tian labour market, following previous research that also analysed job advertisements to comprehend the employers' perspective in this context (Dunbar et al., 2016; Tan & Laswald, 2018). This study uses the framework derived from the International Education Standard (IES) 3 from 2015 to identify specific dimensions of professional skills in job advertisements. This research study also expands its focus by analysing skills required in various stages of the career of professional accountants to identify skills that are important in general, not just for a particular career phase. In addition, it will contribute to a more comprehensive understanding of this topic in the European geographical area.

This study aimed to address the following research questions:

- Which dimension of professional accountants' skills is the most required by employers?
- What are the attributes most required of professional accountants?
- Is there a difference between job functions in terms of required skills?
- Is there a difference between different levels of job experience in terms of required skills?

This paper aims to contribute to this area of research by exploring the attributes and skills of professional accountants, which will enable the synthesis of a profile of professional accountants regarding the skills requirements of employers of the Croatian labour market. Data were collected for this study from online job advertisements of accounting employers in the period from February to March 2020. The results can be used by accounting academics as well as accounting educators as a reference point to determine the importance of certain skills to accounting employers in a European context. Previous studies identified a "wide gap between the skills and capabilities of graduates and the requirements and demands of the work environment" (Andrews & Higson, 2008, p. 411) in some European countries, and the need that "business graduates are equipped with more than hard business-focused skills and competencies" (Andrews & Higson, 2008, p. 20). Therefore, there is a need to conduct further research on this topic from the accounting perspective. There is no systematic research into this subject matter in the Republic of Croatia, and we believe that the results of this study can provide important insight from the perspective of the accounting industry. There is global criticism regarding accounting education not including demands from employers and differences between accounting employers' expectations and those of accounting educators regarding professional/generic skills and competencies (Bui & Porter, 2010). Research efforts have also been made to develop a curriculum design proposal to better prepare accounting graduates for the workplace demands (Willcoxson et al., 2010; Tsiligiris & Bowyer, 2021). Accounting education, especially at universities, has an important role in forming competent professional accountants since it provides professional knowledge, but also enables requiring skills that are an essential part of professional competence. Howcroft (2017, p. 464) argues that university accounting education is a competitive market and that there is pressure upon university accounting educators to "pay attention and give serious consideration to the professional accountancy bodies' and practitioner employers' expectations of business schools to provide vocational training". Various teaching methods could be employed to support the development of the required skills according to the needs of the labour market.

The next section of the paper provides a literature review, followed by the methodology section. The fourth part of the paper analyses results and the conclusion is provided in the last section of the paper.

2. *Literature overview*

Professional skills have been an important part of accounting research in the last decades, as well as various competency frameworks of the accountancy profession. They are considered part of a multidimensional construct of professional accountants' competence (IFAC, 2019, p. 134; AICPA, 2018). Professional skills are also promulgated by prominent professional accounting bodies within competency frameworks. Palmer et al. (2004, p. 892) compared various competency studies, completed from 1989 to 2003, mostly US-based. According to the results, entry-level accountants were mainly required to possess "communication skills, interpersonal skills, general business knowledge, accounting knowledge, problem-solving skills, information technology, personal attitudes and capabilities, and computer skills" (p. 892). Recent competency frameworks that contain expected competen-

cies of professional accountants in various fields of the accountancy profession such as the ACCA Competency Framework, the AICPA Pre-certification Core Competency Framework, the IMA Accounting Management Competence Framework, the Chartered Global Management Accountant (CGMA) Competency Framework, the INTOSAI Competency Framework, also articulate skills like communication skills, personal organisation and teamwork, decision making, leadership and digital skills (Barišić et al., 2020).

Professional accountants are expected to possess specific knowledge of various competence areas such as financial accounting, management accounting, taxation, and audit, but employers also require professional accountants to possess certain professional skills. In this paper, professional skills are regarded as skills that are not subject-specific and are often defined as "skills that are transferable, i.e., they can be transferred from one job or career to another, and are skills that are required for employability" (Crawford et al., 2011, p. 117). Many interchangeable terms are used to describe professional skills such as generic skills, transferable skills, personal transferable skills, core skills, key skills, graduate attributes, generic attributes (Jones, 2010), employability skills, soft skills, underpinning skills (Tempone et al., 2012), non-technical skills, personal transferable skills, soft skills and attributes (Tan & Laswald, 2018), and employability skills (Webb & Chaffer, 2016). Many authors (Jones, 2010; Bunney et al., 2015) argue that there is certain ambiguity not only regarding its "definitional confusion" but also regarding lack of consensus on the issue of what skills are most important in this regard. Howcroft (2017) argues that there is no "real likelihood" of a consensus between accounting employers regarding expected skills of accounting graduates since they vary in sizes and organisational types, and thus in the required skills and knowledge. In the International Education Standard 3 (IES 3), the International Federation of Accountants (IFAC) promulgated four competence areas of professional skills, which are also used as a framework in this paper. First of all, *intellectual* refers to the "ability of a professional accountant to solve problems, make decisions, adapt to change, and exercise professional judgment". Secondly, *interpersonal and communication* refers to the "ability of a professional accountant to work and interact effectively with others". Then, *personal* "relates to the personal attitudes and behaviour of a professional accountant", and finally *organisational* "relates to the ability of a professional accountant to work effectively with or within an organisation to obtain the optimal results or outcomes from the people and resources available" (IFAC, 2019, p. 134).

In their review of previous research of accounting academics, Tan and Laswald (2018) identified a large volume of studies dating from the mid-1980s from different geographical areas, largely Australia and New Zealand. The authors argued that the professional skills "issue is not unique to a country but is an area of growing concern worldwide", and that it concerns many disciplines, including accounting (p. 4). They analysed a growing body of research from late 1990 to 2016 and identified communication skills and personal, interpersonal, and intellectual capabilities as the most required generic skills. Recently, more research efforts have been made to gain an understanding of employers' perceptions, especially in Australia. Tempone et al. (2012) interviewed employers in Australia that ranked communication and presentation, teamwork, and self-management attributes in the graduates they were employing as the most required skills for accounting graduates entering the labour market. Similarly, Chaplin (2017) classified the requisite skills of accounting graduates in Australia. Respondents were questioned via an email survey questionnaire, and analytic skills followed by creative thinking skills and computer skills were the most important prerequisite skills for new junior employees. Dunbar et al. (2016) collected data from job advertisements over a four-year period (2006 to 2009) in Queensland Australia, and concluded that there was greater emphasis on soft skills, rather than on technical skills, and that the most required soft skills were communication skills. Low et al. (2016) interviewed accounting employers in New Zealand and concluded that employers find "non-technical skills more important or at least equally important as technical skills" (p. 52). Interpersonal skills, the ability to work with organisational culture of the firm as well as oral communication skills were found to be the most important among identified non-technical (generic) skills. Tan & Laswald (2018) criticised previous studies that just identified broad categories of professional skills (they were referred to as employability skills) and offered more information about what each skills category consisted of using Birkett's taxonomy of skills and IFACs IES 3 from 2015. They analysed job advertisements in Australia from 2015 to 2016. The study also ana-

lysed skills depending on various experience levels and in terms of different accounting sub-groups. In Indonesia, Aryanti & Adhariani (2020) analysed students' perceptions and employers' expectations regarding skills, measured through attributes identified in previous studies. In this regard, employers in Indonesia emphasised work ethics, teamwork, and time management. Mhlongo (2020) analysed accounting job advertisements in South Africa. Skills selection was based on the skills that were prescribed by national professional accounting bodies. According to the results, employers valued oral and written communication, critical thinking, and computer literacy as the most important skills for the employment of accounting graduates, and there was no difference in their rank when they were analysed across levels of employment, except in the case of critical thinking. Critical thinking was more preferred in the higher levels of accounting job functions.

Regarding research in other countries at European level, in the UK, Howcroft (2014) analysed vocational skills expected from novice management accountants and the expectation-performance gap by conducting a survey and interviewing students, practitioner employers, and university educators. Employers emphasised verbal communication and written communication skills as the most important skills for management accountants. Jones (2014) analysed accounting employers' views on key personal and professional skills engaging employers' panels in England. The study identified the importance of generic skills as well as the "professional credibility with colleagues and clients". The idea was to study the skills/personal attributes required of an early career accountant. Nicolaescu et al. (2017) analysed the importance of transversal competencies based on the perception of accounting graduates and employers from Western Romania. Employers placed the use of IT technology and communication, readiness for life-long learning as well as the learning autonomy, teamwork, decision-making and problem-solving ability as the five most important transversal competencies. The study was based on the national classification of competencies. Atanasovski et al. (2018) surveyed accounting employers and accounting students in Romania regarding generic skills as well as technical skills considered important for future accountants. There was no specific framework used in the study but an extended list of skills that had been considered important in previous studies. Both groups of respondents emphasised the importance of generic skills over technical skills for future accountants, and employers emphasised "personal and interpersonal skills of oral communication, knowledge of foreign languages, ethical attitude, credibility, and commitment to life-long learning" (p. 64). Dolce et al. (2020) analysed soft skills of Italian accounting graduates and employers' expectations via a questionnaire. Italian employers prioritised soft skills over technical skills, and teamwork and communication were considered most important. Cernușca (2020) used IFAC's IES 3 (2015) skills taxonomy to survey students majoring in accounting and accounting employers in Romania to analyse the importance of hard and soft skills required for entering the labour market. Accounting employers who took part in the survey ranked hard and soft skills as follows: personal skills, interpersonal and communication skills, technical and functional skills, organisational and business management skills, and intellectual skills.

3. Methodology

This study uses a qualitative data collection method to analyse the professional skills required of professional accountants from the accounting employers' perception. We used Internet research to collect primary data by analysing job advertisements. As previously mentioned, job advertisement analyses have been used in some previous studies of this subject matter in the field of accounting. It is also a well-known and frequently used method in other fields, especially "to examine the changing nature of skills which are required in the workplace" (Harper, 2012, p. 29), and to understand employers' preference regarding the "distribution of the need for a certain skill" (Kurekova et al., 2015, p. 14).

We have used the purposive sampling technique, which is often used when analysing job adverts (Harper, 2012) with several sampling criteria described in the next section of the paper. After that, content analysis was used to analyse job adverts, where data were coded manually and extracted using Microsoft Excel. It is argued that the advantage of human reading instead of using textual software analysis is that it "may ensure that words are analysed in terms of their context as well as their frequency" (Harper, 2012, p. 42). In addition, descriptive and inferential statistics have been employed to analyse the results.

4. Results and discussion

4.1 Sample description

We collected job advertisements available in the Republic of Croatia, during the period of one month in 2020 (between 10 February 2020 and 10 March 2020) that included job functions within the accountancy profession. All job advertisements that were analysed were active at the time of sample collection. As presented in Table 1, job advertisements were collected from the web pages of the following job search sites: Burza rada, Moj Posao, Posao, and LinkedIn, as well as from the web pages of the accounting firms that are part of the "Big Four".

Table 1 Job sites used for job advertisement collection

Job advertisement site	f	%
Moj Posao	45	62
Posao	10	14
LinkedIn	9	12
"Big Four"	3	4
Burza rada	6	8
Total	73	100

Source: Authors

As presented in Table 2, most collected job adverts were from companies in the services industry (37%) and the production industry (31%), followed by trade (19%), and the accounting industry (12%). Concerning the size of the companies, as can be seen in Table 3, the sample mostly comprises small (36%) and medium-sized companies (31%).

Table 2 Company industry

Industry	f	%
Production	18	31%
Services	22	37%
Trade	11	19%
Accounting	7	12%
N/A	1	2%
Total	59	100

Source: Authors, based on empirical research results

Table 3 Company size

Size	f	%
Micro	14	24%
Small	21	36%
Medium	18	31%
Big	4	7%
N/A	2	3%
Total	59	100

Source: Authors, based on empirical research results

Table 4 indicates that most collected job advertisements searched for a bookkeeper (29%) and an accountant (25%), followed by an accounting assistant (16%) and a senior accountant (10%). Very few job adverts searched for the auditing job functions (overall, 5%).

Table 4 Accounting/Auditing job function

Accounting/Auditing job function/ position	f	%
Accountant	18	25
Accounting assistant	12	16
Auditor	1	1
Auditor analyst	1	1
Internal auditor	1	1
Auditor - IT specialist	1	1
Bookkeeper	21	29
Bookkeeper assistant	3	4
Chief accountant	6	8
Financial controller	2	3
Senior accountant	7	10
Total	73	100

Source: Authors, based on empirical research results

4.2 Analysis of the collected job advertisements

This study uses IFAC's IES 3 Initial Professional Development - Professional Skills taxonomy from 2015 as a reference for professional skills analysed in the job advertisements. IES 3 was slightly revised in 2019, but changes were effective from 2021, and since the time frame for this study was 2020, the revised 2019 IES 3 taxonomy was not used. Job ad-

vertisements also contained requirements regarding specific accounting knowledge, but that was not included in the analysis since it is not the focus of this research.

Learning outcomes contained in the 2015 IES 3 (IFAC, 2019, pp. 45-46) related to four skills dimensions, intellectual, interpersonal and communication, personal, and organisational were used to extract attributes (characteristics) for each professional skills dimension. Those attributes were then used as the reference to categorise the required attributes from the collected job advertisements into four aforementioned professional skills dimensions. In the cases where attributes could not be identified directly from the framework used, English synonyms were used to enable more precise coding.

Attributes extracted from the collected job advertisements and categorised into four professional skills dimensions are presented in tables 5-9.

It can be seen from Table 5 that the most required attribute categorised as the intellectual skills dimension is "responsible", which was identified in almost 30 collected job adverts, with 27.8% frequency in comparison to all other attributes in that professional skills dimension. It was followed by "work independently", with a relative frequency of 23.1%. Employers also highly value professional accountants with problem-solving attributes, with a relative frequency of 12%.

Table 5 Frequency of attributes of the intellectual skills dimension (category)

Attributes of the intellectual skills dimension	f	%
analytical skills	16	14.8
creative	1	0.9
decision making	3	2.8
evaluate data	1	0.9
inventive	1	0.9
proactive	12	11.1
problem-solving	13	12.0
responsible	30	27.8
self-initiative	6	5.6
work independently	25	23.1
Total	108	100

Source: Authors, based on empirical research results

As presented in Table 6, teamwork is the most in-demand attribute in the interpersonal and communications skills dimension (relative frequency of 53.8%), followed by communication skills (relative frequency of 18.5%).

Table 6 Frequency of attributes of the interpersonal and communication skills dimension (category)

Attributes of the interpersonal and communication skills dimension	f	%
communication skills	12	18.5
communicative	8	12.3
helpful	1	1.5
interpersonal skills	1	1.5
oral presentation skills	3	4.6
positive attitude	4	6.2
teamwork	35	53.8
written presentation skills	1	1.5
Total	65	100

Source: Authors, based on empirical research results

A requirement that professional accountants should be able to use appropriate IT is the most required attribute categorised as the organisational skills dimension, as can be seen in Table 6. It is required in almost all of the analysed job adverts (69 out of 73), with a relative frequency of 35.4%. Most employers required IT proficiency in using MS Office, in particular Excel. They also mainly required an advanced level of proficiency. Interestingly, there were only a few requirements regarding proficiency in using specific accounting software, such as Synesis and Pantheon. Detail-oriented (relative frequency of 7.7%) and precision (7.2%) followed as the most required attributes in this professional skills dimension.

Table 7 Frequency of attributes of the organisational skills dimension (category)

Attributes of the organisational skills dimension	f	%
ability to comply with prescribed standards	2	1.0
ability to meet deadlines	10	5.1
ability to meet prescribed goals	5	2.6
ability to set priorities	5	2.6
ability to work under pressure	4	2.1
accurate	10	5.1
uses appropriate IT	69	35.4
detail-oriented	15	7.7
leadership skills	3	1.5
neat person	4	2.1
organisational skills	13	6.7
organised	9	4.6
precise	14	7.2
punctual	2	1.0
structured	2	1.0
systematic	13	6.7
time management	2	1.0
timeliness	13	6.7
Total	195	100

Source: Authors, based on empirical research results

Regarding the attributes categorised as personal skills, which are presented in Table 8, commitment to learning is the most required attribute (relative frequency of 33.3%), followed by the attribute 'reliable' (relative frequency of 22.9%), and 'flexible' (relative frequency of 14.6%).

Table 8 Frequency of attributes of the personal skills dimension (category)

Attributes of the personal skills dimension (category)	f	%
agile	1	2.1
committed to learning	16	33.3
conscientious	1	2.1
flexible	7	14.6
motivated	6	12.5
open-minded to new opportunities	4	8.3
professional	2	4.2
reliable	11	22.9
Total	48	100

Source: Authors, based on empirical research results

Attributes from the job adverts that could not be categorised into any of the four professional skills dimensions were classified as other (Table 9).

Table 9 Frequency of attributes of the "other" skills dimension (category)

Attributes of the "other" skills dimension	f	%
accessible	1	7.1
brave heart who dares to "think outside the box"	1	7.1
diligence	3	21.4
entrepreneurship	1	7.1
focused	1	7.1
multitasking	1	7.1
open-minded	1	7.1
practical	1	7.1
resourceful	1	7.1
simple	1	7.1
takes other responsibilities	1	7.1
truthful	1	7.1
Total	14	100

Source: Authors, based on empirical research results

In order to answer the first research question, i.e., which dimension of professional accountants' skills is the most required dimension by employers, we analysed frequencies of attributes required in collected job advertisements that had previously been categorised into four professional skills dimensions. According to the results presented in Table 10, employers mostly required professional accountants with attributes that were categorised as the organisational skills dimension (45% of all required attributes). They were followed by attributes categorised as the intellectual skills dimension (25%), interpersonal and communication (15%), and personal (11%).

Table 10 Frequency of attributes per skills dimensions

Skills dimension (category)	f	%
Intellectual	108	25
Interpersonal and communication	65	15
Organisational	195	45
Personal	48	11
Other	14	3
Total	430	100

Source: Authors, based on empirical research results

Considering the second research question, the goal was to analyse what the most required attributes are for professional accountants, regardless of the professional skills dimension they were categorised into. As can be seen in Table 11, taking into consideration the rank of all attributes extracted from the collected job advertisements, employers mostly require professional accountants that use appropriate IT, have teamwork skills, are responsible, possess the ability to work independently, possess analytical skills and are committed to learning. The aforementioned attributes are top five ranked attributes in terms of the frequency of their requirement in all collected job advertisements.

Table 11 Ranks of attributes

Attribute	Frequency	%	Rank
use appropriate IT	69	94.52%	1
teamwork	35	47.95%	2
responsible	30	41.10%	3
work independently	25	34.25%	4
analytical skills	16	21.92%	5
committed to learning	16	21.92%	5
detail-oriented	15	20.55%	7
precise	14	19.18%	8
problem solving	13	17.81%	9
organisational skills	13	17.81%	9
systematic	13	17.81%	9
timeliness	13	17.81%	9
proactive	12	16.44%	13
communication skills	12	16.44%	13

Source: Authors, based on empirical research results

To analyse further if there is a difference between job functions in terms of required skills (categories of professional skills), which was the third research question, we conducted a chi-squared test. According to the results, presented in Table 12, there is no statistically significant difference (χ^2=4.08, p=0.90) between accounting job functions (accountant, accounting assistant, bookkeeper, bookkeeper assistant, chief and senior accountant) in terms of different professional skills dimensions. Overall, organisational skills and intellectual skills are mostly required, then there follow interpersonal and communication, and personal skills, but those differences are not statistically significant when different accounting jobs are taken into consideration. So we can conclude, regardless of the accounting job position, that accounting employers require attributes from all four professional skills dimensions. In comparison, when analysing differences between accounting sub-groups in job advertisement analyses in Australia and New Zealand, Tan & Laswald (2018) identified interpersonal and personal skills as top skills in demand in all sub-groups in both countries.

Table 12 Analysis of interdependence between accounting job functions and professional skills dimensions

Accounting job functions	Total	Skills				
		Intellectual	Interpersonal and communication	Organisational	Personal	Other
Accountant*	18	17 (94.4%)	9 (50%)	18 (100%)	6 (33.3%)	1 (5.6%)
Accounting assistant*	12	11 (91.6%)	7 (58.3%)	12 (100%)	4 (33.3%)	4 (33.3%)
Auditor (analyst, internal, IT spec.)	4	4 (100%)	3 (75%)	4 (100%)	4 (100%)	1 (25%)
Bookkeeper (and assistant)*	24	17 (70.8%)	10 (41.6%)	23 (95.8%)	14 (58.3%)	1 (4.2%)
Chief accountant (and senior acc.)*	13	11 (84.6%)	8 (61.5%)	13 (100%)	4 (30.8%)	2 (15.4%)
Financial controller	2	2 (100%)	0 (0%)	2 (100%)	2 (100%)	0 (0%)
Total	73	62 (84.9%)	37 (50.7%)	72 (98.7%)	34 (46.6%)	9 (12.3%)

χ^2=4.08, p=0.90 (p>0.05)

Source: Authors, based on empirical research results

We have also tested interdependence between accounting job functions and professional skills dimensions to see if there is a difference between different levels of job experience in terms of required skills (professional skills dimensions), which is the fourth research question. Groups based on work experience are presented in Table 13. According to the results presented in Table 14, there is no statistically significant difference (χ^2=1.30, p=0.72) between the groups regarding work experience concerning different professional skills dimensions. Although intellectual skills are more in demand in both work experience groups, that difference is not statistically significant in relation to all other professional skills dimensions. In contrast, Tan & Laswald (2018) identified that interpersonal skills were considered more important for more experienced professional accountants.

Table 13 Groups based on work experience

Work experience	f	%
1. Group (up to 1 year - min. 2 years)	26	41
2. Group (min. 3 years - min. 5 years)	38	59
Total	64	100

Source: Authors, based on empirical research results

Table 14 Analysis of interdependence between work experience and professional skills dimensions

Skills dimensions	Work experience		
	1	2	Total
Intellectual	14 (53.8%)	24 (66.7%)	38
Interpersonal and communication	4 (15.4%)	3 (8.3%)	7
Organisational	4 (15.4%)	5 (13.9%)	9
Personal	4 (15.4%)	4 (11.1%)	8
Total	26	36	62

χ^2=1.30, p=0.72 (p>0.05)

Source: Authors, based on empirical research results

5. Conclusion

The contribution of this paper is in identifying the required skills of professional accountants in a different context and further investigating the importance of professional skills regarding different accounting jobs and levels of work experience. The evidence suggests that employers mostly required professional accountants with attributes categorised as the organisational skills dimension. The most required attribute from the organisational

skills dimension according to the frequency of appearance in job advertisements was the ability to use appropriate IT. Furthermore, employers mostly required an advanced level of IT proficiency, which indicated the importance of digital competency for professional accountants. Intellectual skills were the second most in-demand skills by the Croatian employers, and "responsible" was the most required attribute in the professional skills dimension, followed by the ability to work independently. This study also revealed the 'profile' of the professional accountant considering the requirements of employers. Taking into account the professional skills dimension, a professional accountant is required to possess the ability to use appropriate IT, have teamwork and analytical skills, be responsible, possess the ability to work independently, and be committed to learning, since those were most highly ranked attributes in the collected job advertisements. Additionally, according to other results, no statistically significant difference was found in the required skills dimensions comparing different accounting jobs/positions or levels of work experience. Results suggest that employers equally require skills within the scope of all four professional skills dimensions, which is in contrast to some previous research. It is also interesting to point out that we identified only a few attributes that were not categorised into four professional skills dimensions which were used as the framework for this research, indicating that employers mostly require skills promulgated by prominent accounting bodies.

Generalisability of these results has certain limitations. The first limitation refers to sample size and sample structure since companies from the sample were mainly small and medium-sized companies. Furthermore, there are some limitations concerning the source of data as we extracted attributes from online job advertisements over a certain period. Online job advertisements can give a glimpse into employers' perspectives but they lack a critical perspective. Future research should take into consideration further analysis regarding required skills using different data sources. It would also be interesting to further explore required skills of different types of jobs within the accountancy profession and various accounting employers' sectors and sizes.

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SYSTEMATIC MAPPING STUDY: APPLICATION OF AUGMENTED REALITY IN MARKETING

Abstract

Purpose: The aim of this paper is to provide an overview and analysis of literature dealing with the possibilities for applying augmented reality (AR) in marketing and the impact of AR on marketing in the era of digital transformation of business. Though attractive, this topic is still insufficiently explored.

Methodology: The paper uses a bibliometric method - citation and co-citation analysis in the Web of Science and Scopus citation databases. Data analysis was performed using the VOSviewer software tool for information construction, analysis and visualization.

Results: The conducted research revealed that there is an increasing trend in the number of research papers dealing with the AR and marketing topics. The specific topics dealt with in the papers are primarily related to the impact of AR on business, creating customer loyalty, sales increase and other marketing activities.

Conclusion: AR is a powerful and influential tool the use of which improves communication with customers and, at the same time, sales strategies and processes. AR is based on immersing customers into a new experience, by showing virtual objects in the users' real-world environment and creating harmony between the digital and the real-world environment so that the boundaries between them disappear. It is manifested as a form of experiential marketing, since it focuses both on a product and a service, and on the entire experience created for customers.

Keywords: Augmented reality, marketing, bibliographic analysis

1. Introduction

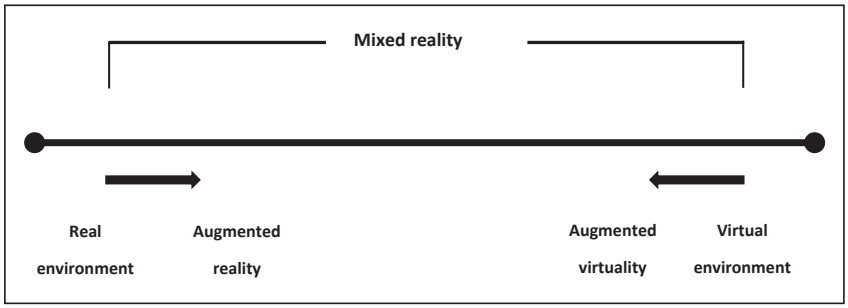
Digital transformation leads to significant changes in all segments of business, including marketing. Immersive technologies appear, which allow increased customer satisfaction by means of a new and more innovative approach to products and services. Augmented reality (AR), which creates an interactive experience, is one of them.

AR is an innovative media format that integrates virtual content into the user's real-world environment (Rauschnabel et al., 2019). The concept of AR is also defined as an artificial environment which complements the real-world environment with virtual elements, though it also allows the user to see the real world (Azuma, 1997).

Karakus et al. (2019) point out that AR has three important dimensions:

1. combination of both virtual and real items in the environment,
2. being able to interact with these items in real time, and
3. accurate registration of those virtual and real items. In other words, AR is positioned between the virtual and the real world, as defined in Milgram's reality-virtuality (Milgram, 1994). The following figure presents the differences between the virtual environment (where all objects are virtual), augmented virtuality (where a virtual environment is augmented with real objects), augmented reality (real-world objects augmented with a virtual environment) and the real environment.

Figure 1 Presentation of the reality-virtuality continuum



Source: Milgram et al. (1994)

The concept of AR began to develop in the 1960s, after Ivan Sutherland invented the first 3D optic head-mounted display (HMD), which was then used for watching objects which are part of AR (Rabbi & Ullah, 2013). Feiner et al. (1993) published the paper "Knowledge-Based Augmented Reality", which was fully focused on the AR system. The paper claims that the AR system is supported by HMD technology synchronized with people's movement and their orientation, which can easily manipulate virtual objects shown in real space.

AR enhances a user's perception and their interaction with the real world, since virtual objects display information that the user cannot directly detect with their own senses and make a task easier to perform (Mekni & Lemieux, 2014). The ways of application vary depending on the type of AR technology used, devices and applications; however, their common characteristic is that they can allow synchronization of virtual objects in real time (Javornik, 2015).

AR was initially used in military and medicine, while at present it has a widespread application in tourism, sports, education, marketing and architecture (Rabbi & Ullah, 2013). AR has led to significant changes in various areas, including marketing, where the emphasis is on its impact on a user's brand perception, and on the change in user experience when making a purchasing decision (Javornik, 2015). The use of AR in marketing provides the organization with the advantage in promoting a product or a service through interactive experience in a real-time environment, by means of changing the entire concept of product presentation and transforming user experience (Ching & Ramasamy, 2018). Experiences in the use of AR are exploited for gathering data on customers and customer relationship management (CRM), which in turn allows companies to gain advantage in further development of products and services, which will be modified by AR application (Nanda, 2012).

Though attractive, this topic is still insufficiently explored. Therefore, the aim of this paper is to provide an overview and analysis of literature dealing with the possibilities for applying AR in marketing and the impact of AR on marketing in the era of digital transformation of business.

2. *Augmented reality and application in marketing*

In recent years, digital information and communication technologies have significantly affected marketing, and therefore we describe the concept of digital marketing, which can be defined as an "adaptive, technology-enabled process by which firms collaborate with customers and partners to jointly create, communicate, deliver and sustain value for all stakeholders" (Kannan & Li, 2017). Together with continuous advances in technology, a need arises for communication with customers

through new and interactive ways to make marketing content more attractive (Yuksel & Tolon, 2017; Foster & Yaoyuneyong, 2014). Since the emergence of more sophisticated technologies allows synchronization of the environment, objects and persons, marketers thus perceive AR technology as a very promising technological tool that can produce satisfactory consumer experience resembling the experience in the physical environment (Alcañiz Raya et al., 2019). AR allows marketers to combine the traditional and the digital methods to create an exciting interaction between customers and a brand (Al-Modwahi et al., 2012). Bulearca & Tamarjan (2010) conclude that the use of AR technology has a positive impact on brand sustainability, and that building a relationship has become an important marketing tool for owners of small enterprises in their ability to cope with competition (Foster & Yaoyuneyong, 2014). Most mobile applications using AR focus on interactive marketing campaigns. The second way of using AR is based on placing 3D models or holograms around, and changing their position. Undoubtedly, these applications offer a unique experience for customers (Yuksel & Tolon, 2017).

Javornik (2014) defines three assumptions related to AR in marketing. First, the advanced AR tools are able to establish interaction in real time between products, brands, consumers and physical space. Secondly, AR simulation ability allows managers to digitally promote and present their products in a far more efficient way than before. Thirdly, advanced visual presentations in AR create a superb user experience. Due to its relatively new emergence, AR also often creates the wow effect for customers.

From a user's perspective, AR is entertaining, while from a marketing manager's perspective, it can increase brand awareness and trigger consumer engagement. AR provides marketers with important data on campaign effects (Feng & Mueller, 2018). In relation to AR advantages, Matta & Gupta (2019) mention real-time interaction, momentary feedback, personalization, attraction by means of games and tracking the return on investment (ROI).

In terms of shortcomings of AR, Feng & Mueller (2018) claim that marketing practices supported by AR increase an individual's curiosity about new experiences, but that curiosity typically diminishes after repeated or prolonged interaction. Furthermore, consumers who are not innovative will perhaps not have the pleasure of learning how to use new technology and media formats offered by AR, while some consumers may consider the steps necessary for installing AR application on their phones as fairly difficult and boring. For consumers who prefer the actual shopping experiences, virtual experiences offered by AR do not allow them to judge what a product actually looks like. One should also take into account a frequent need for linking with a PC due to the power of a processor, the inability to fully recognize 3D objects, a lack of actual spatial awareness, and the ability of devices to recognize 3D objects only from a certain angle. In addition, it is also necessary to develop hardware - devices should be improved so as to be lighter, more compact and easy to use (Mekni & Lemieux, 2014). For example, many headphones and glasses are bulky and have a limited visual field, contrast and resolution (Mariani et al., 2017).

AR has a powerful potential for contributing to integrated marketing programs. However, to reach its full potential, marketers must focus on the ways to maximize the function of contextual integration of AR for virtual content to perfectly fit in a user's real world and to develop a truly immersive consumer experience. In AR experiences based on mobile devices, marketers can offer users a greater freedom to manipulate AR content which is integrated into their real world, so that these users can gain a feeling of independence and self-containment. Through such consumer-brand interaction, consumers can better understand characteristics and advantages of a product (Feng & Mueller, 2018).

Scholz & Smith (2016) list important elements necessary for the design and optimization of AR campaigns: defining the target group, defining communication goals, determining the way in which AR will be implemented, creating contents that will be part of AR, and planning the possibility for integrating AR content with the physical world. Poushneh (2018) lists the following assumptions that marketers should keep in mind when it comes to using AR:

1. If customers are satisfied with the purchase, they are less likely to return the product and the repeat purchase will occur.
2. The better customer experiences, the more convinced they would be to use AR, and better experiences are achieved when customers trust technology.
3. Although the entertainment aspect is important, people will trust AR only if the application can display a product as accurate, correct and with all the information.

4. AR can display the current product promotion. For example, when customers visit a store, they can use their phones to see virtual product information and current promotions and discounts.

AR helps customers by simplifying the purchase. To increase customer satisfaction, it is possible to effectively use AR applications. For example, retail stores can be equipped with a *Magic Mirror* so that customers can virtually try on the clothes to see how they looks on them. Using AR technology in the store both entertains customers and encourages them to stay there longer. Accordingly, AR increases in-store traffic (Haumer et al., 2019).

The table below shows several examples of the use of AR in marketing campaigns.

Table 1 Examples of the application of AR

BRAND	WAY OF APPLICATION	RESULT
Volvo Cars Source: Håkansson (2018)	• WebAR • Promotion of the new S60 model	• Positive user experience • Registered an increase of 293% in traffic
Pepsi & Co Source: Jin & Yazdanifard (2015)	• An LED screen at a bus stop in London • Unusual appearances such as aliens or cheetah	• Positive reactions of passers-by • Millions of views on YouTube • Generated the WOM effect
Samsung Source: Watson (2020)	• WebAR and scanning QR code • Presence at virtual events • Presentation of new products	• Attracting user attention • Positive experience • Appearance in all media as an example of creating innovative content
Strava - fitness application Source: Becker (2017)	• *FitnessAR* Application • 3D image of maps that display hiking, cycling and running routes • The image is projected onto a table or a flat surface which can be managed	• User satisfaction • Novelty in the area of fitness applications • Users' interest in the application
Kinder Source: Cambosa (2021)	• *Applaydu* Application • For children • Animated animals, games, interactive stories	• Entertainment for children • Increased product sales
Hyundai Source: Håkansson (2018)	• *Virtual Guide* Application • Car interior display • Information on how to use certain functions	• Makes things easier for car owners • Satisfaction • Fast acceptance of the application

Source: Adapted according to Håkansson (2018), Jin & Yazdanifard (2015), Watson (2020), Becker (2017), Cambosa (2021)

It can be concluded that experience with AR results in user satisfaction and generated interest in products and services as well as increased sales and fast acceptance of new technology.

3. Presentation of research findings

Methodology

The paper is aimed at studying the connection between concepts of AR and marketing, i.e., the extent of the tendency to write academic papers on AR in marketing. Research questions to which answers will be provided are as follows:

- To what extent is the domain "augmented reality in marketing" present in academic papers and what is the trend in research?, and
- What is the strength of linkage between the most cited papers?

The study will use bibliometric methods, analysis of bibliographic pairs and co-citation analysis of the data from two citation databases – Web of Science and Scopus. Co-citation analysis allows an overview of conditions and structure, and the stages of the development of individual areas over a given time period (Bušelić, 2018). In terms of co-citation analysis, the frequency of co-citation represents the

measure of linkage between/similarity of two papers, and in this case, the relationship is dynamic, since the papers have been cited for a long time after their publication. In terms of measuring co-citation power, the degree of relationship or linkage between papers is measured by the perception of citing authors**.** Based on the analysis of common citations, clusters are generated that make up sets of linked papers (Marić, 2019).

The study used the VOSviewer software tool, by means of which data from citation databases can be analyzed and visualized. Data were extracted in March 2021 from the Web of Science and Scopus citation databases. All types of records were extracted and analyzed, which were searched in both databases by the following keywords: "augmented reality" AND "marketing". The search was conducted in English, since most academic papers are written in English.

After the academic areas had been selected in both databases, a total of 70 papers and 1,730 papers were extracted from the Web of Science and the Scopus database, respectively. The following areas were selected for the analysis of the Scopus database: *Business, management and accounting* and *Economics, econometrics and finance,* while the analysis of the Web of Science database encompassed the following areas: *Business* and *Management*. Evidently, the Scopus database includes far more papers than WoS, although the paper will not examine the reasons for such variance. Consequently, data analysis will be conducted separately for both citation databases, since they differ in nature and cannot be merged in the analysis, primarily due to coverage in terms of the number of papers. Furthermore, the results will be compared, which highlights the complexity of the research.

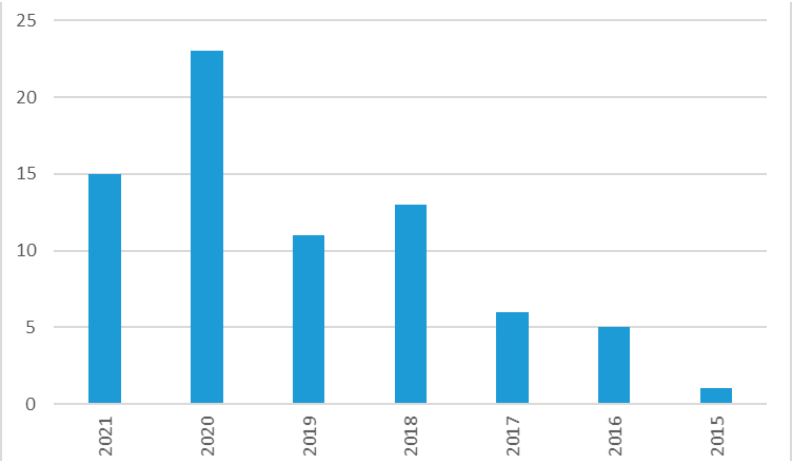
Presentation and discussion of findings

RQ1: To what extent is the domain "augmented reality in marketing" present in academic papers and what is the trend in research?

The analysis was conducted of data extracted from Scopus and WoS databases and a significant disproportion between them was observed. It should be noted that the Scopus database has broader coverage, which can be decisive for the multiple difference between the databases. Due to the assumption that variances can occur, it was previously determined that the analysis will be conducted in both citation databases.

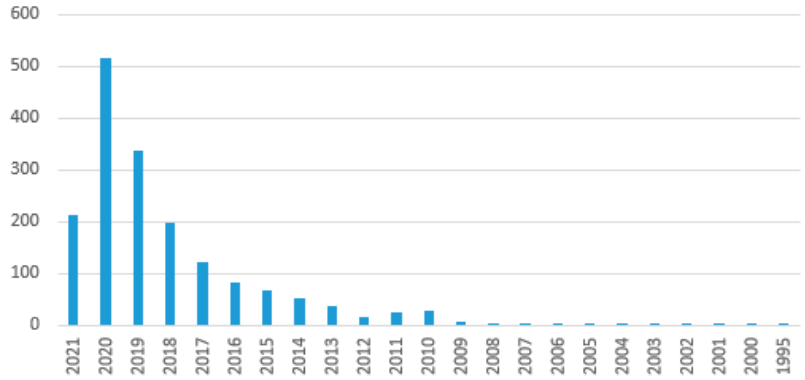
Graphs 1 and 2 describe the trend in this area; most papers in the WoS database were published in 2020. Since 2010, an increasing trend in the number of published papers can be observed, which suggests increasing interest in the area of AR and marketing. Similar results were obtained in the Scopus database, where a positive increasing trend was also observed. The year 2020 witnessed an exponential increase, and it is assumed that 2021 will witness more published papers compared to previous years.

Graph 1 Number of papers published by years (Web of Science)



Source: Authors

Graph 2 Number of papers published by years (Scopus)



Source: Authors

Although there are variances in the number of papers between the databases, with respect to the countries with the most research papers published in the area of AR and marketing, both databases reveal the same results, i.e., there is correspondence for the first four countries. An overview reveals the prevalence of papers by authors from the United States of America followed by England (WoS)/ Great Britain (Scopus), Australia and Germany.

Table 2 Overview by countries for both databases

SCOPUS		WOS	
Country	**Number of papers**	**Country**	**Number of papers**
USA	376	**USA**	25
Great Britain	277	**England**	17
Australia	143	**Australia**	11
Germany	137	**Germany**	8
China	123	**The Netherlands**	6
Italy	116	**Italy**	5
India	99	**France**	4
Spain	96	**India**	4
South Korea	79	**South Korea**	3
France	71	**Portugal**	3

Source: Authors

In addition to a significant variance in the number of papers between the databases, both databases show the same most relevant journals in this area by the number of published papers and the number of citations. In both databases we found correspondence of two most relevant journals. The *Journal of Retailing and Consumer Services* has 90 papers published in the Scopus database in the area of AR and marketing, while the WoS database has seven papers, thus it ranks first in both databases. The *Journal of Business Research* ranks second, with 57 papers published in the Scopus database, and six papers in the WoS database.

With the aim of examining the research trend in the target area, the occurrence and the importance of key terms were analyzed over the time period from

2015 to 2020. The goal was to describe the structure of research papers and their correlation within the area based on keywords and to show the trend present in the studies. In the Scopus database, 6,438 words were extracted from titles, keywords and abstracts; and adding a minimum threshold of 17 occurrences, a total of 63 most frequent keywords were extracted. In the WoS database, a total of 509 words were extracted from titles, keywords and abstracts; and adding a minimum threshold of three occurrences, a total of 62 most frequent keywords were extracted.

The table below shows keywords that occur most frequently, i.e., the most frequent topics.

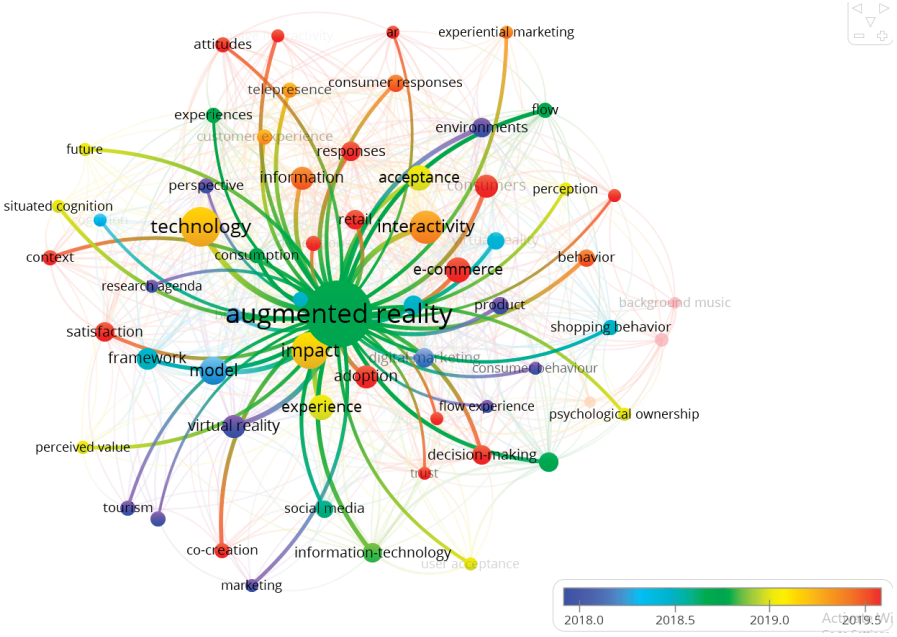
Table 3 Overview of keywords

SCOPUS		WoS	
KEYWORDS	**OCCURENCE**	**KEYWORDS**	**OCCURENCE**
augmented reality	177	**augmented reality**	43
virtual reality	172	**technology**	19
retailing	92	**impact**	17
marketing	75	**interactivity**	14
innovation	71	**model**	11
consumption behavior	68	**e-commerce**	9
tourism	66	**acceptance**	9
technology adoption	60	**experience**	9
Industry 4.0	57	**information**	8
electronic commerce	54	**adoption**	8
technology	45	**virtual reality**	8
social media	44	**consumers**	8
e-commerce	42	**framework**	7
artificial intelligence	42	**environments**	6
sales	39	**responses**	6
costumer experience	38	**technology acceptance model**	6
internet	37	**online**	6
literature review	37	**retail**	6
tourist destination	35	**information-technology**	6
perception	33	**decision-making**	6

Source: Authors

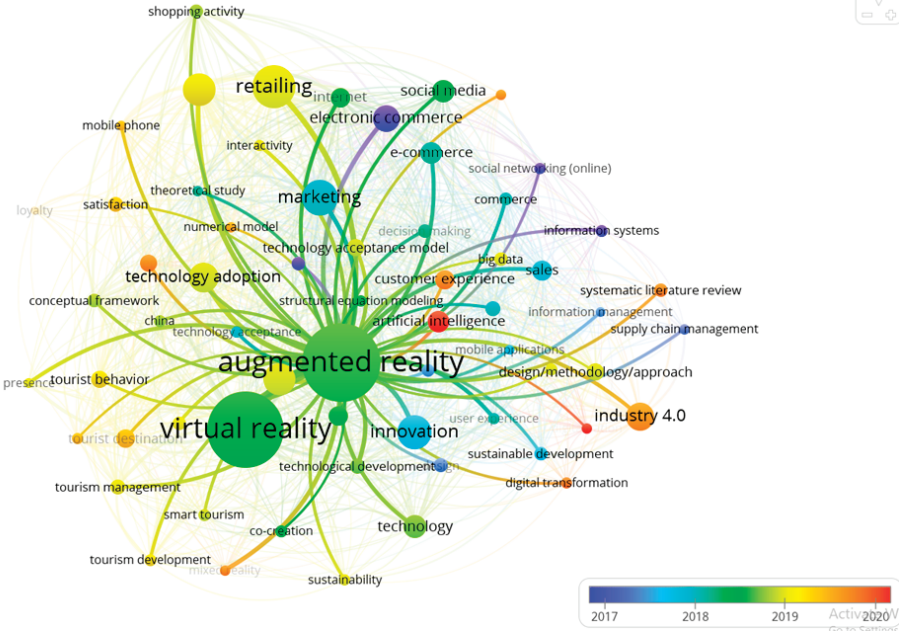
Analysis results revealed that *augmented reality* is the most frequent term in both databases. The term *marketing* ranks fourth in the Scopus database, while in the WoS database it is not present among the first twenty most frequently occurring keywords. Figure 2 shows the linkage between the term AR and other terms, and the total strength of mutual relationships amounts to 213. AR is linked with all keywords in different periods. In the Scopus database, the strength of mutual links between AR and other terms amounts to 312. Figure 3 reveals that the frequency of keywords linked to AR is greater starting from 2018.

Figure 2 Links of term AR - WoS database



Source: Authors

Figure 3 Links of term AR - Scopus database



Source: Authors

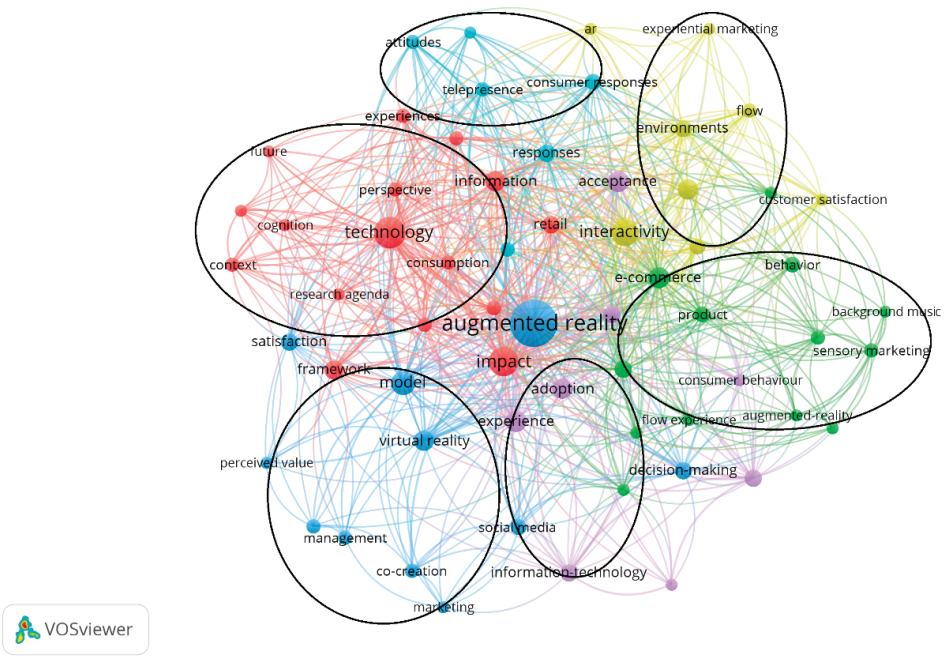
Results related to WoS show that studies in this area are significantly linked with the following terms: technology, impact, interactivity, model and e-commerce. Consequently, it can be concluded that studies focus on investigating AR technology itself, its impact, creating interactions with the real and the virtual world, use in online sales and acceptable models. The most frequently used keywords in 2019 and 2020 were experience, customer satisfaction, sensory marketing and context, which suggests that studies continue to investigate how AR in marketing creates a new experience, how it affects customer satisfaction and what the importance of sensory marketing is. Since AR in marketing is a relatively new area, it is understandable that these keywords occur, because numerous possibilities offered by AR in marketing are still being studied.

The Scopus database shows somewhat different results for the most frequent keywords. The most frequent keywords typically occur starting from 2019 onwards. With the exception of terms AR and VR (virtual reality), which have the highest degree of occurrence and links with other terms, keywords occurring from 2019 are loyalty, sales, tourism management, smart tourism, artificial intelligence, combined reality, and digital transformation. Notably, studies focus on investigating new technologies and finding all the possibilities and advantages provided by digital transformation.

Cluster analysis of keywords was conducted. The VOSviewer software algorithm determines the number of clusters by defining and grouping them based on mutual links. Clusters are ordered hierarchically, from the most significant to less significant ones. The clusters are assigned different colors for easier identification. Thus, there are six clusters for the WoS database and five for the Scopus database. Creating clusters of keywords results in a better insight into the structure of academic papers in the observed area, and they can serve as an instrument for monitoring the development of the academic field in the future.

Identification of six clusters in the WoS database is shown in Figure 4.

Figure 4 Map of keywords with identified clusters - WoS



Source: Authors

a) The first cluster (marked in red) includes 16 keywords. They form the basis for the conclusion that papers in this cluster focus on technology and its impact on customer satisfaction, sales and consumption, context creation and provision of information.

b) The second cluster (marked in green) represents papers dealing with the psychological impact of AR. The keywords include perception, trust, *word-of-mouth*, sensory marketing and behavior.

c) The third cluster (marked in blue) includes papers focusing on studying AR in marketing and management, as well as in tourism, and on the application of AR in social media.

d) The fourth cluster (marked in yellow) represents papers that investigate how AR and VR create customer satisfaction, and how they encourage interaction and entertainment.

e) The fifth cluster (marked in violet) includes papers that study the acceptance of AR technology, consumer behavior and creation of the positive AR experience.

f) The sixth cluster (marked in light blue) represents papers dealing with consumer attitudes toward AR, their responses and interaction with AR.

A total of five clusters related to keywords were identified in the Scopus database, which are shown in Figure 5.

a) The first cluster (marked in red) includes papers focusing on digital transformation, information systems and artificial intelligence combined with AR.

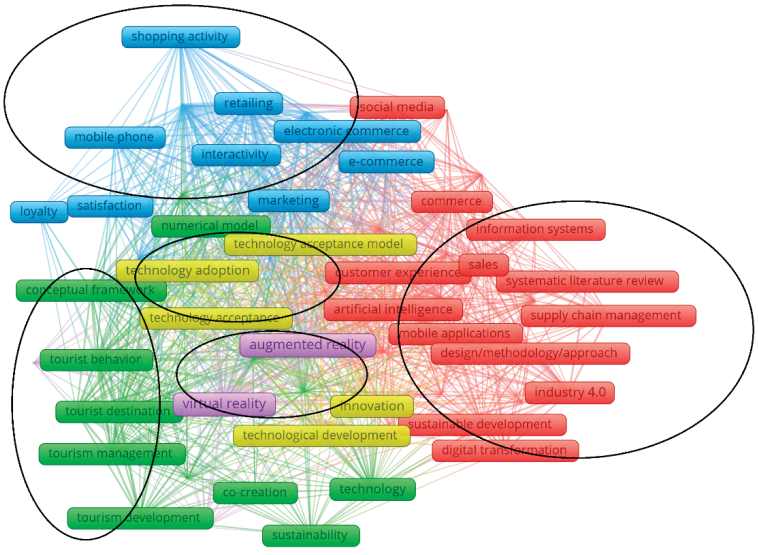
b) The second cluster (marked in green) includes papers on AR mostly related to the development and sustainability of tourism and tourist behavior.

c) The third cluster (marked in blue) includes papers dealing with the creation of interaction, customer loyalty and satisfaction using AR, as well as with enhancement of sales and sales activities.

d) The fourth cluster (marked in yellow) includes papers that study technological developments and innovation, as well as the acceptance of AR technology.

e) The fifth cluster (marked in violet) includes papers that study AR and investigate the presence of virtual and combined reality.

Figure 5 Map of keywords with identified clusters - Scopus



Source: Authors

The most significant authors in the area of AR and marketing were analyzed using data in both databases. The results reveal that a greater representation of papers in the Scopus database does not change the ranking of leading authors compared to the WoS database. The six leading authors are the same in both databases, with minimum differences.

Table 4 The most significant authors in Scopus and WoS citation databases

AUTHOR	Scopus		WoS	
	No. of papers	Mutual links	No. of papers	Mutual links
De Ruyter, K.	12	8,620	7	3,585
Keeling, D. I.	11	8,491	4	2,472
Chylinski, M.	10	8,297	5	2,992
Mahr, D.	9	7,801	5	3,096
Hilken, T.	8	7,079	6	3,542
Heller, J.	8	6,660	4	2,326

Source: Authors

In both databases, Ko de Ruyter is one of the most significant authors in the area of AR and marketing, with the greatest number of published papers and most mutual links. Mutual links signify the extent to which one author is linked with other authors. The VOSviewer software algorithm determines the authors' mutual links. According to the WoS database, his most cited paper in the given area is *Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences.*

Co-citation analysis in the Scopus database reveals that Dimitrios Buhalis has most co-citation links with other authors and their papers. The strength of co-citation links amounts to 55,102 and it represents the degree of relations among the authors' papers that are cited together. In the WoS database, the author with the greatest strength of co-citation is Philipp Rauschnabel, who has 142 co-citation links, with the strength of 1,509.

RQ2: What is the strength of linkage between the most cited papers?

When taking into account results from the Scopus database, it can be observed that the most cited paper is *Information Privacy Research: An Interdisciplinary Review* by H. Jeff Smith, Tamara Dinev and Heng Xu, which was published in 2011. The strength of linkage between this paper and the other ones amounts to 74 mutual links. The paper titled *Privacy in the Digital Age: A Review of Information Privacy Research in Information Systems* by France Bélanger and Robert E. Crossler ranks second. The paper was published in 2011 and has a negligibly smaller linkage strength, or more precisely, 70 mutual links. In addition, these two papers are linked in a way that they are part of one of the six generated clusters. The second most cited papers that have the strong linkage of mutual links are *A Typology of Technology -Enhanced Tourism Experiences* (65 mutual links), and *Virtual reality: Applications and implications for tourism* (46 mutual links with other papers). These two papers make up one of the clusters.

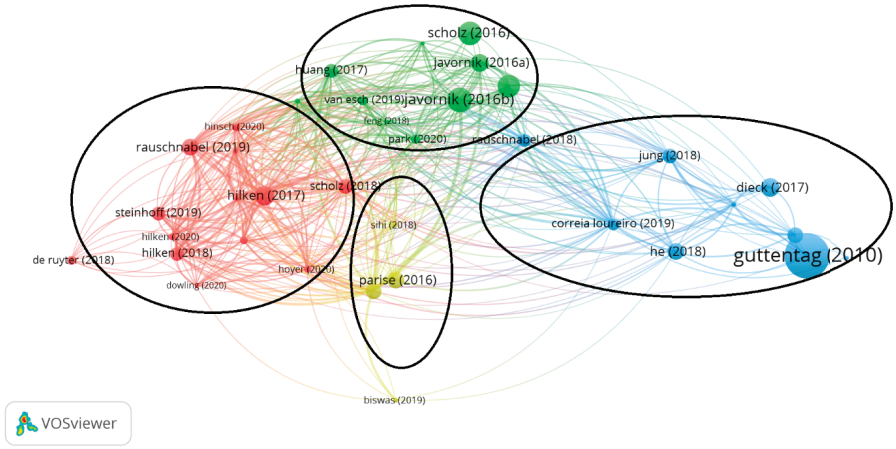
In the WoS database, the obtained results differ and there is no correspondence of papers with the Scopus database within the ten most cited papers in both databases, with the exception of one paper that is the most cited paper in the WoS database. It is the paper titled *Virtual reality: Applications and implications for tourism* published in 2010 by Daniel Guttentag; however, it does not have a significant number of mutual links with other papers. Furthermore, this paper ranks second in the Scopus database by the number of citations and mutual links. In the WoS database, the paper with the greatest number of links with other most cited papers is *Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences*, published in 2017 by Tim Hilken, Ko de Ruyter, Mathew Chylinski, Dominik Mahr and Debbie I. Keeling. Its strength of linkage amounts to 120 mutual links. The next

two papers have the strength of linkage with other most cited papers amounting to 113 and 112 mutual links, respectively. These are papers '*It's an illusion, but it looks real!' Consumer affective, cognitive and behavioral responses to augmented reality applications* and *Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behavior.* It should be noted that the Scopus database has broader coverage than WoS. In terms of AR and marketing, the Scopus database published 1,730 papers, while the WoS database published only 70 papers. It was expected that a variance in the number of papers would affect the category of the most cited papers.

Cluster analysis was conducted of the papers in both citation databases, with the aim of obtaining a better insight into the structure of papers. Clusters consist of sets of related papers based on the analysis of common citations. Four clusters were identified in the WoS database, while six clusters were identified in the Scopus database.

Cluster analysis - WoS database

Figure 6 Cluster visualization - WoS



Source: Authors

The first cluster (marked in red) mostly pertains to papers focused on customer perception and their motivation for the purchase. The most significant authors in this cluster, De Ruyter, Keeling, Hilken and Mahr, focus on customer experience and the entire shopping experience. The paper *Making omnichannel an augmented reality: the current and future state of the art* concludes that AR offers endless possibilities to provide users with the impeccable "journey", while the authors of the paper *We ARe at home: How augmented reality reshapes mobile marketing and consumer-brand relationships* suggest that AR has the potential to completely reshape the purchase experience.

The second cluster (marked in green) consists of papers focused on studying the way in which augmented reality affects customers and their purchase. The authors of the paper *Anthropomorphism and augmented reality in the retail environment* (Esch et al., 2019) conclude that brands benefit when managers make AR a crucial part of the retail experience. The fourth industrial revolution is making augmented reality (AR) possible, which has the potential, among other things, to profoundly alter the ways in which individuals purchase and consume goods. Furthermore, the papers conclude that innovative marketing experts can now make use of augmented reality to generate impressive brand experiences, create interactive advertising and allow consumers to experience products and spaces in new ways.

The third cluster (marked in blue) is most closely related to the topic of the application of augmented reality in tourism and for the purpose of preserving cultural heritage. User experience is still the most important factor. Besides augmented reality, the

authors also study the influence of virtual reality. Dieck & Jung (2017) claim that augmented reality is considered as a way to preserve history, improve visitor satisfaction, generate a positive word-of-mouth story, attract new target markets and contribute to the positive experience.

The fourth cluster (marked in yellow) also deals with customer experience, and additionally studies sensory marketing. Sensory elements are an important aspect of both offline and online retail stores, and can unconsciously affect consumer judgements and behavior when purchasing. People are increasingly purchasing (e.g., food, clothes) and consuming (e.g., movies, courses) online, where sensory interaction has traditionally mostly been limited to visual, and to a lesser extent, auditory inputs. However, other sensory interfaces (e.g., including touch screens, together with a range of virtual and augmented solutions) are increasingly being made available to people to interact online (Petit et al., 2019).

For a better insight into the papers which make up the clusters, a tabular overview of papers with the largest number of citations by clusters is presented.

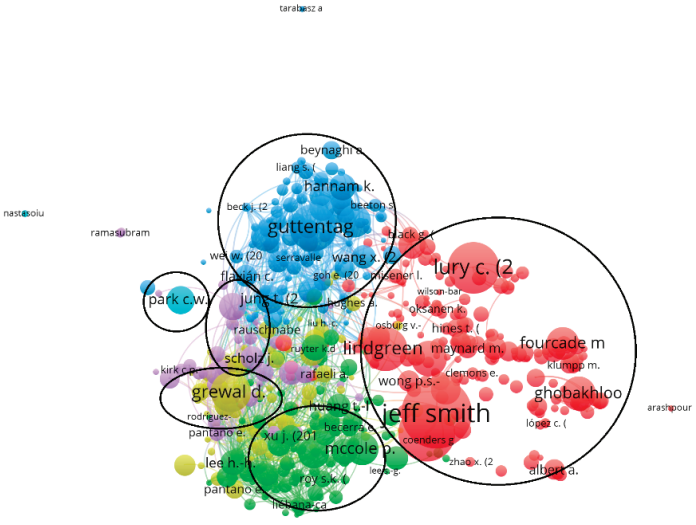
Table 5 Overview of papers by clusters - WoS database

CLUSTER 1	• *Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences* • *Augmented reality marketing: How mobile AR-apps can improve brands through inspiration*
CLUSTER 2	• *Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behavior* • *Augmented reality: Designing immersive experiences that maximize consumer engagement*
CLUSTER 3	• *Virtual reality: Applications and implications for tourism* • *Value of augmented reality at cultural heritage sites: A stakeholder approach*
CLUSTER 4	• *Solving the crisis of immediacy: How digital technology can transform the customer experience* • *Digital Sensory Marketing: Integrating New Technologies into Multisensory Online Experience*

Source: Authors

Cluster analysis - Scopus database

Figure 7 Cluster visualization - Scopus database



Source: Authors

The first cluster (marked in red) mostly pertains to earlier studies which focused on information security (Smith et al., 2011) and business transformation**.** Terms such as innovation, digitalization, and Industry 4.0 are more frequently used in the papers. In addition, they also research forging links between customers and brands.

The second cluster (marked in green) consists of the papers which primarily study consumer satisfaction. Hedonism, TAM (the technology acceptance model), customer behavior, and motivation for purchasing are frequent topics in this cluster. Lee et al. (2006) conclude that hedonic shopping orientation had a significant effect on one aspect of TAM (perceived enjoyment), whereas utilitarian shopping orientation had a significant effect on two TAM aspects (perceived usefulness and perceived ease of use). The results presented in the paper *The Impact of Website Quality Dimensions on Customer Satisfaction in the B2C E-commerce Context* (Hsiu-Fen, 2007) revealed that website design, interactivity, informativeness, security responsiveness and trust affect customer satisfaction. Furthermore, an increasing number of studies deal with topics related to VR, IoT and AR, as well as to e-sales. The authors of the paper *Predictors of customer acceptance of and resistance to smart technologies in the retail sector* (Roy et al., 2018) conclude that retail stores should focus on smart technologies that are simple, yet offer enhanced customer value through improved shopping efficiency. Findings also suggest that retail stores can engage in brand management strategies to improve customer acceptance of smart technologies. Besides, the authors focus on system quality, information quality and service quality as factors important for customer satisfaction.

The third cluster (marked in blue) is based on papers dealing with the use of augmented reality in tourism. The papers study the overall understanding of technologies and mobile applications to allow the development of e-tourism. VR and AR technologies are in focus in the case of tourism. Jung et al. (2015) point out that increased availability of smartphone and mobile gadgets has transformed the tourism industry and will continue to enhance the ways in which tourists access information while traveling. It should be noted that the authors believe that the aim of enhancing tourism services is user satisfaction and interaction with them, typically via social networks (Minazzi, 2015).

The fourth cluster (marked in yellow) includes papers which study the impact of technologies on retail and online sales, with the focus on augmented reality. Retailers have embraced a variety of technologies to engage their customers (Grewa et al., 2017). This group of papers focuses on the customer and the experience arising from shopping (Dacko, 2017). An increasingly recognized approach that has the potential to enable smart retail is mobile augmented reality (MAR) apps. MAR apps are seen as changing consumer behavior and are associated with increasingly high user valuations of retailers offering them. It should be noted that some papers study new topics such as blockchain technology and artificial intelligence.

The fifth cluster (marked in violet) is mostly related to the previous ones. There are more topics which are studied. The focus is on the topics of virtual reality, e-commerce retail and user satisfaction. The authors of the paper *Does "Being There" Matter? The Impact of Web-Based and Virtual World's Shopping Experiences on Consumer Purchase Attitudes* (Baker et al., 2019) claim that the use of virtual worlds as an emerging technology has a significant impact on business-to- consumer commerce and on corporate Internet retail strategies.

The sixth cluster (marked in light blue) is composed of three papers. The link between the papers is research into consumer behavior and their satisfaction. The papers are only weakly related to other papers.

For a better insight into the papers making up the clusters, a tabular overview is provided for the Scopus database as well. Papers with the largest number of citations by clusters are presented.

Table 6 Overview of papers by clusters - Scopus database

CLUSTER 1	• *Information Privacy Research: An Interdisciplinary Review* • *Privacy in the Digital Age: A Review of Information Privacy Research in Information Systems*
CLUSTER 2	• *Privacy in the Digital Age: A Review of Information Privacy Research in Information Systems* • *The Impact of Website Quality Dimensions on Customer Satisfaction in the B2C E-commerce Context*
CLUSTER 3	• *Virtual reality: Applications and implications for tourism* • *A Typology of Technology-Enhanced Tourism Experiences*
CLUSTER 4	• *The Future of Retailing* • *Enabling smart retail settings via mobile augmented reality shopping apps*
CLUSTER 5	• *Virtual reality, presence, and attitude change: Empirical evidence from tourism* • *Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behavior*
CLUSTER 6	• *Choosing what I want versus rejecting what I do not want: An application of decision framing to product option choice decisions* • *Competing with loyalty: How to design successful customer loyalty reward programs*

Source: Authors

4. Conclusion

The paper was focused on investigating the application of AR in marketing. Research findings reveal that, starting from 2010, one can observe the tendency of an increase of interest in research and writing academic papers in the area of AR and marketing, with the papers predominantly coming from the USA. The number of published papers increased every year, and 2020 witnessed the largest number of papers published on the given topic. Cluster analysis conducted in both databases reveals that the papers focus on technology, digital transformation, and artificial intelligence combined with AR, as well as on the impact of AR on customer experience and enhancement of sales. Ultimately, papers on AR in marketing correlated with papers related to the topic of modern technologies.

Bibliographic analysis illustrated the structure of papers in the given area. On the basis of the above, it can be concluded that studies focus on investigating AR technology itself, on its impact, creating interactions with the real and the virtual world, on how it can be used in online sales, and on investigating new technologies and their capabilities.

A review of relevant literature leads to the conclusion that AR technology provides marketing managers with the advantage when promoting products and services, by creating interactive experiences with customers and stakeholders. It creates a strong interaction between the customer and the brand and allows a personalized experience, which customers want to experience again. The application of AR results in customer satisfaction, and therefore in a greater interest in products and services, which is accompanied with the increased sales and ultimately an increase in market shares.

A limitation of this research is the fact that it did not encompass more papers. Both citation databases include a small number of papers for the observed areas; it is particularly true for the Web of Science database and its 70 papers. The papers certainly deal with the topic that is growing in popularity. In our opinion, if the same analysis were conducted at this moment, there would be deviations in results, precisely because of the papers published after our analysis.

The paper reviewed relevant literature to clearly define the research area. In the future, the analysis should be conducted with more rigorously defined domains of marketing and augmented reality as the subject of research. We propose expanding the analysis with the customer/user domain, aimed at defining the impact of augmented reality on the customer/user more clearly through marketing activities. In addition, the area of marketing could be narrowed down so that the focus is only on digital marketing.

We believe that the paper can be used as a signpost in future research studies of this topic, which would be more comprehensive and use different techniques of bibliographic research.

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EMPIRICAL ASSESSMENT OF TOURISM-GENERATED EMPLOYMENT: CONCEPTS AND CHALLENGES

Abstract

Purpose: This paper aims to examine the important concepts and challenges emerging from an assessment of the employment generated by tourism activity.

Methodology: Standard methodology for the compilation of the tourism satellite account is used. The case study is Croatia, a small European country whose economy is immensely driven by tourism, thereby representing a particularly suitable research example.

Results: The paper reports and discusses all practical issues related to the process of assessment and measurement of tourism-generated employment in a small tourism-driven economy.

Conclusion: The assessment of tourism-generated employment is far from being analyzed and documented as thoroughly as the assessment of tourism-generated GDP. A common impression is that researchers have hitherto been too busy measuring tourism-generated GDP, thereby paying insufficient attention to the most important manifestation of GDP creation - employment. Therefore, this paper aims to fill, at least partially, this huge gap in the current literature.

Keywords: Tourism, employment, tourism satellite account, EU, Croatia

1. Introduction

Tourism could stimulate local economies. Since tourism is mostly labor-intensive, employment is considered a key variable for the description of its economic impact. Nevertheless, tourism-generated employment has hitherto been one of the least studied phenomena in tourism economics literature because the assessment of tourism-generated employment is a particularly complex task. Compared to other industries such as agriculture and manufacturing, tourism is not an industry in the traditional sense and has not been defined as a separate sector within the national accounts. Since it is not an unambiguous sector directly observed in the official statistics but a collection of complementary industries providing goods and services to visitors, standard definitions and classifications are not readily applicable to tourism and consequently to tourism-generated employment. Measurement dif-

ficulties also arise from the specific characteristics of tourism-generated employment. High seasonality, a huge proportion of part-time jobs, and low-paid labor represent just some of the many specificities related to tourism-generated employment.

From a statistical point of view, the data on tourism-generated employment are quite fragmented and lack credibility (UNWTO & ILO, 2014). A wide range of concepts and definitions, different methods and data sources often lead to different estimations, lacking international comparability (Heerschap, 1999; Johnson & Thomas, 1990; Ladkin, 2011). Regarding the applied analytical methods, tourism is a two-sided phenomenon that can be approached from the demand-side and supply-side perspective. When calculating the level of tourism-generated employment, demand-side and supply-side approaches may result in major differences.

The demand-side approach concentrates on the activities of visitors and their consumption of goods and services (UNWTO & ILO, 2014). Therefore, it cannot be used to get an insight into the structure of employment (Heerschap, 1999). It is usually based on the data on tourist expenditures and labor coefficients. The key methodological issue of its appliance lies in the appropriate conversion of the expenditure to the employment figures (Johnson & Thomas, 1990). On the other hand, the supply-side approach is industry-oriented and considers tourism as a set of productive activities that serve visitors (United Nations & UNWTO, 2010). This approach estimates the level of tourism-generated employment by calculating the tourism ratio or the share of total employment in a set of selected industries that can be attributed to tourism (Heerschap, 1999). The main issue is the selection of industries that should be included (Johnson & Thomas, 1990; Glyptou et al., 2014).

Since it is obvious even from a brief inquiry that there is a lot of fuzziness and complexity in the field, this paper aims to report all practical issues emerging from the process of assessment and measurement of tourism-generated employment. In this regard, we have analyzed the case of Croatia, a small European country whose economy is heavily dependent on tourism.

The rest of the paper is organized as follows. The next section presents a review of existing literature with a special focus on the most important concepts in the field. This is followed by the central part of the paper presenting the practice of tourism-generated employment measurement in the European Union together with the case study of Croatia as a detailed example of the practice in an EU member state. The paper ends with concluding remarks containing a brief discussion of the main findings.

2. A review of conceptual measures assessing tourism-generated employment

Tourism-generated employment can be measured through a set of complementary indicators – the number of people employed, the number of jobs, and the number of full-time equivalent jobs (United Nations et al., 2010; Heerschap, 2018; Koens & Wood, 2017). Since tourism is characterized by a high proportion of part-time jobs, the indicator of full-time equivalent jobs is important for more meaningful comparisons of the size of employment generated by tourism in different destinations (United Nations et al., 2010; Heerschap, 2018). It is calculated by converting all hours worked by persons employed part-time into full-time jobs. While the data on the number of jobs or people employed are relevant to microeconomic policy, the data on the number of full-time equivalent jobs are relevant in macroeconomic governance (Leiper, 1999).

Two conceptual measures, yielding rather different perspectives, can be employed in the process of assessing and measuring tourism-generated employment. The first concept is 'tourism employment' and the second is 'employment in the tourism industries'. The concept of 'tourism employment' implies employment in the production of all goods and services consumed by visitors. These goods and services are produced by either tourism-characteristic industries or other industries within a national economy (United Nations & UNWTO, 2010). In other words, tourism employment measures the number of jobs directly attributable to tourism demand (UNWTO & ILO, 2014). On the other hand, 'employment in the tourism industries' refers to all jobs providing both tourism-characteristic and non-tourism-characteristic services in all establishments in tourism industries (UNWTO & ILO, 2014). All establishments that serve visitors directly and would likely cease to exist in the absence of tourism activity are classified as the tourism-characteristic industry (UNWTO & ILO, 2014).

Tourism-generated employment may take direct, indirect or induced forms, thereby further complicating the assessment of employment impacts of tourism. The figures on direct tourism-generated

employment include those employed in tourism-characteristic industries that provide services directly to visitors, such as travel agencies, tour operators, and accommodation providers (UNWTO & ILO, 2014). The total output of a tourism-characteristic industry usually exceeds consumption by visitors, as part thereof is consumed by non-visitors. The levels of employment generated by tourism should be therefore estimated by using the tourism ratio allocator, which relies on the assumption that the employment generated by tourism in each industry is in direct proportion to the value-added generated by tourism (UNWTO & ILO, 2014).

Indirect employment is generated by the supply chain of other industries which provide inputs to the tourism-characteristic industry, such as agriculture and transportation industries (UNWTO & ILO, 2014). It can be estimated from the national accounts, which enable an insight into the relationships between different industries of a national economy and calculation of the tourism multiplier to determine which part of the employment corresponds to tourism consumption (Heerschap, 2018). When calculating multiplier effects, it is important to adjust for non-touristic sources of demand which generate employment, since in some industries only a part of the employment can be assigned to the consumption of visitors (Koens & Wood, 2017; Heerschap, 2018).

Finally, employment is also generated by the consumption of people who are directly or indirectly employed by the tourism industry, and whose spending stimulates the growth of employment in other areas. This is called induced employment. A comprehensive analysis of the total employment impacts of tourism should therefore include direct, indirect and induced effects (United Nations et al., 2010).

Only a limited number of countries produce meaningful data on tourism-generated employment (UNWTO & ILO, 2008; Chernyshev, 2009). National methods of data collection were often insufficient and inappropriate for accurate measurement (Ladkin, 2011). When collecting employment and other data, countries usually adopt a form of standard industrial classification, such as the International Standard Industrial Classification of All Economic Activities used by United Nations International Labour Organization (ILO), NACE - Statistical classification of economic activities in the European Community used by Eurostat (European Commission and EUROSTAT, 2008), or the North American Industry Classification System.

Analysis of tourism-generated employment necessarily includes more than one statistical source, and hence the integration of data from different sources measuring various dimensions of tourism-generated employment is preferable (UNWTO & ILO, 2014). The major data sources on employment are establishment-based sample surveys, population census and household labor force surveys (United Nations & UNWTO, 2010).

Preferable methodological frameworks for data integration are the Tourism Satellite Account (TSA: RMF 2008), the OECD Employment Module, and the International Recommendations for Tourism Statistics 2008 (IRTS 2008). It is also worth mentioning the European system of national and regional accounts 2010 (ESA 2010), which is especially important for the EU member states.

The most popular methodological framework for estimating the impacts of tourism on the overall economy is the TSA: RMF 2008, which provides a detailed analysis of production units in different industries that provide goods and services consumed by visitors (United Nations et al., 2010). It identifies the supply of goods and services consumed by visitors and describes how the supply of such goods and services interacts with other economic activities (UNWTO & ILO, 2014; Meis, 2014). Table 7 in the TSA: RMF 2008 analyzes employment in the tourism-characteristic industries in terms of the number of jobs, hours of work and full-time equivalent jobs, by status in employment. Before the development of the TSA, it was not possible to determine an aggregate measure of employment in tourism-characteristic industries comparable with other industries or the overall economy (Martin, 2013). TSA is, however, focused on the economic side of employment, and neglects the social dimension of tourism employment, such as working conditions (Martin, 2013; United Nations & UNWTO, 2010). To address the shortcomings of the TSA, additional tools (for instance, the OECD Employment Module) and techniques (for instance, General Equilibrium Model) can be applied (Glyptou et al., 2014; Dwyer & Forsyth, 1998).

The challenges of deriving meaningful figures on tourism-generated employment also arise due to various particularities of tourism, such as high seasonality, a high proportion of informal labor, high variability in the working conditions and high labor turnover (Briassoulis, 1991; Gartner & Cukier, 2012; United Nations et al., 2010; Heerschap, 1999). Furthermore, tourism-generated employment should not be viewed just as a production factor, but also as

a social phenomenon, i.e., socio-demographic characteristics of persons employed, working conditions, etc. (United Nations & UNWTO, 2010). In this regard, the OECD Employment Module represents a convenient methodological framework for measuring the level and some characteristics of employment (e.g., socio-demographic characteristics) generated by tourism activity (OECD, 2000). It is focused on a supply-side perspective, measuring only the employment in a set of selected tourism-characteristic industries (UNWTO & ILO, 2014) and serves as a complementary tool to the TSA: RMF 2008.

A brief literature review of the current state of concepts and general practices regarding the measurement of the tourism-generated employment can demonstrate the complexity of the topic, suffering from deficiencies driven by conceptual ambiguities, data unavailability, analytical capacity needs and the lack of cross-country comparability. With the new trends in the tourism business, the state of tourism employment will certainly change. Advanced digitalization will make some human tasks redundant, but it should also introduce new jobs that will require different classifications. These developments emphasize the importance of comprehensive and standardized monitoring of tourism-generated employment.

3. Assessing tourism-generated employment in the EU

Despite the internationally harmonized framework for the measurement of tourism-generated employment, data at the national and international levels in the European Union still lack quality and comparability. Their relevance for conducting economic and tourism policy is questionable, while the characteristics of primary sources also require special attention. Such a conclusion is supported by the analysis of the development of tourism satellite account implementation in the EU (European Parliament & Council of the European Union, 2011).

Based on a survey of 24 EU member states and the United Kingdom, Norway and Switzerland, it could be concluded that the harmonization of national methodologies has not yet been achieved (EUROSTAT, 2019). In the segment of employment, this survey focused on the compilation of four indicators of employment in tourism industries: 'number of jobs', 'number of hours worked', 'number of full-time equivalent jobs' and 'number of people employed'. The information gathered showed that none of the surveyed countries provided data for all four indicators of tourism-generated employment, and data coverage varies across countries. The data on the number of full-time equivalent jobs have been submitted by 18 countries, the data on the number of jobs by 15 countries, the data on the number of people employed by 8 countries, and the data on the number of hours worked by 7 countries.

The level of the compilation of all required employment indicators across the whole set of analyzed countries reached 46% (58 indicators were transmitted out of a maximum of 108 indicators or 4 indicators for 27 countries), which is much lower than for other tourism satellite account indicators. For instance, 86% of indicators of total domestic supply and internal tourism as well as 95% of indicators of internal tourism consumption and 100% of indicators of production have been submitted by the analyzed countries.

The compilation of employment data within the tourism satellite account framework usually requires the use of a wide range of sources, including labor demand sources such as establishment-based data, labor supply sources such as labor force surveys, and administrative sources such as employment office registers or tax and social security records. The practice across the EU countries singled out the labor force survey as the most relevant data source. It is used by 10 reporting countries as the primary source of data and by five countries as an auxiliary source. Business statistics that are based upon data on enterprise establishments are used by 12 countries, 5 of which use them as the primary source and 7 as an auxiliary source. Supply-use tables, such as the input-output table, and other national accounts data are the primary source of data in 13 countries and an auxiliary source in 3 countries. All other sources, including surveys of tourism service providers and administrative data, have been used by 10 countries, 4 of which use them as a primary source.

4. Sources and indicators used in assessing tourism-generated employment in Croatia

Being a small Mediterranean country with a total population below 4 million, Croatia has experienced a significant restructuring of the national economy in the last 30 years, which is to some extent the consequence of the War of Independence 1991 - 1995. As of today, tourism accounts for more than 15% of Croatian GDP, thereby making Croatia a particularly suitable case study for the analysis of

different kinds of tourism impact on economic and non-economic phenomena.

After more than a decade of development, in 2019, the tourist satellite account became an integral part of official Croatian statistics (Croatian Bureau of Statistics, 2019b). It includes data on internal tourism expenditures and consumption as well as the output of tourism industries. Employment data for Croatian tourism-characteristic industries were compiled on a preliminary basis focusing on the key features of available data sources and their compliance with the requirements of the *TSA: RMF 2008*. The reference year is 2016.

Adjustments related to the classification of products and tourist activities have been conducted due to the lack of relevant data from statistical sources. Culture, recreation, and sports services were aggregated into one tourism-characteristic industry. In order to increase the understanding of the specificities of Croatian tourism, retail trade has been added to the 'standard' list of internationally comparable tourism-characteristic products and activities. It was done because shopping expenditures make up to 15% of average daily expenditures of tourists in Croatia (Institute for Tourism, 2018).

Given common practice of using multiple sources to compile employment data in Croatia (Croatian Bureau of Statistics, 2019a), the first step was to assess the compliance of available sources with the *TSA: RMF 2008.* This informed our choice of measuring employment as employment in the tourism industries, with a focus on the number of jobs and hours worked as indicators of the size of employment and intensity of labor force utilization (United Nations et al., 2010). The data sources are divided into three groups: (i) administrative data sources, (ii) statistical sources related to the demand for labor, and (iii) statistical sources related to the supply of labor.

Administrative data sources include:

- ***Tax Administration***

  The data are compiled through the income tax form. Filling and submitting this form to the Tax Administration is compulsory for income payers. The collected data are used by the Croatian Bureau of Statistics for the calculation of the number of persons employed in legal entities. The data are published in a monthly publication at the level of the sections and divisions of the Croatian National Classification of Activities, which is harmonized with NACE - Statistical classification of economic activities in the European Community. Data source weaknesses are related to the problem of compliance of data with the data from other sources and the problem of collecting data according to the prevailing activity of legal entity and not on the level of its establishments.

- ***Register of Annual Financial Reports***

  The creation of annual financial reports and their submission to the Register of Annual Financial Reports [hereinafter referred to as "RAFR"] is compulsory for all legal entities and natural persons that pay the profit tax. The reports include data on the average number of employees and the number of employees based on hours worked according to prevailing activities of the legal entity. The RAFR is organized as an e-book from which data can be easily accessed (FINA, 2020). Data source drawbacks are related to the problem of compliance with data from other sources as well as to the problem of collecting data according to the prevailing activity of a legal entity and not at the level of its establishments. Data are accessible at any needed level of the Croatian National Classification of Activities 2007 [hereinafter referred to as "NKD 2007"] (Government of the Republic of Croatia, 2007). However, the database does not contain data on gender and employment status of employees and the self-employed and does not allow access by different periods of the year, which would be useful due to the problem of high seasonality of tourism in Croatia.

- ***Croatian Pension Insurance Institute***

  This source contains data on pension insurance beneficiaries in trades and freelancers by economic activities. The data are processed and published by the Croatian Bureau of Statistics in a quarterly publication including the number of persons employed presented at the level of the sections of the Croatian National Classification of Activities presented by gender (Croatian Bureau of Statistics, 2017a). The data source weakness, in addition to the issue of questionable data compliance with the data from other data sources, arises from an inadequate level of disaggregation by economic activities.

Statistical sources related to the demand for labor:

- ***Annual survey of employment in all legal entities***

  The survey is conducted and processed by the Croatian Bureau of Statistics and it includes data on the number of persons employed in accordance with the type of employment status, gender, age and educational attainment level on March 31 each year. The results of this survey are published in a yearly publication that includes data on employment by sections and divisions of the Croatian National Classification of Activities (Croatian Bureau of Statistics, 2017b). The data source weakness comes from the time horizon of data and the overall limitation to legal entities.

Statistical sources related to the supply of labor:

- ***Labor Force Survey***

  The survey is carried out throughout the year by the Croatian Bureau of Statistics on a sample of households. The results are published in a yearly publication, including quarterly data on the number of employees, the self-employed, temporary employees, part-time employees and average usual weekly working hours by the NKD 2007 sections. The applied methodological framework allows data processing at the division level as well. The time horizon and coverage of data comply with the requirements of the TSA: RMF 2008. Thus, the Labor Force Survey can be considered the best available source for the compilation of employment data in tourism-characteristic industries. However, the sections and divisions of the NKD 2007 are not fully compatible with the definition of the tourism-characteristic industries, and the quality of this source is also limited due to insufficient accuracy of the data at the quarterly level (Croatian Bureau of Statistics, 2018). There is also an issue regarding the suitability of the research methodology used for the measurement of employment in the cases of the sharing economy. This is especially important for destinations where renting one's own housing facilities as short-term tourist accommodation is rapidly growing.

Given the limitations of available sources, especially their relevance and accuracy, the compilation of employment data for Croatian tourism-characteristic industries is based on a combination of different sources of official statistical data. To minimize the negative effects of combining data from the sources applying different methodological standards, the number of sources used was minimized. Furthermore, it was necessary to adjust the list of tourism-characteristic industries as well as the list of the compiled employment variables. Corrections were made to the list of tourism-characteristic industries in the segment of country-specific tourism industries, as they assume availability of data at a higher level of industry disaggregation than provided by official statistical sources.

According to the guidance given by the *TSA: RMF 2008* (United Nations et al., 2010), employment indicators focus on the intensity of the use of the labor force measured by: (i) the number of jobs by status in employment (employees and self-employed) and gender (male and female); (ii) the number of hours worked by status in employment (employees and self-employed), and (iii) the number of full-time equivalent jobs by status in employment (employees and self-employed) 'in order to wipe out the effects of part-time jobs' (United Nations et al., 2010; para. 4.68). A more detailed overview of the procedures, sources used and the main results of the estimation of employment in the tourism industries in Croatia is given in Table 1. As the overview shows, the Labor Force Survey is the most significant source of data for the estimation of employment in the Croatian tourism industries. However, the Labor Force Survey could not be the only source. Therefore, due to the problem of coherence, the data from the Labor Force Survey were supplemented by the administrative sources having access to individual company business figures.

The established methodological framework resulted in an estimate of approximately 317,500 persons or 20.3% of total employment, which can be attributed to tourism industries in Croatia. A group of 'standard' tourism industries generated approximately 156,000 jobs or 9.96% of total employment. At the same time, these tourism industries generated 9.66% of Croatia's gross value added. Retail trade, as a country-specific tourism-characteristic industry, generated approximately 162,000 jobs or 51% of total jobs. In addition to retail trade, the largest employers among the 'standard' tourism industries are food and beverage servicing industry with 74,000 jobs, and accommodation services for visitors, with approximately 35,000 jobs.

Table 1 Employment in the tourism industries in Croatia

Tourism industries	Sources, limitations of available data and procedure of estimation of the employment in the tourism industries in Croatia	Number of jobs by status in employment and gender					Number of hours worked	Number of full-time equivalent jobs**
		Total	Number of jobs by status in employment		Number of jobs by gender			
			Employees	Self-employed	Male	Female		
Accommodation services for visitors	Source: • Labor force survey (Croatian Bureau of Statistics, 2018). Characteristics of the source/data used: • Data available at 2-digit level of NKD 2007; activities are defined according to the main activity of the 'establishment'. • At the quarterly level, data on the number of employees by employment status and gender as well as the number of hours worked are available. Procedure: • Data on the number of employees and self-employed including gender distribution have been simply transferred from the Labor Force Survey (with adjustments for the non-observed employment and self-employment). • Number of working hours has been estimated based on average weekly working hours and the total number of employed persons.	34,840	33,371	1,469	11,556	23,284	65,971,760	36,328
Food and beverage servicing industry		74,126	62,372	11,754	32,872	41,254	141,027,032	77,658
Travel agencies and other reservation services industry		9,185	6,525	2,660	4,970	4,215	15,671,188	8,630
Cultural, sports and recreational industries		25,073	24,107	966	14,554	10,519	46,105,696	25,389
Retail trade*		161,854	148,936	12,918	87,573	74,281	288,023,528	158,603
Railway passenger transport	Sources: • RAFR and company disclosed financial and business statements. Characteristics of the sources/data used: • Passenger services are provided by one company so published data enable a compilation of the defined indicators. Procedure: • Number of employees, working hours and gender distribution have been estimated with respect to the number of employees in the company Hrvatske zeljeznice, the only provider of passenger railway transport.	1,906	1,906	-	1,463	443	3,412,971	1,879
Road passenger transport	Source: • Labor Force Survey. • RAFR and companies that disclosed financial and business statements. Characteristics of the sources/data used: • Data from the RAFR do not contain information on the number of self-employed persons and the structure of jobs by gender. Procedure: • Total employment and the number of hours worked have been estimated as the sum of the total number of employees by working hours. • Number of self-employed persons has been estimated based on the number of natural persons (with registered legal trade entities) that submit annual financial reports to the RAFR. • Number of employees by gender has been approximated based on the gender structure presented in the Labor Force Survey.	6,383	6,139	244	3,454	2,929	11,398,589	6,277

Tourism industries	Sources, limitations of available data and procedure of estimation of the employment in the tourism industries in Croatia	Number of jobs by status in employment and gender					Number of hours worked	Number of full-time equivalent jobs**
		Total	Number of jobs by status in employment		Number of jobs by gender			
			Employees	Self-employed	Male	Female		
Water passenger transport	Source: • RAFR and companies that disclosed financial and business statements. • Labor Force Survey. Characteristics of the sources/data used: • Data from the RAFR do not contain information on the number of self-employed persons and the structure of jobs by gender. Procedure: • Total employment and the number of hours worked have been estimated as the sum of the total number of employees by working hours. • Number of self-employed has been approximated from the Labor Force Survey based on the assumption that all crafts and trades in the Water Transport NKD 2007 division are engaged in the transport of passengers. • Number of employees by gender is approximated based on the gender structure of employees in the Jadrolinija company, the largest provider of passenger water transport in Croatia.	2,924	2,397	527	2,389	535	5,455,248	3,004
Air passenger transport	Source: • Labor Force Survey. • RAFR and companies that disclosed financial and business statements. Characteristics of the sources/data used: • Data from the RAFR do not contain information on the number of self-employed persons and the structure of jobs by gender. Procedure: • Total employment and the number of hours worked have been estimated as the sum of the total number of employees by working hours. • The number of employees by gender is approximated based on the gender structure of employees in the Croatia Airlines company, the largest provider of air passenger transport in Croatia.	1,165	1,165	-	594	571	2,123,015	1,169
Total		317,456	286,918	30,538	159,425	158,031	65,971,760	318,937

*As a country-specific tourism-characteristic industry

**Based on 1,816 hours of annual work hours (the sum of monthly hours minus work hours during public holidays and annual leave)

Source: Institute for Tourism (2019)

In comparison with the overall economy, Croatian tourism industries are less oriented towards self-employment. The share of the self-employed in the total number of jobs in tourism industries is 11%, which is two percentage points lower compared to the overall level of employment (Croatian Bureau of Statistics, 2018).

All tourism industries in Croatia are predominantly reliant on female workforce. 54% of jobs were held by women and 46% by men. This contrasts with the structure of the total economy, where 54% of jobs were held by men and 46% by women (Croatian Bureau of Statistics, 2018).

The accommodation industry includes the activity of renting and operating self-owned short-stay accommodation. It is not covered by the Labor Force Survey. However, it is especially important in Croatia, where 76,600 households provide approximately 3.5 million commercial tourist nights. With the estimated working time of at least 1 hour per 1 overnight stay required for the work process that includes activities such as registering guests, cleaning and laundering, it follows that 35.5 million hours or 54% of the estimated number of hours worked in the accommodation industry were not included in the employment statistics.

It can be concluded that the assessment of employment figures requires changes in the data collection and processing in both supply-side and demand-side surveys, including coverage of all types of economic entities, adjustment to seasonal oscillations and disaggregation of economic activities. This is important in order to ensure an increase in the accuracy of the Labor Force Survey as well as to enable a more transparent process of data transfer between the different data sources.

Finally, the analysis showed that special attention should be paid to measuring employment resulting from the provision of accommodation within households, since this particular type of part-time employment provides a different insight into employment in the tourism industries with a potentially very significant impact.

5. Concluding remarks

Employment is a key variable in the economic analysis of productive activities and an important factor in long-term competitiveness. Therefore, high-quality measurement of different dimensions of employment, especially in labor-intensive industries, is imperative. However, as shown, measuring employment in tourism is faced with significant methodological challenges. Methodological complexity stems from the fact that tourism, observed from the supply side, is a set of diverse economic activities that provide products and services to visitors. Moreover, tourism is also often characterized by high seasonality of the demand involving extensive oscillations of the demand for labor.

The challenges of measuring tourism-generated employment represent particularly important issues in the context of internationally harmonized methodological frameworks of tourism statistics and the tourism satellite account. For instance, the scope of tourism satellite account employment indicators is much narrower than the scope of indicators proposed by the International Recommendations for Tourism Statistics. Therefore, the tourism satellite account does not enable an in-depth analysis of the quantitative and qualitative characteristics of human capital and productivity in tourism industries (Joppe & Li, 2016). Moreover, the practical examples exhibit the problems of employment data compilation even within that narrow scope. It undoubtedly requires further improvement of tourism employment statistics and their international harmonization. It also requires the focus to be expanded in order to encompass variables like age group, country of residence, labor costs and educational attainment. The focus should not be related to the choice of indicators only, but also to the question of how to generate these indicators in a quality and harmonized manner.

The analyzed practical example of Croatia also indicates the requirement for improvement of tourism employment statistics, especially concerning the quality of sources. Important weaknesses also stem from insufficient disaggregation of the national classification of economic activities as well as from the measurements of the magnitude of part-time and overtime work. Although these problems are solvable at the national level, important challenges are related to the quality of estimated and compiled data and their cross-sectoral and international comparability.

Since data comparability and harmonization are extremely important, there is an urgent requirement for the development of an internationally transparent, relevant, and harmonized approach to data collection and processing. This is a critical

factor for international comparability of data since the importance of comparability of employment indicators established by the *TSA: RMF 2008* has a limited impact if harmonization is not ensured. Consequently, special attention should be paid to the process of harmonization of key methodological elements of the most relevant data sources. This will ensure data comparability not only between countries with homogeneous economic structures (UNWTO & ILO, 2014), but also between countries offering similar product portfolios.

Furthermore, the changing characteristics of business in modern economies require adaptation of established tourism employment concepts for the impact of the sharing economy. Due to its win-win character for both owners and renters (Fang et al., 2016), the sharing economy in tourism, and especially in accommodation, has grown significantly. In 2019, 21% of EU citizens used a website or an application to arrange accommodation with another person (EUROSTAT, 2020). Since the process of collecting data on short-stay accommodation offered through online platforms has already been launched, we should soon expect successful measurement of the physical and monetary impact of short-stay accommodation offered through online platforms on the output of tourism-characteristic industries. However, as the case study of Croatia has shown, there is a huge methodological issue related to measuring labor inputs involved. This involves dealing with the possible conceptual issues related to the nature of labor in the field of the sharing economy (e.g., legal status of operation, commercial or non-commercial type of services, direct or indirect employment). It also calls for the action of adaptation of internationally harmonized statistical methods and instruments.

Finally, given the policy-driven requirements for the measurement of overall tourism-generated employment and not only the measurement of employment in the tourism industries, the justification for the usage of the tourism ratio requires additional attention from a cross-sectoral and international perspective. The generally accepted principle that tourism ratios provide a good basis for estimation of tourism-generated employment arises from the assumption that there are the similar structures of inputs in tourism and non-tourism segments of tourism-characteristic industries (United Nations et al., 2010). However, it seems reasonable to question the homogeneity of the production process of tourism-characteristic industries with different portfolios of products and services offered to visitors and non-visitors. This is especially true in the case of the food and beverage servicing industry, where technological and organizational processes can significantly differ between facilities with product portfolios adapted to the needs of specific segments of tourists and facilities focused primarily on local demand. Retail trade as a specific tourism-characteristic industry in many countries is another industry heavily dependent on the size and structure of tourist and non-tourist segments. Therefore, future developments of the methodological framework should provide methods for the measurement of employment in tourism that should ensure more accurate estimates of tourism-generated employment by both tourism industries and tourism products. It would finally ensure higher comparability of employment data across countries with different products and different economic structures.

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THE ROLE OF THE UNIVERSITY OF PRISHTINA IN KNOWLEDGE CREATION AND TRANSFER: ARE UNIVERSITY-INDUSTRY LINKAGES INCREASING?

Abstract

Purpose: This case study aims to analyse the role of the university in knowledge creation and transfer to the industry.

Methodology: Knowledge creation is analysed in terms of research activities, while knowledge transfer focuses on the abilities and motivation of university staff in transferring the science outcome to the industry. The general problems of the lack of data on innovation activities in Kosovo are evident; therefore, this research uses a qualitative research technique. Data were collected based on a qualitative guide interview, combining and analysing 15 semi-structured interviews.

Results: The findings show that part of the achievements is evident, but part of them is questionable in many aspects, e.g., there is a visible asymmetry between knowledge creation and knowledge transfer. By comparison, teaching has improved significantly over the last decade, while critical thinking is not yet at a satisfactory level.

Conclusion: Indeed, much progress and many challenges could be identified over the half-century. The university's efforts are debatable in terms of knowledge creation, and no sign motivates university staff to publish in high-ranking international journals and contribute to research activities. However, the university is continuously improving its collaboration with international donors, e.g., the European Union remains the main partner.

Keywords: University, industry, collaboration, knowledge creation and transfer

1. Introduction

The overall objective of the university case study is to map the factors that shape innovation in the institution of knowledge creation and knowledge transfer, with the focus on the university. Like many other universities in Europe, the University of Prishtina is a traditional university with a leading role in higher education in Kosovo. The University was founded in 1970, based on the law establishing the University of Prishtina, and at that time, it consisted of the

faculties of Law, Economics, Philosophy, Architecture, and Medicine. The campus of the University is located in the centre of Prishtina. The Statute of the University came into force very late, i.e., on 9 July 2004. Presently, the University has 42,006 students and consists of 14 faculties accredited by the Kosovo Accreditation Agency (KAA), along with 900 academic staff members and 300 administrative staff members employed (University of Prishtina, 2019). Not surprisingly enough, all necessary ingredients and all relevant actors of the innovation ecosystem in Kosovo are present. However, a systematic approach toward linking such components to make the innovation ecosystem function properly as an ecosystem that directly supports innovation has been lacking (STIKK, 2014). The Innovation Centre Kosovo (ICK), the Chamber of Commerce, start-ups, companies, universities, and public institutions are the main innovation actors in the Kosovo innovation ecosystem. It is also the largest research centre in Kosovo (Correa et al., 2013).

The paper is structured as follows. Section 2 provides a literature review, Section 3 presents a short methodology, and Section 4 provides an analysis of the University budget composition. Section 5 focuses on the role of the University in knowledge creation and collaboration with the industry, while Section 6 concentrates on the capabilities and willingness of the University to transfer knowledge to the innovation ecosystem. Finally, results and future recommendations are drawn in Section 7.

2. Brief literature review

Innovation is an important source of growth that plays a vital role in determining the competitive advantages of many firms (Lam, 2011) and has been essential for sustained long-term economic development in recent centuries (Baumol, 2002). First, there is a need to differentiate between invention and innovation. While invention means the first idea for a new product or service that universities and academic institutions carry out, innovation is known as implementing ideas that happen at the firm level (Fagerberg, 2003). Schmookler (1966) strongly highlights the importance of patents related to inventive activity. In this relation, it might be worth bringing up the distinctions between narrow and holistic perspectives. While the narrow approach considers the invention (only the first occurrence of the idea), the so-called holistic perspective stresses the importance of understanding the entire cycle of innovation, e.g., from the creation of novel ideas to the commercialisation and diffusion of the idea in practice (Edler & Fagerberg, 2017). Hence, closer cooperation between universities and industry can help match university skills output and labour market needs. Industry inputs could help align curricula to firm and market needs.

Moreover, internship programmes contribute to knowledge creation and transfer. More internships in the industry would allow students to get practical experience and create connections with employers before graduation. Improving the availability of these skills sets among university graduates and the existing SME workforce via on-job training can lead to higher productivity and innovation among SMEs, OECD (2021).

Lundvall and Nelson were the two pioneers in the development of an approach to innovation systems, claiming that it would include, in particular, organisations and institutions interested only in science and research, such as R&D departments, technology institutions, and universities (Lundvall, 1992). Organisations are firms, universities, and policy organisations intentionally designed and with a clear purpose, while institutions are laws, guidelines, and rules, and the leading institutions engaged in innovation systems are patent laws, regulations, and laws governing the interaction between firms and universities (Edquist, 2014). Moreover, in his early work, Edquist (2001) pointed out that firms do not innovate in an isolated environment; thus, the role of institutions is critical for innovation processes as they shape the activities of organisations and the connections between them. Tight cooperation between universities, firms, and public and private research organisations is necessary for significant innovations. Havas (2015) indicated that policy interventions aim to create incentives and increase private R&D, often through subsidies, and protect intellectual property rights.

To sum up, innovation is related to many variables. It needs science, technology, entrepreneurship, critical education, training, finance, and numerous organisations and agencies dealing with intellectual property rights, regulations, laws, and competition. Consequently, most innovations result from new ways of collaboration between firms and diverse organisations and the university, rather than the individual activities of single dominant innovation firms (Nooteboom & Stam, 2008).

3. Methodology and data collection

Arino et al. (2016) claimed that qualitative research focuses on the depth and complexity of new phenomena and highlights the objective of reality by explaining why and how phenomena occur. The general problems of the lack of data on innovation activities in Kosovo are evident; therefore, this research relies on a qualitative research technique instead of a quantitative method, consisting of in-depth interviews with key stakeholders and a review of relevant policy documents. The research tool "case study" method was conducted with the key actors of the Kosovo innovation ecosystem, with a particular focus on university staff. According to Yin (2018), the case study approach is viewed as an empirical method focusing on an in-depth investigation of a contemporary phenomenon within the scope of the real world, mainly when the boundaries between context and phenomenon are not readily visible. In the university case study, knowledge transfer organisations were interviewed to test how innovation emerged, developed, or lacked in Kosovo. Empirical experiences used in this research are based on semi-structured interviews with key innovation-related actors from February 2020 to January 2021. The following case study was carried out at the State University of Prishtina as critical knowledge creation and transfer. The reasoning behind the university case study is to map the factors that shape innovation in the institution of knowledge creation or knowledge development and transfer, such as the University and innovation ecosystem actors in Kosovo. Therefore, the relationship between the University and the industry has been thoroughly studied in this context. The role of the interview for data collection in conducting the case study is essential; in this respect, Malhotra and Dash (2016) suggest some general steps for the conduct of in-depth interviews, and they state that interviews are an unstructured and transparent method of collecting data that are carried out on a "one-on-one" basis. Understanding the importance of the university in the innovation ecosystem, the main objective of this case study is to answer the following research questions: 1) How does the university contribute to the process of knowledge creation through research activities?, and 2) How does the university contribute to knowledge transfer to the actors in the Kosovo innovation ecosystem? Data were gathered using a qualitative guide interview, which combined and analysed 15 semi-structured interviews from university staff, government institutions, the Kosovo Chamber of Commerce (KCC), the industry sector, ICT companies, and an ICT business association. Targeted respondents were informed on time by email, and one-on-one interviews were held as recommended by Malhotra and Dash (2016).

4. University budget composition

Over the years, the University has received only 1.49 percent of the state budget, or EUR 34.79 million in value, with a slight increase in 2020. Table 1 illustrates the University budget allocations between 2018 and 2020.

Table 1 Activity-based budgeting of the University

Year	Wages and salaries	Goods and services	Utilities expenditures	Subsidies and transfers	Capital expenditure	University budget in total
2018	21,158,067	3,052,645	1,175,000	1,299,000	7,150,000	33,834,712
2019	21,263,857	3,402,645	1,175,000	1,444,000	7,500,000	34,785,502
2020	20,986,212	3,422,513	1,175,000	1,444,000	7,900,001	34,927,726

Source: Author's compilation based on the state budget and the Ministry of Finance (2019)

As seen in Table 1, the University has a limited budget, and it has remained at the same level over the years, which determines its low value. According to the analysis of the total university budget of EUR 34.78 million, 88.51 percent is financed from the state budget. In comparison, the University generates 11.49 percent of its own revenue, amounting to EUR 3.99 million in 2019. This means that the University contributed 12.26 percent of its budget, or EUR 4.15 million, from its own sources in 2018. The revenue generated by the University consists of student registration fees or tuition fees and professional services expertise by the institutes and laboratories. The analysis shows that the main budget

of the University is spent on salaries, and the University has not spent its budget correctly for many years now. It is interesting to analyse how the University spent activity-based budgeting. For example, 70 percent of the budget is spent on wages and salaries, followed by 10.43 percent on goods and services, 3.15 percent on utilities, 4.02 percent on subsidies and transfers, and only 12.28 percent on capital expenditure.

Similarly, in 2019, 61.13 percent, or EUR 21,263,857 out of EUR 34.92 million, was spent on wages and salaries. In addition to a small University budget, what can be seen in Table 1 is that there is no money allocated for research activities. The University claims that the strategic plan envisages for the future that 1 percent of the University total budget should be reserved for R&D. However, the study reveals that there is nothing concrete yet. First, to increase the University quality and its higher ranking, the University budget should be managed better, and second, it should increase the number of employees and academic staff.

5. The role of the university in knowledge creation

According to Nielsen (2019), R&D is essential for product innovation, but it is not the only kind of knowledge; sometimes, innovation is linked to the kind of knowledge produced in the sense of R&D, which is also one of the critical functions of universities. Therefore, the case study tries to identify and measure the involvement of academic staff in research activities. The University is aware that knowledge creation remains its most important mission. According to the University Statute, teaching and R&D are two key twin objectives. The Statute obliges academic staff to continuously contribute to research activities using two resources: public funding provided by the University, or private funds sponsored by individual contractors of third parties, or both. Though, according to the case study, this remains questionable.

Moreover, to achieve internationally competitive results, the University teaching staff are also obligated to conduct scientific research and innovate work using their professional skills (Statute, 2005). However, University executives admit that many professors treat the University as a secondary school - students show up in classes and attend lectures, professors teach, and students leave. Indeed, teaching is one pillar and it is essential, but R&D-based teaching, incorporating the results of collaboration with the industry and international partners, should be the most crucial pillar. Unfortunately, presently, this sort of project work is almost absent.

Recently, Webometrics and Times Higher Education (2017), ranked the University 2,829, while the Continental Ranking and the Country Ranking, ranked it 940th and 5th, respectively (Webometrics, 2020), which means that the University is lagging behind in terms of many ranking indicators, especially in the field of R&D (Kaçaniku et al., 2018). However, some analyses of scientific publications undertaken by the Organisation for Improving the Quality of Education (ORCA) and recent updates to the Research Gate indicate some developments in scientific publishing (ORCA, 2018; ResearchGate, 2020). For example, Table 2 indicates an increase in the number of the University publications in 2019 compared to 2017.

Table 2 University scientific publications

Year	Total number of scientific publications
2017	1,320 papers
2018	1,735 papers
2019	2,481 papers

Source: Author's compilation based on ResearchGate and the University of Prishtina (2020)

Table 2 indicates an increase in the number of publications in 2019, but the quality of the University publications is not at a satisfactory level. Thus, the university must continue its efforts to enhance the quality rather than the mere quantity of scientific publications in order to fulfil its mission of knowledge creation. In addition, Table 3 further analyses the total number of scientific papers and the participation of faculties, along with the number of professors involved in publishing.

When analysing the total number of academic staff and faculties, the results indicate that despite a limited number of total scientific publications, the average of publications published by professors by faculties is sometimes even smaller than the total number of professors by faculties. Unfortunately, we have only aggregated statistics on publication activity of University professors, so we do not know the structure of publications according to quality indicators (e.g., the impact factor, Q1, Q2).

Table 3 Number of academic staff involved in scientific publications by faculties in 2018

Faculties	No. of professors	Scientific publications	Number of professors who published	Average
Philosophy	93	35	32	34%
Mathematics	94	524	65	69%
Philology	124	36	39	31%
Law	65	74	42	65%
Economics	89	98	44	49%
Construction and Architecture	65	48	23	35%
Electrical and Computer Engineering	69	57	21	30%
Mechanical Engineering	69	94	29	42%
Medicine	350	528	87	25%
Arts	159	-	-	0%
Agriculture and Veterinary Sciences	79	184	33	42%
Physical Education and Sports	41	14	14	34%
Education	77	94	36	47%
Total	**1,374**	**1,735**	**465**	**34%**

Source: Author's calculation based on ORCA (2018) report and KAS (2019) data

The analysis shows that the University is not performing well in knowledge creation due to a low average of scientific papers published by the University, representing participation of the University with only 34 percent in R&D, which means that the most significant 66 percent of academic staff do not justify the academic title or ranking of the University. Furthermore, there is a lack of criteria since professors should not retain the full academic title if they have not consistently contributed to research activities or have not published a scholarly article in a prestigious journal every year. Even though the University set up the Office of Research and Sponsored Projects in 2017, it aims to facilitate R&D and make it easier for teachers to submit competitive projects and get sponsored. The Office serves as a link between the University academic staff, organisations, agencies, and foundations that sponsor and finance research projects, and operates under direct supervision of the University Vice-Rector for Science. Since it was established, the Office has supported 17 projects in 2018, and 35 other projects in 2019, focused on capacity building. The faculties of Electrical and Computer Engineering, Mechanical Engineering, Philosophy, Economics, Education, and Agriculture are among the main beneficiaries of these projects. Such projects are implemented in collaboration and partnership with several European universities in e.g. Germany, Italy, Spain, Croatia, Slovenia, the United Kingdom, Montenegro, and Albania. As a result, Kosovo's innovation ecosystem was created, and the functions of socio-economic actors are working, but this kind of knowledge requires systematic research into Kosovo's socio-economic and cultural-technological conditions. The University's initiative to establish a venture incubator was a good step that might be spread to other higher educational institutions (Lajqi et al., 2019).

Interviewed University participants acknowledge that teaching has advanced significantly over the last decade, while R&D has improved slightly. The positive shift reflecting generational change of academic staff (e.g., replacing old academic staff with a new generation) has contributed to a positive change in the mindset, as younger professors are more active in research activities. However, research activities are not systematically tracked compared to teaching, which is continuously monitored by the University Academic Development Office through student evaluation of professors engaged in teaching bachelor's and master's degree courses; thus, teaching is performed better as it is

easier to develop and track administration. Moreover, the University needs to improve students' critical thinking. The national qualification framework specifies that critical thinking should be one of core components of the programme and the curriculum, which means that bachelor's degrees should have a critical mindset and it should be compulsory in the master's programme as well. The University admits that students partially gain critical thinking skills.

5.1 University and industry collaboration: important but not focused on building Science, Technology and Innovation (STI) and Doing, Using and Interacting (DUI) relations

The level of education of the workforce is vital for the development and growth (Junge and Skaksen, 2010), and methodological and analytical skills of problem-solving, including absorption capacity and professional knowledge of graduates (STI learning on the university side), are ranked high in terms of the industry's expectations when recruiting graduates (Nielsen, 2019). However, Kosovo's innovation ecosystem actors complain about the lack of good cooperation with the University. Based on the interviews with participants from the metal and wood industries, KCC, 3CIS, Tre Pharm, the ICT sector, and the Association of Information and Communication Technology of Kosovo (STIKK), a classification and elaboration of complaints referring to the University is provided in Table 4, which reflects the lack of University efforts to strengthen cooperation with the industry.

Table 4 Classification and elaboration of complaints by the industry about the University

The case study shows that there is currently the lowest level of satisfaction among firms working with the University. Furthermore, a partnership in terms of STI research has not contributed to innovations since there is no evidence of inventions or patents sold to the industry in Kosovo.	The industry confirms that if the University could provide inventions or patents, companies would be willing to buy and commercialise them. This means that there is a lack of STI and DUI relations between the University and the industry.
The lack of adequate knowledge of the University and the lack of incentives for University personnel are shown as concerns. Kosovo's industry is not satisfied with the students' level of knowledge from the University as the labour force for the industry. Companies claim that students lack soft skills, critical thinking skills, problem-solving skills, and presentation skills.	The industry hires students who are not relevant to their professional background, and this forces companies to invest heavily in offering vocational training, in the field of business interest, along with the practical part of how machines work in a company; therefore, it is expensive for the company to improve the skills of new employees/students.
University curricula and teaching methods are very old-fashioned (the curriculum is updated every three years), not encouraging students to remain up-to-date with their skills. Furthermore, there is a total lack of co-research activities between the University and the industry and a total lack of their commercialisation (a lack of STI & DUI relations).	Although the industry has continuously tried to adjust and adapt curricula to technological developments, the University should be able to provide graduates with up-to-date skills and learning capabilities (e.g., increase the number of students enrolled in science, technology, engineering, and mathematics (STEM) study programmes) in order to exploit significant R&D investments of innovative firms efficiently.
There is a tendency of public institutions and universities to avoid collaboration with the industry. Due to non-systematic cooperation, there is a lack of effort at the University aimed at offering students the industry internship scheme.	While the industry confirms its willingness to accept students for an internship scheme, this is of mutual benefit because it will make it easier for the industry to recruit new workers from an internship programme that demonstrates skills and competencies.

Source: Author's compilation based on the interviews with innovation ecosystem actors

Mutual trust, which is frequently developed in mutual experiences (DUI learning is usually characterised by such collaboration), is necessary for tight collaboration. A study conducted by Nielsen (2019), which rates the University of Aalborg in Denmark as the best in terms of partnership with the industry, argues that innovative firms that have collaborated with universities (building STI and DUI relations) have a much higher probability of product or service innovation (a novelty in product or service

innovation) compared to the segment of firms that have not collaborated with the university. Therefore, a strong partnership between the university and the industry is necessary to achieve successful STI. However, in terms of university-industry cooperation, regardless of the issues listed above, the case study stresses some developments that show some progress in recent years. Nevertheless, the case study tries to figure out how the university contributes to industrial innovation and how this contribution could be improved. The university approves improved ties with the industry resulting from academic staff, but it still needs improvement. The university recognises the importance of industry engagement in a range of issues of mutual interest; thus, it took the first step towards establishing the industrial advisory board. The establishment and principles of the advisory board have enabled the academic units to set up such an advisory board. The main objective of the advisory board is to link the academy with the industry. Through closer ties, the university can prepare graduates with skills better suited to the labour market requirements and work together with the faculty advisory management on updating the curricula.

Furthermore, the main task of the industry is to provide inputs when new curricula are designed. Unfortunately, this has not been done flawlessly because the above complaints have not been addressed accurately. However, some positive changes are evident. The Faculty of Economics has been quite involved in organising the advisory board, addressing economic and entrepreneurship problems, and strengthening job opportunities for students. The Faculty of Agriculture and Veterinary Sciences has also been active in updating academic curricula, improving teaching and learning methods, and providing practical work and innovative conditions (Career Development Centre, 2019).[1] A success story in the field of collaboration between the University and the industry can be illustrated by the industry initiative, where the Kosovo Metal Industry and Renewable Energy Cluster was developed for the first time in 2017, focusing on encouraging the industry and universities to work closely together. The cluster concept was designed to bring development and innovation together and was viewed as a positive start, but unfortunately, this partnership did not last long. The industry confirms that, after cluster formation, the University did not systematically help them and was no longer active. Nevertheless, even with the passive role of the University, the cluster has continued to play an active role, and has consistently offered vocational training to the staff of its member companies, young engineers, students, and jobseekers, and 20 training sessions to 800 participants. Of these 800 trained participants, 70 have completed the internship scheme, and around 100 young people are working in cluster firms.

The Faculty of Electrical and Computer Engineering has made excellent progress through the advisory board concerning the innovation ecosystem development. For example, several computer science students are sent to participate in ICK events because they offer an excellent infrastructure to support students with future challenges. The Faculty highlights various examples as successes, e.g., in cooperation with STIK and ICK, suggestions are considered when preparing new curricula for the new semester. According to advisory board members, up to 20 percent of the industry suggestions have been incorporated into the new curriculum as the new academic year begins. Although the business community is not satisfied with this progress, the curricula are updated every three years, making it difficult for the University to provide graduates with up-to-date skills and raise the number of STEM students. In addition, the advisory board allows students in the final semester of their studies to have a compulsory course as an internship and they are required to work at least 120 working hours on a project in international or domestic companies. This helps students establish industry connections, demonstrate skills, strengthen relations with possible future employers, and improve negotiating positions and regular track records.

For instance, a company from Germany called Wiso Tech GmbH opened a branch and began operating in Kosovo in 2019. The company launched a student scheme and randomly connected university students who started the internship programme, and due to their excellent skills and competencies, the company recruited them and continuously increased the demand for university students. As a result, 12 university students responsible for developing software were engaged in the company between 2019 and 2020. Students are also sent to Germany to participate in the internship programme

1 According to the regulation, the advisory board can have at least 11 members and a maximum of 17 members. Faculties should organise advisory board meetings as needed, but not less than two meetings per year.

at Bosch, Microsoft, and Intel, while some others work in German companies operating in Kosovo, such as Wiso Tech GmbH. In addition, students also participate in internships in domestic companies such as 3CIS, ICK, and STIK, developing software for international and domestic market needs. An intended result of the internship programme is that many students could get full-time jobs, primarily in 3CIS. The analysis shows that 10 percent of students are involved in the internship programme abroad, while 30 percent participate in outsourced activities and work on the local market. Companies in which students engage in the internship programme provide dual training for students on technology development issues.

The idea of bringing business people together to develop student soft skills in technology came from STIKK. However, it is not yet clear whether the University has successfully implemented this activity. The University acknowledges that the industry always complains about knowledge transfer. It is good because as long as the industry complains, the University produces something, but not the best. Thus, the University should educate students who can join various projects and not just particular innovation and technology related projects. There is still a lack of research into the technological, social, and institutional practices at the University in Kosovo that was surveyed. Developing high value-added or strategic collaboration between the University and the industry will significantly boost the University knowledge creation function and help improve the position of the country's firms in the Global Value Chain (GVC). Concerning the performance indicators of University staff, such as the quality of their publications, involvement in international conferences, and the teaching code, the case study shows that the influence of these factors shaping university-industry collaboration is mutually beneficial. Strengthening international and regional cooperation increases collaboration with the industry as the industry is currently at least a step ahead of the University. However, both parties should strengthen the relationship as the advisory board remains only an advisor and not so involved, e.g., both have failed to build STI & DUI relations. As far as STI mode is concerned, there is no evidence in Kosovo of the inventions or patents that have been given to the industry, while regarding DUI mode, only the internship scheme, along with the formation of clusters, can be considered to have led to graduate recruitment. Finally, the University lacks ideas and initiatives to improve cooperation as it tends to change very slowly, but this does not mean that the industry should not push ahead with such efforts.

6. Why lack of knowledge transfer?

Knowledge transfer is a vital part of the role of a university, but offering high-quality lectures requires professors to adapt and develop "state-of-the-art" knowledge. While some progress has been made in creating knowledge, the University is unfortunately well behind in its possibilities of knowledge transfer. Despite the lack of systematic data collection, the findings indicate that knowledge creation and transfer are unbalanced, and the University has admitted this weakness. Likewise, the transfer of knowledge to the industry is relatively weak or even lacking in some fields, and this has been confirmed by the industry; thus, the issue of knowledge transfer needs to be addressed urgently.

On the one hand, the legal framework needs to be strengthened along with the willingness to implement it. On the other hand, knowledge transfer would improve by improving collaboration with the industry and strengthening the role of the advisory board. The University admits that the issue of knowledge transfer has not been adequately addressed to date. However, the study reveals that knowledge transfer is reasonable only in the teaching pillar, which is good, as knowledge creation could be transferred to students. The University needs to increase cooperation with international organisations and donors as one essential tool, while research projects are another driver that should not be neglected. Collaboration with national and regional partners is also essential, both of which are unfortunately not at a satisfactory level. Knowledge transfer needs a time-consuming process of collective learning. Technological developments have rapidly taken place; therefore, university-industry knowledge transfer is a permanent need. Furthermore, the transfer of knowledge from industry to university is necessary, and in this connection, it is worth using the experience of Aalborg University in Denmark as a benchmark (Nielsen, 2019). Due to some improvement in teaching, the transfer of knowledge is working well for students but is not yet in a good phase with the Kosovo innovation ecosystem actors. However, few faculties provide

specific professional services or expertise to public or private enterprises or individuals, e.g., telecommunications, construction, architecture, health, and agriculture, which can be considered a form of knowledge transfer, but it is not satisfactory.

7. Conclusion and recommendations

The findings show that there is asymmetric progress in comparing knowledge creation and knowledge transfer, and the University efforts are questionable in relation to knowledge creation. The University has not yet been able to dedicate financial resources to R&D, and its contribution to R&D accounts for only 34 percent, while 66 percent of academic staff do not justify the academic title. Furthermore, there is a lack of monitoring of professor R&D performance, and there is no sign that motivates university staff to publish in high-ranking international journals. The study recommends that strengthening the role of R&D and increasing knowledge creation in the coming years is necessary to prepare, train, and motivate academic staff to be more competitive in delivering internationally attractive, multidisciplinary, and practice-oriented projects. Likewise, the study recommends that the University should allocate money to R&D and enable academic staff to benefit from that fund and contribute to research activities.

Regarding the criteria for promotion to academic ranks, the University requires academic staff to have five scientific publications to be able to be appointed to the academic title of full professor, but it does not oblige and monitor professors to be active regularly. The research recommends that academic staff should be more active and publish at least one article a year that contributes to research activities. A positive sign is that between 2019 and 2020 the University invested EUR 2.1 million in the development of institutions, laboratories, and infrastructure. An additional EUR 2.4 million is allocated from the University budget to be invested, focusing on increasing knowledge creation and transfer. The study recommends that, while teaching has improved significantly, the University should improve critical thinking for students as this remains challenging because the University does not have any tool to measure student critical thinking. This is confirmed by the industry that complains about the old curricula, which need to be addressed, and the study recommends that the new curricula should be updated and rely on the industry's needs. This often forces companies to employ students unrelated to their professional background and invest heavily in providing vocational training. The study recommends that the University should develop a teaching method to teach high-quality students to think critically and educate students who can take part in various projects.

It is a positive sign that the University recognises the importance of industry engagement in many issues of mutual interest; thus, establishing the advisory board was a good step forward. As a result, many students have been able to participate in the internship scheme, create network industry connections and become fully employed in domestic and foreign technology companies, particularly in the field of international and domestic software development. However, the advisory board remains only an advisor and not so much involved as they have not succeeded in building STI & DUI relations. Knowledge transfer from the University to the industry remains challenging. Hence, what needs to be addressed urgently is creating an appropriate legal framework, enforcing it, and building the ability to enforce the requisite legal framework and the motivation and assessment system for academic staff to be engaged in practice-oriented, high value-added cooperation.

According to scientific results, the fundamental objective of the study has been considerably fulfilled. The findings of the study aim to contribute to the research field and provide an insight into open innovation literature. Of course, since the present study examined only a state university, the findings cannot be generalised to all universities and the Kosovo innovation ecosystem. Therefore, to increase its contribution to the research field, the present study recommends that a similar study should be conducted in Kosovo and the developed countries, and the findings compared with the present study, not using only aggregated statistics measures.

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Appendix

List of persons interviewed in the university case study

Persons interviewed	Date of interview	Position
1 Blerim Rexha	February 2020	Professor and Head of the Computer Engineering Department at the Faculty of Electrical and Computer Engineering at the University of Prishtina
2 Enver Hamiti	March 2020	Dean of the Faculty of Electrical and Computer Engineering at the University of Prishtina
3 Myrvete Badivuku	April 2020	Professor of Economics & Vice-Rector for Budget and Finances
4 Faton Berisha	April 2020	Professor of Mathematics & Vice-Rector for Scientific Research at the University of Prishtina
5 Vjollca Cavolli	May 2020	Executive Director of the Association for Information and Communication Technology
6 Avdi Krasniqi	May 2020	Senior trademark officer in the Intellectual Property Agency in the Ministry of Trade and Industry
7 Laura Zherka	May 2020	Director of the Innovation Department at the Ministry of Education, Science, Technology and Innovation
8 Uranik Begu	May 2020	Chief Executive Officer of the Innovation Centre Kosovo
9 Arieta Pozhegu	June 2020	Executive Director of Kosovo Wood Processing Association
10 Astrit Rexhaj	June 2020	Executive Director of the Metal Industry and Renewable Energy Cluster of Kosovo
11 Fitim Seferi	June 2020	Research Support Officer of the University of Prishtina
12 Yllza Mehmeti	June 2020	Head of the Innovation Division at the Ministry of Education, Science, Technology and Innovation
13 Besnik Loxha	June 2020	Director of the Academic Development Office of the University of Prishtina
14 Berat Rukiqi	January 2021	President of the Kosovo Chamber of Commerce and Assistant Professor at the Faculty of Economics, University of Prishtina
15 Besnik A. Krasniqi	January 2021	Professor at the Faculty of Economics, University of Prishtina

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FROM CANVAS TO PLATFORM: REFLECTING ON THE DIGITAL PLATFORM CANVAS

Abstract

Purpose: In this article, the canvas used to simplify business modeling of a platform and its visual depiction are put into the entrepreneurial context, and critically reflected accordingly. Furthermore, it is discussed to what extent the canvas is advantageous, disadvantageous, applicable, not applicable, or even contradictory.

Methodology: The analysis is based on theoretical research. Additionally, qualitative interviews with business founders were conducted.

Results: The results conclude that the canvas employed to ease the business model sharpening process supplies founders with essential aspects to cover, yet they are part of a large set of factors that play in.

Conclusion: The limitations of this study are rooted in the chosen research design based on the conceptual review.

Keywords: Business model, entrepreneurship, Digital Platform Canvas, ecosystems, digitalization

1. Introduction

The currently prevalent COVID-19 pandemic catalyzes innovation, as it can be identified as an economic megatrend that is forcing entire industries to innovatively restructure their economic core (cf. Lubin & Esty, 2010) and develop crisis-resistant business models (McKinsey & Company, 2020a; 2020b; Tidd & Bessant, 2013). Emerging startups should leverage this push of changing needs to develop businesses aligned with the economic demands of the future, with a focus on digitized ecosystems resilient to crises (McKinsey & Company, 2020c; 2020d; Siegfried, 2015). In this sense, this study aims to provide critical thinking on business models to help startups design and sharpen their business models that are platforms to be.

In the structure of this study, addressing aims and objectives comes first. After that, there follows analysis of the conceptual background. A detailed reflection critically examines von Engelhardt and Wangler's (2019) Digital Platform Canvas (DPC). Subsequently, a delineation of implications for the canvas value added and its pitfalls are shown. That output comprises qualitative interviews with business founders.

The study aims to identify critical aspects and advantages that need to be considered when creating a digital platform business model. The overall objective is thus to identify promising parameters that are advantageous for prospective business founders. To achieve the respective goals, pitfalls in the application of the method are to be identified as well as the application of the method, critically evaluated in its authenticity and transferable conclusions and implications derived.

To identify the barriers in the application of the method, literature is consulted to provide a holistic view with valid information.

Overall, the objectives underlying this research will result in a chronological sequence that sheds light on the application of the canvas, which can be both beneficial and detrimental to a company in its early stages.

The potentially resultant generation of competitive advantage underpins the significance of that education on the methods (Kim & Mauborgne, 2015; McKinsey & Company, 2020b; cf. Lubin & Esty, 2010; Siegfried, 2014). Beyond that, businesses and particularly innovative startups that build and shape the next decades' platform economy should be equipped with the implications (McKinsey & Company, 2020a; 2020b). Consequently, the following indicative research question is intended to contribute to the filling of existing academic literature gaps in the context of building digitized platform business models:

Can digitized startups transfer knowledge to their platform business model applying solely the Digital Platform Canvas?

Throughout this study, the question above will be answered to clarify the feasibility and appropriateness of the methods in the contextual sector.

2. Theoretical and conceptual background

In the following chapter, the conceptual background is dedicated to the analysis of the subject method. Hence, in what follows, a critical reflection on the feasibility and effectiveness of the DPC (von Engelhardt & Petzolt, 2019) is elucidated.

A critical reflection of the Digital Platform Canvas

"[Digital platform economies] link players who would not be able to interact with each other, or only with difficulty, without the platform. The interaction of the various players thus creates digital ecosystems." (von Engelhardt & Wangler, 2019, p. 13). The realization of an ecosystem is intended to be simplified with the DPC designed by von Engelhardt and Petzolt (2019). Leveraging this canvas is especially topical, while the global economy is still exposed to the COVID-19 pandemic that pushes industries towards a high rate of occurrence of business digitization (McKinsey & Company, 2020c; 2020d). The objective of the DPC is to sharpen a digitized ecosystem according to its key drivers that foster success and guide the founders through the market entry phase. The expected result is hence to refer to a consistent and convincing prototype ecosystem that is at least in its state of proof of concept (cf. Klein, 2013; Maurya, 2016; Ries, 2012; von Engelhardt & Petzolt, 2019).

The DPC calls to reflect on current revenue models and sheds light on future developments of the subject platform. In this way, the creation of revenue forecasts is leveraged as far as possible by considering changing external conditions such as the prevailing pandemic and the growing presence of digitization (cf. Bennett & Lemoine, 2014; Cohen & Levinthal, 1990; Frederick, O'Connor & Kuratko, 2016; Pressfield, 2012; Ries, 2012; Travis & Hodgson, 2019). Besides, generating potential revenue projections allows for creating initial prototypes that can validate customer demand and the planned proof of concept (cf. Bhargava & Herman, 2020; Kaplan, 1966; Ries, 2012; Siegfried, 2012; Voloshinov et al., 1973). The following expectations that founders may have of this multi-dimensional canvas are as follows (Figure 1):

Figure 1 DPC expectations

DIGITAL PLATFROM CANVAS
EXPECTATIONS

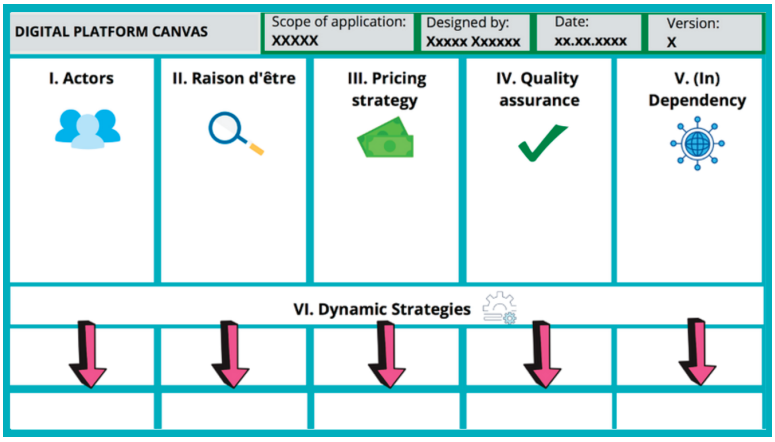
	Key drivers	Simplicity	Understanding	Reflectiveness
Platform's market entry strategy V + F	✓	✗	✓	✓
Accurate knowledge transfer V + F	✓	✓	✓	✓
Strategic validation V + F	✓	✓	✓	✗
Structure & guidance V + F	✓	✓	✓	✗
Uncertainty avoidance F	✓	✗	✓	✓

V: Viewers' point of view
F: Founders' point of view

Source: Authors

The DPC template differs vastly in the visual design and composition from the Business Model Canvas designed by Osterwalder (2011). The Business Model Canvas consists of nine building blocks, while the von Engelhardt and Petzolt's (2019) DPC consists of six, where the upper five represent the success factors of the digital platform, and the bottom represents the respective dynamic strategy to plan the market entry deliberately (see Figure 2; cf. Chesbrough, 2006; Kim & Mauborgne, 2015; Osterwalder, 2011; Rumelt, 2011; Siegfried, 2017).

Figure 2 DPC



Source: Adapted from von Engelhardt & Petzolt, 2019

However, these possible amendments towards developmental trends are invalidated hypotheses only. Thus, it is uncertain whether the platform founders cover enough potential scenarios to be prepared for upcoming, even unforeseen, events and external business-environmental changes and challenges (cf. Bennett & Lemoine, 2014). A potential time loss driven by a human being's psychological subjectivity that can guide the founders due to their bias of persuasion in relation to their business must be considered in this context as it is impossible to separate the mind from individual thought patterns completely (Nisbett, 2003; Düsing, 2006). Hence, it is appropriate preparatory work for flexible minds of the founders to go through diverse scenarios, but as they cannot be proven immediately, the consideration of different scenarios can still result in the unexpected. Here too, Stähler's (2019) approach of consulting expert opinions could be beneficial to evade the risk of unpleasant event emergences.

A higher risk emanates from the steps to be taken before filling out the DPC. Von Engelhardt and Petzolt (2019) recommend using an existing and completed Business Model Canvas (Osterwalder, 2011; cf. Stähler, 2019) to complement their DPC. The controversial point here is the subsequent recommendation to use the DPC because the subject canvas is to be understood merely as a tool that relies on additional tools. That has an increased degree of uncertainty, as an error-filled ecosystem can emerge within the application of the DPC based on consequential errors with roots in an earlier completed Business Model Canvas. That can lead to setting incorrect parameters and choosing respective complementary tools or methods (cf. Cohen & Levinthal, 1990; Stähler, 2019; versus Bennett & Lemoine, 2014; von Engelhardt & Petzolt, 2019). Furthermore, the DPC does not require validation of customer needs, which in the worst case could end in disinvested time, money, and efforts (cf. Ries, 2012; Voloshinov et al., 1973; Kaplan, 1966).

In contrast, the validation of customer needs and desires could be perceived as an entrepreneurial duty (cf. Drucker, 2006) that von Engelhardt and Petzolt (2019) could recommend exercising as axiomatic since other dedication without validation would miss the point of creating a digitized ecosystem. Nonetheless, cognitively strong and strategically affine founders should engage in building a digitized ecosystem since they can determine the most cru-

cial parameters themselves and emancipate their minds from predetermined patterns if necessary and since an ecosystem requires a founder's ability to execute and capitalize multiple revenue models similarly. It should be kept in mind that an overly present and consecutively repeated error ratio is not welcome among investors, accelerators, or incubators, especially in Western cultures, as it discredits the strategic and economic holistic caliber of the founders with regard to the subject business model's succeeding potential (Hofstede, 1980; Trompenaars & Hampden-Turner, 1997; cf. Bennett & Lemoine, 2014; versus Frederick et al., 2016; Primecz et al., 2009; Ries, 2012; Bätz & Siegfried, 2021). However, a positively practiced error culture is yet welcome, even among big corporate companies, as it accelerates the internal innovation culture.

Examining the conceptualization of the DPC, it is apparent that each building block is complemented by its dynamic strategy, which lowers the risk of disregarding crucial aspects while building a complex, multi-layered ecosystem. As the complexity increases from building block to building block and since one is built upon the prior, von Engelhardt and Petzolt (2019) recommend filling out the DPC in its given order:

1. With the first building block - actors, company founders who employ the DPC must critically reflect on who they aim to attract (cf. Ries, 2012; Maurya, 2016) and connect to their platform. That addressing of target groups is another subliminal objective of the canvas, as it allows the founders to logically derive synergies. The knowledge acquired on the platform users allows for creating novel value added and increases the UX, thus the likelihood of returning users and daily active users, which fosters ecosystem growth (cf. Deutscher, 2010; Grove, 2009; Hartson & Pyla, 2012; Kim & Mauborgne, 2015; Klein, 2013; Stull, 2018; Tidd & Bessant, 2013; Travis & Hodgson, 2019).

   Furthermore, the respective dynamic strategy of which target group to acquire first must be defined, similarly to Ries's (2012) and Maurya's (2016) approach with the LS and the associated Lean Canvas, where research must be conducted to identify the early adopters. For a digital platform, it is essential to identify those that are likely to recommend the platform as these users are a vital component of the ecosystem (cf. Bhargava & Herman, 2020; Greve, 2010; Hartson & Pyla, 2012, Reichheld & Seidensticker, 2006; Stull, 2018). Hence, it is imperative to satisfy these users' needs and respond to their user behavior and feedback for further development and commercial success of the platform. In this way, the well-known chicken-and-egg problem of what should be done or who should be attracted first is supposed to be resolved, which is intended to generate the first user traffic on the platform and favor the anticipated scaling (cf. Alpar et al., 2015; Herzberger & Jenny, 2017; Hoffmann & Yeh, 2018; Kaplan, 1966; Voloshinov et al., 1973). However, as there is neither a strategy nor a tool that promises validation that the founders have identified the right group(s) of early adopters (cf. Bennett & Lemoine, 2014), time to rethink the attraction of new early adopters must be considered, which can be detrimental to a young venture as time is a valuable resource, especially in a market that is fast-paced driven by trends.

2. The second building block - raison d'être - deals in greater detail than the first building block's actors with the goals to identify problems and needs of the target groups, which is noticeably important. That applies not only to the aspect of a deeper understanding of the platform users but also to necessary growth, which can be reflected in the increasing net promoter score enabled through the understanding of users (Greve, 2010; Reichheld & Seidensticker, 2006; cf. Hoffmeister & Von Borcke, 2017). By applying the DPC in this stage, platform founders are encouraged to focus on the value-adding unique selling proposition that justifies platform existence. Knowledge of that kind can favor the inherent competitive advantage (cf. Kim & Mauborgne, 2015; Osterwalder, 2011; Ries, 2012).

   To determine the desired raison d'être, von Engelhardt and Petzolt (2019) recommend asking and answering the following four questions:

   - Which actors would miss the platform if it no longer existed?
   - What function and role does the platform perform to create value for the platform users?
   - What is the (competitive) unique selling proposition of the platform?

- What services must the founders of the platform offer to fulfill the platform functional role?

According to von Engelhardt and Petzolt (2019), after answering these questions, the next step is to determine what other requirements the platform has to deliver for long-term success. For example, they mention user-friendliness of the platform and its security. While they are right that such requirements can be derived, it is not foreseeable for most ecosystem founders what dynamics their platform will take on. Dynamics is community-based, and the digitized socially constructed genre among users is unpredictable and human-made instead of controllable (Bazerman, 1995; Pearce & Conger, 2002; Swales, 1990; versus Hall, 1959; von Engelhardt & Petzolt, 2019). A lot of customer needs and their user behaviors are served through monitoring and extraction of data, similarly to the LS created by Ries (2012), in which a company goes through numerous iteration loops and repeatedly adapts its business model to customer needs and desires (cf. Travis & Hodgson, 2019). Subsequently, a precise definition of services with the respective target groups is intended to follow (von Engelhardt & Petzolt, 2019).

In the best case, the milestone proof of concept is reached using this canvas, which is indicative of a validated raison d'être (Bhargava & Herman, 2020) and user demand. Nonetheless, it could be disadvantageous to the platform if the founders decide to rely on one service for too long or too short. The appropriate time frame to test the presumably most exciting service intended to generate initial platform traffic is not covered in this canvas; yet, it is relatively impossible to be determined beforehand. Again, the presence of jeopardizing uncertainty (Bennett & Lemoine, 2014) must be considered in the creation of an ecosystem.

3. The third building block - pricing strategy - is vital for external financial sources. Von Engelhardt and Petzolt (2019) broke this complex building block down into the following four w-questions that should help platform founders reflect on their future revenue streams:

- Which platform do users pay for, how much, for which services, and at what time?
- What is the level of the respective willingness to pay?
- Which actors of the platform are the most significant for the other (complementary) target groups and should therefore be subsidized?
- Which actors of the platform could be exposed to the fear of undesired dependency or lock-in effects?

This actively demonstrates that the interdependencies and the interactions of the target groups present in a digital platform must be considered. Here, too, the relevance of the network effect comes into play. "This makes pricing and pricing strategy on digital platforms more complicated, but also more interesting than on classic linear platforms [as holistic analysis of the platform's target groups and their interaction is required]." (von Engelhardt & Petzolt, 2019, p. 140). A significant benefit is transferred to the participating parties on the platform. That can further be leveraged for the conduction of personal market research purposes.

It is more beneficial for different actors of the target groups to pursue an asymmetric pricing strategy: different actors of the target groups pay different prices (cf. von Engelhardt & Petzolt, 2019).

Nevertheless, it must be kept in mind that those potential daily active users could be exposed to the fear of undesired lock-in effects such as monthly account fees. The fear of financial exploitation can harm a brand's reputation (cf. Page & Parnell, 2019; Smith, 2013). According to von Engelhardt and Petzolt (2019), that risk of undesired lock-in effects should resultantly be evaded.

Moreover, referrals leverage the word-of-mouth and serve, according to Ries (2012), as a viral growth engine, complementing the occurrence of a network effect and creating beneficial economic symbiosis (cf. Kaplan, 1966; Kaplan & Norton, 1992; Rumelt, 2011; Voloshinov et al., 1973; von Engelhardt & Petzolt, 2019).

By shedding light on the nature of the ecosystem's complex pricing strategy, already here at building block 3, there is a chance that many prospective platform founders may start faltering based on the delicate execution plan. How-

ever, this is more due to the complexity of an ecosystem than the concept of the DPC, as it renders highly complex numerical issues with simple questions. Founders of a platform business should therefore beware that it requires extensive research, iteration cycles, expert opinions, strategic analysis (cf. Stähler, 2019), and cognitive flexibility to succeed with their idea (cf. von Engelhardt & Petzolt, 2019; Ries, 2012; Klein, 2013). Furthermore, the complexity of the pricing strategy does not end with the previously posed four w-questions, but moves into its dynamic pricing strategy. Here, the questions to be asked are whether the pricing strategy is adjusted with community growth or not (cf. Greve, 2010; von Engelhardt & Petzolt, 2019; Kaplan & Norton, 1992; Kaplan, 1966; Voloshinov et al., 1973; Rumelt, 2011), and what the construction of the financial design looks like at the beginning and at a later point of an operational activity (von Engelhardt & Petzolt, 2019).

Even if only prognostic assumptions can be made here, platform founders should devise a diverse set of forecasts. While neither Osterwalder's (2011) Business Model Canvas nor Maurya's (2016) Lean Canvas deals with deep pricing complexity, the DPC calls for that entrepreneurial sanity (Drucker, 2006). Even though there is a risk here that platform founders can quickly feel overwhelmed, the DPC guides them through the economical execution of their multi-dimensional platform business idea, with potential pitfalls to consider.

4. The fourth building block of the DPC - quality assurance - was designed to ensure that platform founders can deliver their unique value proposition (von Engelhardt & Petzolt, 2019; cf. Maurya, 2012; Osterwalder, 2011; Osterwalder et al., 2014; Ries, 2012) to various platform stakeholders. That building block serves as a probing block to ensure adherence to the associated values despite deliberate planning (Mintzberg & Waters, 1985; Rumelt, 2011) of the envisioned business model (cf. Berg, 2006; Gray, 2004). Furthermore, quality assurance is a key element for a digital platform as it is defined by von Engelhardt and Petzolt (2019) as one of the vital elements for the success of monetizable platforms since they bring together a versatile set of (commercial) target group aspirations.

If platform founders devote themselves to the DPC and reach this building block, the first step is to define the platform central quality elements. That reinforces the answer to the question of the raison d'être again – it becomes clear why actors use the platform (von Engelhardt & Petzolt, 2019). Nonetheless, the raison d'être must be kept under constant review as the market competitors and their economic interests may use copycatting to undermine a company position in the market. Platform founders should pay attention to such changes that could cause the worst-case scenario to occur with the help of this building block as they can act reactionarily and preventively.

The next step is to reflect on the individual components that enhance the value proposition from the stakeholders' perspective. In this step and in the previous step of identifying key quality elements, similarly to the DT (Lewrick et al., 2018), it is helpful to put oneself in the role of different actors. Quality-enhancing elements can be of any nature, e.g., psychological, technological, or organizational. The goal of this step is to analyze the interaction of different quality requirements and to bring about a harmonious interaction of miscellaneous quality enhancing aspects appropriate to the platform (von Engelhardt & Petzolt, 2019). For example, a technically well-designed platform can significantly limit the UX, which in turn would affect the ratio of daily active users, thus platform growth (cf. Alpar et al., 2015; Herzberger & Jenny, 2017; Kaplan, 1966; Voloshinov et al., 1973).

After that, subsequent concrete implications for measures to ensure and increase quality and the value proposition resulting from the previous analysis must be derived. Thus, platform founders have to highlight what measures they will take. In the best case, platform founders manage to integrate a tool into the platform that invites and implements a culture of constant feedback and interaction of various actors, similarly to the concept of innovation (Chesbrough, 2003; cf. Medinilla, 2014; Weinberg, 2019). Applying that approach, a company generates strategic and profitable innovations through interaction with users to improve the platform by extracting valuable data (cf. von Engelhardt & Petzolt, 2019).

Hence, the dynamic strategy takes place under the points of which quality assurance measures and elements should be present from the beginning and whose requirements will be adapted in the future. In managing this building block, it is advisable to perform multiple iteration loops or even continuous improvement – the Kaizen principle (cf. Medinilla, 2014; Weinberg, 2019). In this way, the quality and value proposition are sharpened continuously (cf. Ries, 2012; Maurya, 2016) and maintained competitively (Bennett & Lemoine, 2014; Kim & Mauborgne, 2015; cf. Tidd & Bessant, 2013).

However, it is impossible to make a generic statement as to which aspects must be strictly subjected to quality assurance. In each case, it depends on the identified raison d'être. Although that is logically justifiable, since every business model is not 100% like any other, it does imply the risk of divergent definitions and interpretations (cf. Deutscher, 2010; Nickerson, 1998; Nietzsche, 1888). Besides, business founders are often biased, unable to take a detached, critical and reflective perspective on their business model intrinsically, as enthusiasm for their idea prevails. Thus, the presumably existing cognitive dissonance – colliding insights that are not compatible with the conditions of the external detached world – of the founders (Festinger, 1957; Schmidt & Hunter; 1977) can emerge. That can be caused by enthusiasm, resulting in the undesirable reality-less completion of the DPC quality assurance, leading to the commercial failure (DeAndrea, 2015; versus Voloshinov et al., 1973; Kaplan, 1966).

Under the aspect of inevitable quality assurance, there is another jeopardy, i.e., another kind of familiarity bias; according to the case that founders seek further expert opinions to reconfirm the business model and identify weaknesses, as suggested by Stähler (2019), founders still run the risk of only asking for help from experts with expertise that they have sympathy for, agree or identify themselves with (cf. Fox & Levav, 2001; versus Stähler, 2019).

5. The fifth building block - (in)dependency - addresses the existing dependencies that result from the joint activities of various groups of actors in the platform through their dynamic economies. This dynamic economy that prevails is conditioned by indirect network effects (von Engelhardt & Petzolt, 2019; cf. Greve, 2010; Kaplan & Norton, 1992; Reichheld & Seidensticker, 2006), that contribute to the platform value added in the first place. Only with the active and frequent use of different target groups is a benefit to all parties present (von Engelhardt & Petzolt, 2019). Thus, the goal of that building block is to identify and analyze (in)dependencies between diverse target groups and design them in a targeted manner, adapted to the individual actor groups. That enables creating novel dependencies that can be leveraged to reduce dependencies that create little value added and strengthen those that are more promising.

   As a first step, it is advisable to identify which actors of the platform rely on whom. The group that is relied on is responsible for generating a critical set of users that favor the network effect and a correspondingly high net promoter score, thus economic growth and scaling (von Engelhardt & Petzolt, 2019; cf. Greve, 2010; Hoffmeister & Von Borcke, 2017; Reichheld & Seidensticker, 2006). In the next step, it should be analyzed how these dependencies occur. As it tends to be rather unlikely to present the optimal solution in the first attempt, here, too, similarly to the LS method (Ries, 2012; cf. Maurya, 2016), it is advisable to pivot and revisit the findings of this building block (cf. Drucker, 2006). Furthermore, changing environmental conditions requires constant adjustment of value-added measures that strengthen and facilitate the establishment of a venture (Bennett & Lemoine, 2014; Kim & Mauborgne, 2015).

   By employing the DPC and the (in)dependencies, platform founders should not (only) look at classic factors such as large suppliers' reputation or market power (von Engelhardt & Petzolt, 2019). Founders are recommended to focus on factors that add novel value or have solid potential to enhance the platform through interdependencies that might not be established.

   According to von Engelhardt and Petzolt (2019), novel platforms would be successful if positive expectations of the stakeholders were satisfied, provided that the previous building blocks of the DPC have been filled out correctly and reflectively. In this case, the self-fulfilling prophecy (Jussim, 2012) designed by public external

expectations would set in (von Engehlhardt & Petzolt, 2019; cf. Greve, 2010; Kaplan & Norton, 1992; Reichheld & Seidensticker, 2006). Nevertheless, it must be noted explicitly that dependencies can be reciprocal (von Engelhardt & Petzolt, 2019; cf. McKinsey & Company, 2020c; 2020d).

Considering the complexity of the DPC and multidimensional pros and cons, it is up to the founders if their strategic caliber refers to sufficient maturity to master that canvas. The following Figure 3 reflects the features of the DPC, which can help founders decide in favor of or against this canvas.

Figure 3 The DPC after reflection

DIGITAL PLATFROM CANVAS
AFTER REFLECTION

	Key drivers	Simplicity	Understanding	Reflectiveness
Platform's market entry strategy V + F	✓	✗	✓	✓
Accurate knowledge transfer V + F	✓	✓	✓	✗
Strategic validation V + F	✗	✗	✗	✓
Structure & guidance V + F	✓	✓	✓	✗
Uncertainty avoidance F	✗	✗	✗	✓

V: Viewers' point of view
F: Founders' point of view

Source: Authors

However, if founders find themselves faltering here, they should critically reconsider whether creating a highly complex and multilayered ecosystem with several revenue models matches the individual economic skill set.

3. Results

The research results highlighting the canvas above are presented below.

3.1 Discussion

The DPC (von Engelhardt & Petzolt, 2019) meets the needs of plenty currently nascent business models and their founders, as the prevailing COVID-19 pandemic acts as a catalyst for digitization (cf. McKinsey & Company, 2020a; 2020c; 2020d). Since digital platforms are predominantly multilayered with several revenue models and respective groups of actors (von Engelhardt & Wangler, 2019), which can expose ecosystem founders to overwhelm, the DPC helps them to rethink the essentials when and how to launch and establish the prospective platform. In particular, it helps solve the well-known chicken-and-egg problem as to which features to introduce first to the users to scale the platform. Accordingly, the DPC gives founders food for thought in which form the platform's profitability (cf. Habermann, 2008; Voloshinov et al., 1973; Kaplan, 1966) can be exercised first. It is, therefore, helpful for understanding the incremental building of the platform. Consequently, the DPC is a strategic device for internal guidance (cf. Schallmo, 2013) regarding the incipient revenue streams that can be illustratively used and introduce external parties.

Nonetheless, the DPC is not a canvas that platform founders should initially engage with, as von Engelhardt and Petzolt (2019) acknowledge. Rather, this canvas requires clarity about the desired business model intended to be used additively to another less specified canvas such as the Business Model Canvas (Osterwalder, 2011). Thus, although the DPC

provides simplified guidance for complex matters, it requires its practitioners to employ it with caution, mindfulness, strategic awareness, and reflectiveness instead of intuitively filling out the building blocks. It must be considered that the DPC shows a higher degree of complexity which can be confusing or demotivating for founders (cf. von Engelhardt & Petzolt, 2019). Nevertheless, a digital ecosystem, in general, is a highly complex case; only those founders of sufficiently strategic caliber and patience should venture into an endeavor of that kind.

Answering the research question, employing solely that one canvas implies an increased risk of failure, which founders should disapprove of. A canvas serves as a means to record the status quo and the corresponding available resources. However, only the DPC (von Engelhardt & Petzolt, 2019) provides information on the extent to which the individual building blocks are connected, what possible obstacles need to be considered when connecting them, or a strategic relationship.

Notwithstanding the aforementioned, the intellectual resource of creating linkages between what is ostensibly not connectable remains the entrepreneurial art that every founder has to learn themselves. None of the canvas supplies business founders with predetermined building blocks that display the business model in its entirety and its unique features but indispensable core elements. Summing up, no canvas should be used alone; the most promising output will be generated through the composite output of plenty. Even though it is not mandatory to incorporate the canvas practice, establishing the method and miscellaneous canvas approaches confirmed the advantages of combining the facilitated visuality with the key components of the business, which requires further elaboration.

3.2 Limitations

Each study has a limited research quota, this study also encounters limitations that call into question the validity of research findings. It can be criticized that the article was solely based on the conceptual review of the canvas as opposed to additive qualitative research. Qualitative research would clarify other angles of research or could even support the above analysis.

4. Conclusion

In summary, the methods presented provide a helpful guide to the core elements of starting a digital platform business, but their validity and appropriateness for a company's particular product/service are not set in stone. In addition, the digital boost hype enjoyed by the method presented is not entirely applicable, as the method has weaknesses in its overall concept. However, the method arguably serves as a starting point, where business flexibility and the ability to adapt the methods should be considered. Thus, it can be expected that the established core principles will increasingly be brought together, while being expanded to include new and contemporary dimensions to approach the creation of a platform business model of the new era and market entry with fresh perspectives. The prospect of digitized business models and ecosystems gaining importance is therefore not only justified but necessary, as these terms will be an integral part of the future management jargon.

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CHALLENGES OF SUPPLY CHAIN VISIBILITY IN DISTRIBUTION LOGISTICS – A LITERATURE REVIEW

Abstract

Purpose: Complex supply chains characterise today's economic life, which is determined by uncertainties and risks. Managing those successfully requires the development of resilient and flexible structures and processes based on information transparency, which enables better decision-making, especially in times of global crises. In this context, supply chain visibility (SCV) is defined as the stakeholders' capability to have access to accurate and timely information about the flow of goods. Although the importance of SCV has been discussed in scientific literature and practice, challenges still inhibit improved SCV, particularly in distribution logistics. These have been scarcely investigated. The purpose of this study is to identify the challenges of SCV in distribution logistics and to provide implications to address them.

Methodology: A qualitative content analysis (QCA) spanning 26 scientific articles was used.

Results: We found evidence of challenges inhibiting SCV in distribution logistics within the three aggregated dimensions of *inappropriate processes & technologies and information systems, lack of communication & trust,* and *insufficient monitoring & decision-making metrics.* The findings show that trust can be seen as both a challenge and a prerequisite. Despite the possibilities of digitalisation, there exist trade-offs between manual processes and new technology implementation. Decision-making can be based on individual experiences, and monitoring can be difficult due to undefined metrics.

Conclusion: Practitioners may use the findings to better identify and address the challenges of SCV in distribution logistics. Further studies could extend the findings through empirical studies, which would allow practitioners to assess their level of SCV and derive initial solutions.

Keywords: Supply chain visibility, supply chain transparency, supply chain management

1. Introduction

Increasing complexity and dynamic changes in global supply chain networks are key reasons for growing uncertainties and risks in modern value chains (cf. Messina et al., 2018). The COVID-19 crisis demonstrated that supply chain visibility is critical for managing disruptive events (cf. Finkenstadt & Handfield, 2021; Norwood & Peel, 2021, p. 416; cf. Freichel et al., 2022). Furthermore, increased visibility is essential to sufficiently control supply chains (cf. Swift et al., 2019). Certain industries

and logistics phases require SCV. One example is the distribution logistics of pharmaceutical goods (cf. Papert et al., 2016). Another example is food distribution logistics, regarding quality and safety requirements (cf. Shi et al., 2010). Inventory availability is required to improve supply chain distribution processes in omni-channel logistics (Wollenburg et al., 2019, p. 12). Inventory allocation across fulfilment centres and offline and online retail warehouses requires channel-integrated availability information through appropriate ERP systems (cf. Hübner et al., 2016). Hence, SCV is an important topic in the field of distribution logistics and is currently receiving attention.

However, it still seems difficult for many companies to improve SCV (cf. Swift et al., 2019). SCV is based on accurate information exchange (Moshood et al. 2021, p. 20), which is often critical within and between companies (Williams et al., 2013, p. 551). Furthermore, digital infrastructures are a prerequisite for SCV (Moshood et al., 2021, p. 20). Technologies for information exchange have been discussed in academia and practice in recent decades, e.g. concerning electronic data interchange (EDI) (cf. Mossinkoff & Stockert, 2008), Blockchain (cf. Sander et al., 2018; cf. Grest et al., 2019; cf. Lustenberger et al., 2020; cf. Sternberg et al., 2021) and especially RFID (cf. Schmidt, 2006; cf. Straube et al., 2007; cf. Morenza-Cinos et al., 2019; cf. Kgobe & Ozor, 2021). Nevertheless, IoT-based technologies for SCV often have to cope with standardisation, security, and accurate information sharing (Ahmed et al., 2021, p. 20).

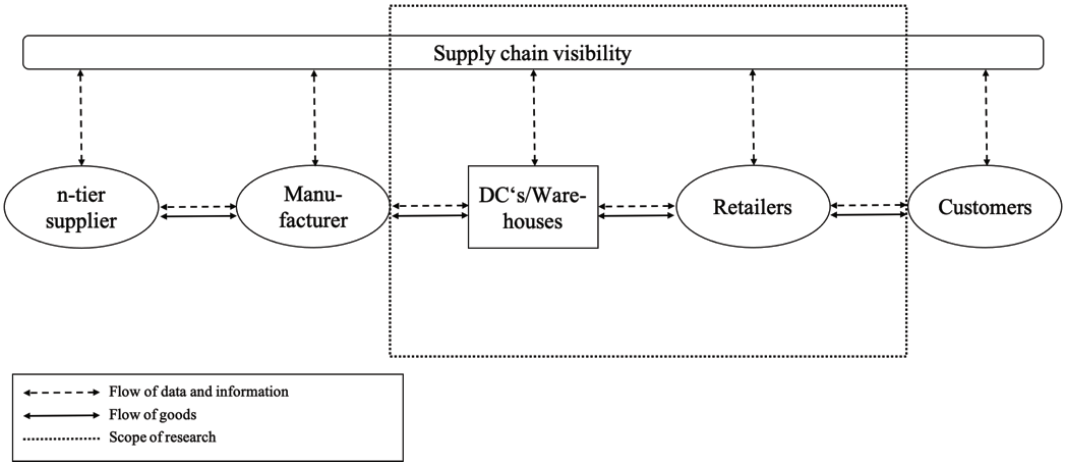
In the context of supply chain information sharing, Kembro et al. (2017, p. 78) define barriers as factors that are too difficult to cope with, while challenges are factors that are complex but can be overcome or solved. Kalaiarasan et al. (2022, p. 5) categorise barriers and challenges together. Thus, we use the term challenges of SCV as factors that hinder the improvement of visibility and transparency in supply chain management and are difficult to overcome.

Challenges of SCV first need to be identified and investigated to specify problem areas better and derive areas of action. Kalaiarasan et al. (2022) provide a holistic framework for SCV based on a literature review of SCV articles. The authors also synthesised barriers and challenges as one of four categories of their SCV framework. In particular, the challenges of SCV in distribution or retail logistics require more investigation.

Therefore, we provide a synthesis of SCV challenges in a systematic literature review, focusing specifically on distribution logistics. Therefore, the following research question is proposed: *"Which challenges inhibit SCV in distribution logistics?"*.

This study aims to identify these challenges and suggest potential areas of action. Figure 1 illustrates the scope of research of this article.

Figure 1 Scope of research within the supply chain



Source: Authors

This article is structured into the following sections: First, the theoretical background of SCV is explained. Then, the systematic literature review methodology is described before presenting the literature findings. Finally, the results and implications are discussed and summarised, and suggestions for further research are given.

2. Theoretical background

Supply chain visibility is known as a key success factor for modern supply chain management. Definitions are proposed rather ununiformed in academia. The following section gives a short overview and working definitions.

2.1 Conceptual understanding of SCV

SCV can be defined as the capability of companies to manage access to data and information. Moreover, it is the capability to identify locations and delivery status of entities in real-time to reveal planned and unplanned events (supply chain event management). This can improve decision-making (Francis, 2008, p. 182; Goh et al., 2009, p. 2549) and supply chain resilience (Roy, 2021, p. 25). Sodhi and Tang (2019) understand SCV as the ability of companies to identify information about entities transiting upstream and downstream supply chains, while supply chain transparency refers to the disclosure of information about products and operations to groups of interest such as consumers or investors (Sodhi & Tang, 2019, p. 2948).

SCV is both a prerequisite (cf. Otto, 2003; Roy, 2021, p. 25) and an outcome of information sharing (Moshood et al., 2021, p. 9). Moreover, visibility can be linked to specific elements. For example, Goh et al. (2009, p. 2550) specify SCV in terms of visibility of "process", "inventory", "demand," and "exception".

In summary, there are various definitions of the term SCV in scientific literature, which remain inconsistently defined. In this article, the definition of SCV is used in line with Francis (2008, p. 182), Goh et al. (2009, p. 2549), and Roy (2021, p. 25).

2.2 Benefits and characteristics of SCV

Various reasons lead to the need for increased supply chain visibility. In complex supply chain networks, SCV enables improved planning of activities and business processes or strategic competencies of companies (Bartlett et al., 2007, p. 308f.; cf. Somapa et al., 2018). This can lead to increased efficiency, profitability, cost reductions, and higher market valuation (Sodhi & Tang, 2019, p. 2949f.; Swift et al., 2019, p. 423f). Moreover, increased SCV can improve supply chain performance (Bartlett et al., 2007, p. 308f.). SCV can improve customers' perception, especially in case of reputation loss (Sodhi & Tang, 2019, p. 2949f.). In addition, it can enhance customers' loyalty through offered and disclosed information enabled by SCV (Pundir et al., 2019, p. 0156f.).

Supply chain performance indicators such as service level, cost, quality, and time have been assessed to measure SCV (Caridi et al., 2014, p. 2). Furthermore, theft or loss and counterfeiting of goods can be avoided by functioning SCV. Specific physical information about goods transhipped, such as temperature or humidity, can be controlled (Pundir et al., 2019, p. 0156f.). Therefore, a higher level of SCV leads to improved supply chain risk management (Sodhi & Tang, 2019, p. 2949f.).

Somapa et al. (2018, p. 329) distinguish characteristics of SCV between automational, informational, and transformational characteristics. The first characteristic refers to companies' ability to access information through the automatic and electronic capture and transmission of data and information. The second characteristic encompasses the need for a certain quality of information in terms of "accuracy, timeliness and completeness of information" (Somapa et al., 2018, p. 329). Caridi et al. (2010, p. 600f.) described information quality in terms of time-related aspects, which refer to novelty, timeliness, and validity aspects regarding accuracy. The last characteristic refers to the exchange of information in terms of its real use (Somapa et al., 2018, p. 329).

3. Methodology

The methodology of this article follows a qualitative content analysis (QCA) to build a literature review. Qualitative approaches are especially appropriate in supply chain research, as they offer the possibility to deeply understand, extract and systemise the complex supply chain reality into explicit knowledge and theory due to the interpretative paradigm of qualitative research. In doing so, they offer a better understanding of supply chain complexities and operations (Trautrims et al., 2012, p. 838f.). Qualitative approaches allow identifying elements and

their interrelations in the investigated area from an informant-centred perspective, as those persons are forming the specific reality, which is under research. For this reason, there is qualitative rigour, as the theoretical findings are based on informant-centred findings (Gioia, 2021, p. 23f.).

For extracting information from already existing studies, we use both guidelines for systematic literature analyses (cf. Tranfield et al., 2003; cf. Watson et al., 2018) and the methodology of qualitative content analyses (cf. Schreier, 2012; cf. Gioia et al., 2013; cf. Mayring & Fenzl, 2019; cf. Gioia, 2021). The former is for the selection process of the articles to be included, the latter for their in-depth analysis.

3.1 Data Collection

Relevant articles for the subsequent QCA need to be identified by planning an appropriate data search process, which is based on the research question of this article, mentioned in section 1. This is followed by a selection of search terms and databases. In addition, a search strategy is needed to select articles based on inclusion and exclusion criteria. Therefore, the search terms are selected and linked with "OR" and "AND" to either alternate or combine them as follows:

TITLE-ABS-KEY (("Supply chain" OR "logistics") AND ("visibility" OR "transparency") AND ("retailing" OR "distribution" OR "fulfilment" OR "fulfillment")).

These search terms must be in the title, abstract and keywords of articles and were searched in the Scopus database, resulting in 457 articles. Then, filters were selected by documentation type: academic journal and conference paper; publication stage: final; subject area: business, management and accounting; language: English; and publication years: 2000-2022.

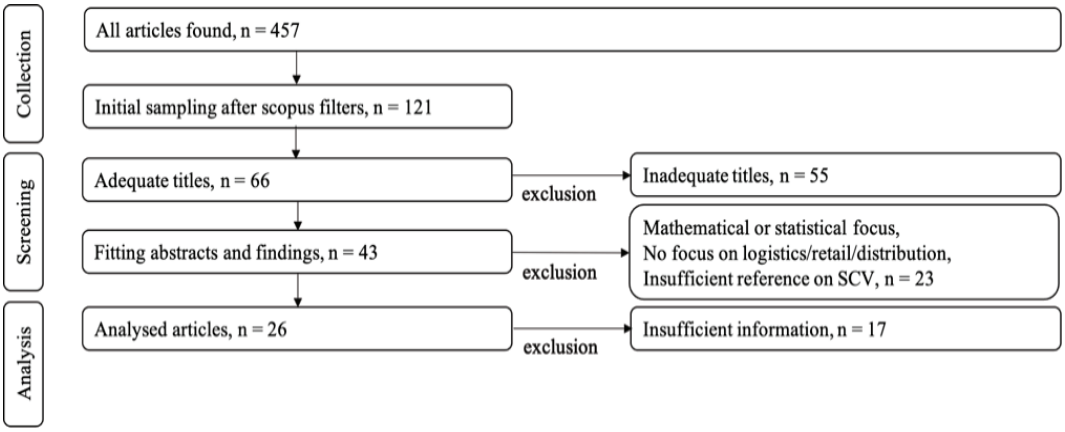
An initial sample of 121 articles remained. All 121 articles were downloaded into a Microsoft Excel spreadsheet. To reduce the number of articles to suitable titles, abstracts and findings that match the research question and scope, articles with the following criteria were excluded:

- Mathematical or statistic models/simulations without thematic reference to SCV;
- No focus on logistics or retail/distribution;
- Insufficient reference on the topic of SCV in general.

43 articles remained. During the reading process, 17 articles were excluded as they did not contain information relevant to this research.

Finally, 26 articles remained that were appropriate for the coding frame of the QCA (Figure 2).

Figure 2 Search strategy for article selection



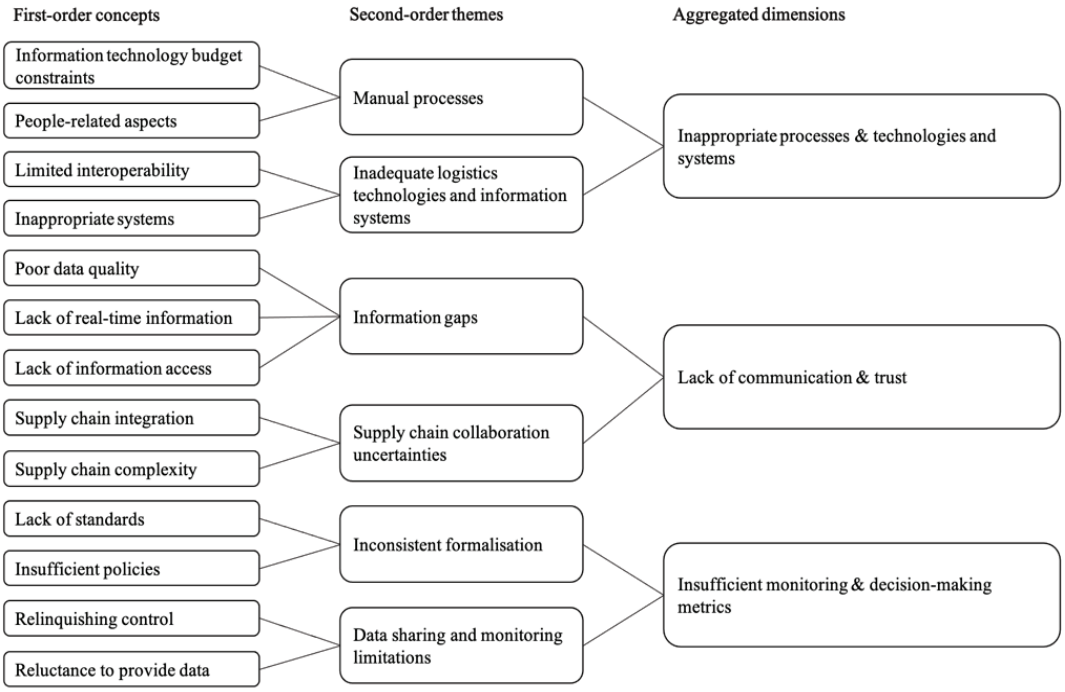
Source: Authors

3.2. Data Analysis

The tool MAXQDA was used for conducting the QCA. Therefore, the 43 articles were uploaded to the MAXQDA application. By analysing all 26 articles line by line, relevant information (=codes) regarding our research question was systematically extracted. By iteratively reviewing the gathered information, patterns of unique and common aspects emerged, which allowed the further systematic aggregation of information into higher level knowledge in an inductive way (Schreier, 2012, p. 60; Gioia, 2021, p. 24).

After extracting the codes, they were summarised into paraphrases to condense them and avoid redundancies (Schreier, 2012, p. 107; Gioia et al., 2013, p. 20-22). Then, these paraphrases were iteratively reviewed and categorised into first-order concepts based on their commonalities and differences. These were again combined and assigned to second-order themes (Gioia, 2021, p. 25). In the next step, the second-order themes are aggregated into aggregated dimensions. First-order concepts, second-order themes, and aggregated dimensions build a data structure which captures the methodological and theoretical development of the analysed data from raw material to the aggregated dimensions (Gioia et al., 2013, p. 20-22). The aim is a data structure that can lead to a better understanding of how all concepts and dimensions are related (Gioia, 2021, p. 24-26). In the following chapter, the findings of the analysis are described based on the data structure represented in Figure 3.

Figure 3 First-order concepts, second-order themes, and aggregated dimensions



Source: Authors

4. Analysis

Our analysis indicates that the challenges regarding SCV are routed in the dimensions of "inappropriate processes & technologies and systems", "lack of communication & trust", and "insufficient monitoring & decision-making metrics". They are presented in-depth in the following section.

4.1 Inappropriate processes & technologies and systems

4.1.1 Manual processes

Information technology budget constraints

Information technology is an enabler for SCV (Somapa et al., 2018, p. 313). However, there is also a lack of simple and cost-effective solutions for small and medium enterprises (Azevedo et al., 2004). Advances in RFID and other technologies have been made in retail logistics (Gaukler et al., 2008), but they remain cost-intensive (Kwok et al., 2010; Ahmed & Omar, 2019). Therefore, profitability varies (Bertolini et al., 2012) and cost-benefit trade-offs hinder technology adoption (Goebel & Günther, 2009). For instance, RFID is only profitable in distributing high-value products, e.g. expensive consumer electronics and apparel (Goebel & Günther, 2009). Another example shows that quality estimation of bacteria in food is more cost-effective (Shi et al., 2010).

People-related aspects

Manual processes such as barcode scanning can be cost-intensive due to labour requirements (Gaukler et al., 2008). In addition, inefficiencies in existing operations occur due to manual procedures, leading to the loss of information, duplicate and incorrect data, or their unauthorised disclosure (Choy et al., 2007; Schenk & Clausen, 2020). Hence, it is important to encourage employees in new system implementation (Chen et al., 2014). Acceptance of new technologies is, however, a challenge for creating transparency. For this reason, local automotive vendors, for example, delay system implementation (Ahmed & Omar, 2019).

4.1.2 Inadequate logistics technologies & information systems dimension

Limited interoperability

Improvement of SCV can be limited regarding the technical interoperability of information technologies. For example, barcodes do not provide rewritable data storage, and data loggers do not provide an identification function (Papert et al., 2016). Furthermore, barcodes have limited information density (Papert et al., 2016). Other information identification technologies, such as RFID, can be read automatically compared to barcodes, but active RFID tags are limited due to their limited lifetime, larger size, and higher cost (Delen et al., 2007). Dealing with the amount of real-time data, e.g. converting RFID data into usable information for new decision-making tools, can be challenging (Ranky, 2007).

Moreover, information and data storage technologies, such as cloud systems, are not always compatible with other key information systems (Suherman & Simatupang, 2017).

Information technologies can be limited due to disruptions in information transmission beyond distribution sites. Goods and their location status are often not visible during transportation (Suherman & Simatupang, 2017). Information at the distribution centre level can be transmitted via a wireless connection to the internet. However, during transport, information transmission depends on satellite communication or cellular network infrastructure, which is less cost-intensive but has lower coverage (Shi et al., 2010).

Inappropriate systems

Information systems can be inappropriate for improving SCV. For example, ERP systems can be unsuitable for dynamic supply chain management and may become a strategic disadvantage if not fully exploited, according to Seethamraju (2009). In addition, legacy systems or systems that are not integrated can become a major obstacle (Howard et al., 2005). Systems should be driven by suitable aspects, e.g. by orientation towards order demand instead of inbound or production logistics (Howard et al., 2005).

Moreover, software packages may not always provide the full support required due to clear gaps in planning and coordination activities (Azevedo et al., 2004).

Finally, inadequate implementation of information systems leads to inefficient visibility and transparency (Suherman & Simatupang, 2017; Ahmed & Omar, 2019).

4.2 Lack of communication & trust

4.2.1 Information gaps

Poor data quality

Information can be unreliable and unavailable (Ahmed & Omar, 2019). Consequently, a lack of information quality can affect performance measurement (Choy et al., 2007), especially if the metrics are not well defined (Munoz & Clements, 2008).

Lack of real-time information

Lack of correct, accurate, and timely information leads to various issues regarding supply chain uncertainties (Choy et al., 2007). Current systems may not fully provide real-time information across supply chain networks, which is required for promised delivery due dates to customer orders, early warning systems across the supply chain network, large overstocks, long throughput times, and reduced responsiveness to unplanned events (Azevedo et al., 2004). In addition, inaccurate inventory information due to poor process quality, theft, and spoilage require real-time information (Delen et al., 2007), which can reduce bullwhip effects (Jonsson & Mattsson, 2013). However, supply chain metrics are not sufficiently related to customer satisfaction, and metrics are not regularly monitored (Munoz & Clements, 2008).

Lack of information access

Information sources and access to information can vary, leading to information asymmetries (Ahmed & Omar, 2019). In particular, event information can still be exchanged via email or telephone, according to Ranky (2007). In addition, separate systems used by trading partners can lead to duplicate data (Howard et al., 2005).

Lack of process flexibility in adapting to changing supply chain configurations, inadequacies of technology interfaces to complement enterprise systems, lack of trust between supply chain partners, and lack of advanced decision support capabilities are challenges (Seethamraju, 2009). The latter, in particular, is often based on incomplete data, which leads to decision-making based on individual experience. Furthermore, these are entered manually into the system (Schenk & Clausen, 2020). Consequently, individual decision-making can lead to perturbation in the flow of goods (Munoz & Clements, 2008).

4.2.2 Supply chain collaboration uncertainties

Supply chain integration

Within supply chains with a large number of members, insufficient information sharing in terms of unclear and unreliable information due to a low level of integration leads to information distortion. This leads to asymmetries in collaboration (Ahmed & Omar, 2019). Therefore, effective information sharing depends on supply chain integration (Fatorachian & Kazemi, 2021). Moreover, trust is considered an important challenge in supply chain risk management (Seethamraju, 2009). On the other hand, trust is a prerequisite and enabler for visibility and transparency (Seethamraju, 2009; Hammervoll & Bø, 2010; Chen et al., 2014; Ahmed & Omar, 2019). Jüttner & Maklan (2011) suggest visibility as part of supplier contracts to avoid information not being shared. However, Ahmed & Omar (2019) note that trust cannot be guaranteed through contracts.

Supply chain complexity

Uncertainties in information flows are caused by complexities in supply chain networks. These can generally result from a lack of adequate legislation, different currencies, different economic policies, different business cultures, different technical standards, and different infrastructure (Bogataj & Bogataj, 2004).

Moreover, real-time information is essential for accurate monitoring by track and trace but cannot be fully transferred to the entire supply chain network (Schenk & Clausen, 2020). It is, for example, impossible to identify the flow of goods and source detection of counterfeit distribution, according to Kwok et al. (2010).

4.3 Insufficient monitoring & decision-making metrics

4.3.1 Inconsistent formalisation

Lack of standardisation

Standards play an important role to ensure global readability. For example, a data matrix code is intended for counterfeit-proof labelling of medicine in the EU (Papert et al., 2016). However, collaboration can be restricted by the lack of standards (Seethamraju, 2009). Both developed and underdeveloped countries seek greater transparency to improve business, operations, finance, legal, and purchasing. Therefore, formalisation enables transparency in other countries (Ahmed & Omar, 2019). Thus, a lack of standards of protocol and data formats, such as EPC, can become a major barrier for suppliers if not used (Howard et al., 2005). For instance, the EPC standard is RFID's most commonly used data representation (Delen et al., 2007).

Insufficient policies

Policies can influence SCV requirements (Papert et al., 2016). From a global point of view, there is a lack of regulatory aspects in the use of IoT-based data, e.g. policies and laws on data sharing (Srivastava et al., 2019). For instance, traceability requirements may be voluntary rather than mandatory, resulting in less traceability due to reduced participation (Shi et al., 2010). Insufficient information-sharing incentives can lead to information manipulation and distortion (Wan & Sanders, 2017).

In addition, RFID technology is dependent on the transmitting power, which is influenced by legal regulations of different countries, e.g. different frequencies (Kwok et al., 2010).

4.3.2 Data sharing and monitoring limitations

Relinquishing control

Trust and confidence are important for both suppliers and customers (Choy et al., 2007). However, implementing information-intense concepts like VMI or CPFR can result in a lack of trust between trading partners (Thron et al., 2006).

Trading partners can be afraid of relinquishing control. They struggle to share sensitive information. For instance, OEMs sell products to competing retailers. Therefore, the retailers do not want to share sensitive information with the OEM (Thron et al., 2006).

Reluctance to provide data

Given the risk of losing business, there is a conflict between sharing sensitive data and value creation (Seethamraju, 2009). Therefore, trading partners are reluctant to communicate and exchange formal and informal information (Hammervoll & Bø, 2010). Consequently, data sharing needs to be consistent, otherwise, visibility undermines trust, which has a negative impact on relationship management and monitoring. Thus, it proves to be a major challenge (Gunasekaran & Ngai, 2004).

5. Discussion

The results underline that cost-benefit trade-offs hinder the implementation of new technologies and systems (Goebel & Günther, 2009). However, manual or semi-manual processes, such as barcode scanning, can lead to inefficiencies due to loss of information or duplicate data. Despite the existing opportunities for greater digitalisation, there are still activities where information is manually entered into systems instead of using automated solutions (Choy et al., 2007; Schenk & Clausen, 2020).

In addition, the transmission of information through legacy systems leads to inconsistent information sources. There is a trade-off between cost-intensive manual processes, the use of legacy systems, and the cost-intensive or time-consuming adoption of new technologies and systems.

However, encouraging and empowering employees to adopt technologies and systems proves to be a challenge. Practitioners should take time to train their employees and focus on adequate and comprehensive onboarding programmes to avoid a lack of understanding of technologies.

RFID technology appears very frequently in the articles analysed. Thus, there has been a strong interest in RFID in combination with SCV in recent years (cf. Chanchaichujit et al., 2020). This technology may have the potential to improve SCV, but it also has its drawbacks, e.g., cost-benefit trade-offs, different frequencies, and standards on a global level. RFID can be a suitable technology for real-time information visibility, but it has its technical and regulatory limits for implementation across a whole supply chain network. Thus, RFID may be appropriate for (finished) high-value products (cf. Goebel & Günther, 2009).

Even though RFID appears very frequently in the analysis, it is not the only solution. Practitioners should investigate which technologies are suitable for themselves, their suppliers, and customers to enable the integration of technologies and information systems for improved SCV.

Trust is a frequently mentioned aspect regarding challenges in the analysis. Trust is a challenge for SCV, especially for the customer- and supplier-related factors (Choy et al., 2007; Thron et al., 2006). In this context, there is a fear of relinquishing control between trading partners (Thron et al., 2006). The results show that trading partners have difficulties in communicating and sharing information. Trust can be an enabler and prerequisite of SCV, e.g., as a basis for information sharing. Both perspectives, trust as a challenge and trust as a prerequisite, should be equally considered for improving SCV. Thus, communication between trading partners should be improved. For instance, neutral enti-

ties that provide communication and data-sharing platforms between trading partners may support this.

Insufficient incentives for truthful data or information sharing can lead to complexities based on cultural or infrastructural differences across the supply chain and low supply chain integration. These can result in low levels of SCV. Moreover, policies related to traceability requirements can be more voluntary rather than mandatory, leading to low participation and, thus, less transparency. Practitioners and researchers should examine technical and regulatory limitations on a use-case basis to find detailed solutions for appropriate incentives to achieve greater visibility.

A lack of real-time information needed for early warning systems and decision-making capabilities can lead to decision-making based on individual experiences, resulting in disruptions in the flow of goods (Munoz & Clements, 2008; Schenk & Clausen, 2020). Thus, there is a lack of adoption of advanced decision-support capabilities (Ranky, 2007; Seethamraju, 2009).

Poor data quality can result from undefined and not regularly monitored metrics, leading to a lack of knowledge and negatively impacting performance measurement. However, accurate monitoring across multiple nodes in a supply chain network is very difficult to achieve due to the complexity of supply chain structures (Schenk & Clausen, 2020). Both practitioners and researchers should investigate existing metrics and look for appropriate metrics for performance measurement and decision-making. The changes that have taken place in recent years in terms of operational processes, technologies, big data, and external circumstances require appropriate metrics for regular monitoring of physical and information flows to enable better decision-making.

6. Conclusion

In this article, a literature review of existing articles on SCV was conducted. 26 articles from an initial sample of 121 articles were analysed through qualitative content analysis. The research question "which challenges inhibit SCV in distribution logistics?" can be answered with our above-mentioned aggregated dimensions "inappropriate processes & technologies and systems", "lack of communication & trust", and "insufficient monitoring & decision-making metrics". The following presents the theoretical contribution, managerial implications, limitations of this study, and further research areas.

The main findings show that trust between trading partners is both a prerequisite and a challenge for SCV. Better communication and more trust could be achieved through neutral entities. RFID technology can have great potential for SCV, but implementing it in a whole network is a challenge. Thus, RFID might be appropriate for (finished) high-value products. Which SCV technology is suitable for users and their suppliers and customers should be investigated on a use-case basis. Furthermore, despite the possibilities of digitalisation, manual processes will remain because of a trade-off between the costs of existing manual processes and the costs of implementing new technology. Focusing on appropriate training, onboarding and empowerment could be a way to gain employees' understanding and trust. Decision-making can be based on individual experiences. Metrics can be undefined or insufficiently monitored. However, accurate monitoring across an entire supply chain network can be challenging, e.g., due to the complexity of the supply chain and the limitations of supply chain integration. Technological and regulatory occurrences require improved incentives to enable SCV. In addition, metrics should be reconsidered and adapted to current requirements for monitoring to improve decision-making on performance measurement and SCV.

The results provide an overview of SCV challenges in distribution logistics. Kalaiarasan et al. (2022) provide a holistic SCV framework, which also suggests dimensions and sub-dimensions of challenges. Our findings complement this existing framework related to distribution logistics. Thus, the challenges of SCV in distribution logistics are synthesised and can serve as an overview and extension of the current literature on SCV. Our findings can be considered for further studies. For example, detailed solutions to overcome the challenges can be sought in the recommended fields of action. To complement our findings, further studies could expand the research scope by considering procurement, production, and reverse logistics. Another idea for further studies is that industry-specific challenges could be analysed and compared.

This study is limited in scope. In general, the selection of search terms already limits the articles found for the analysis at the beginning. A literature review

with other search terms may find other articles and thus different or additional results. Therefore, we ask for further studies to investigate if the results are also meaningful for other logistics phases. In addition, the analysis includes publications from the year 2004. Therefore, synthesised statements may be outdated in practice. Empirical research on our SCV challenges can lead to both further and current challenges and their solutions to address them. Moreover, RFID technology appears very frequently in the results of this study because it has received strong interest in the academic literature in recent years. Further studies should focus on other information technologies regarding the challenges of SCV.

New developments regarding technologies like 5G networks, connecting physical units like pallets, boxes, and parcels using telecommunication devices, camera-based vision systems at point-of-sale and in warehouses, avoiding manual scanning as well as information exchange, using blockchains or Artificial Intelligence (AI) and Big Data analytics all impact and drive SCV. However, further challenges may arise with the implementation, which should be thoroughly assessed.

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INCREASE SUPPLY CHAIN RESILIENCE BY APPLYING EARLY WARNING SIGNALS WITHIN BIG-DATA ANALYSIS

Abstract

Purpose: The current environment of globally interconnected supply chains, the dynamics of changes and potential threats significantly reduce the time for a possible response. At the same time, there is a growing demand for information necessary to mitigate the consequences. To minimise the damage and increase the resilience of supply chains, it is necessary to identify sources of threats promptly, the extent of possible damage and the possibility of preventing or minimising their impact. The aim of the paper is to structure supply chain threats and search for appropriate datasets for prevention.

Methodology: The paper analyses the state-of-the-art through a comprehensive literature review and demonstrates secondary data about how free-access business data can be used as Early Warning Signals to forecast supply chain disruptive events, with a particular focus on international maritime transportation.

Results: It was confirmed that companies can access many open datasets, and collecting and aggregating these data can improve their preparedness for future disruptive events. As the most important issue, the authors defined the selection of proper datasets and interpreting results with foresight.

Conclusions: Identifying and analysing the relevant Early Warning Signals by companies to prevent supply chain disruptions are essential for keeping their supply chains sustainable and their resilience on a sufficient level. It was proved that general business indicators (PMI delivery time, container capacity, inflation rate, etc.) can help to signal the increasing possibility of maritime traffic problems in ports and container unavailability as usual supply chain disruption types in recent years. Therefore, the companies in the supply chains need to find, collect and analyse the appropriate data, which are, in some cases, free and available. However, it is a substantial task for data analysts to identify the most relevant data and work out the analytical methodology which can be applied as Early Warning Systems (EWS).

Keywords: Supply chain resilience, big-data analytics, high-impact low probability events, early warning signals

1. Introduction

Resilience is vital for designing and managing viable value-creation networks (Ivanov, 2021). In the global market, supply chains compete with each other, and their extent and complexity are a major concern from optimisation, design, efficiency or resilience points of view, even on the level of indi-

vidual companies or the entire supply chain (Dujak, 2019). The ability of global supply chains to be resilient and flexible is indispensable since they face a wide range of threats, uncertainties, and sudden shifts in case the time and necessary resources for an adequate reaction are limited. Therefore, supply chains should be interpreted in a systems theory context. Supply chains today have to operate in a particularly turbulent environment. An important issue in such circumstances is the supply chain's ability to successfully maintain its operations while adapting to a dynamically changing environment.

The paper has the following structure: in the literature review part, the supply chain disruption approaches will be introduced, followed by the role of digital technologies in managing the supply chains, as well as big data analytics and how it can support supply chain management and what role early warning systems (EWS) can have in preventing disruptions. The following section will introduce the methodology. Since this is a theoretical paper, the framework we built is an example of using EWS to prevent disruptions in maritime transportation was identified as a key process in global supply chains. Finally, in the Conclusions, the findings and the relevance of the framework will be discussed as well as the limitations of the study.

2. Literature Review

To analyse the current state-of-the-art knowledge, professional publications from international databases of scientific publications, Web of Science (WoS) and Scopus were primarily used. At the same time, analyses of consulting companies and professional portals were reviewed. Open databases of the OECD and the World Bank were used as data sources.

2.1 Supply Chain Disruption Approaches

In the paper, the authors investigate how big data analytics can help supply chains become resilient to disruptive events. Many significant influencing factors affect the supply chain´s overall performance and long-term operational sustainability. A very appropriate categorisation of factors causing supply chain disruptions is found in Tang, Teo and Wei (Tang et al., 2008, pp. 206-208; Tulach & Foltin, 2020) and their three main categories:

- *Chain deviations:* a change in one or more control parameters, such as changes in costs, demand, or delivery times within the supply chain, without a change in the logistics chain's original structure;
- *Chain disruption:* a significant change in the supply chain structure due to the unavailability of some logistics nodes or their edges due to unexpected events caused by human or natural factors;
- *Disruption due to a disaster:* temporary irreversible closure of the supply network due to an unexpected, unforeseen disaster, which may cause total disruption of the functionality of logistics nodes and transport capabilities.

Threats might originate in various sources for supply chains. They can be irregular, catastrophic, or hybrid, emerging from hostile intentional or non-intentional activities, e.g., natural or disasters (Freier, 2008, p. vii). Supply chain disruption can be experienced inside or outside the supply chain (Narasimhan & Talluri, 2009). It can be intentional or unintentional (Foltin, 2011) and might concern supply chain flows like materials flow, information flow, knowledge flow, control and coordination flow (Neiger et al., 2009). Several research teams have also dealt with the consequences of catastrophic events (Knemaver et al., 2009) and the consequences of socioeconomic, political, man-made and natural disasters (Singh & Singh, 2019).

At the same time, the supply chains are exposed to disruptions, and usually, at some point, a warning about potential or upcoming problems is needed (Vries et al., 2021). The usual way of dealing with the need to predict potential disruptions of supply chains is to involve a group of experts to continuously evaluate changes in supply chains and the conditions of their operations (Jalowiec, 2020). The team of experts constantly monitors and evaluates these changes. In case of a threat of disruption or change in the chain's functionality, they give appropriate recommendations. The advantage of this approach is the high professional level of advice. However, their preparation is lengthy; it requires endless meetings and discussions with experts, so this method is also expensive.

The complexity of supply chains indicates that their management necessitates complex technological applications. Data about the material flows, data quality requirements and the need for information sharing between all logistics nodes become the ob-

ligatory requirement for value creation and supply chains' long-term operational sustainability. The decision-making process of planning and managing the supply chains/ networks also requires overall analytical support (Diop et al., 2021). Next to identifying risks threatening supply chains, managing such risks in global supply chains is also a hot topic. Its process is (1) identifying risk sources, (2) defining the circumstances under which such risks can occur, (3) estimating the potential consequences, and (4) providing possible routes to mitigating and handling these consequences (Tang et al., 2008, p. 210). Digitalisation might offer plenty of possibilities to support these activities.

The number of individual supply chain elements and their interconnections create a complex system which might also carry an inherent risk (Vlkovský, 2019). Therefore, it is substantial to identify the supply chain´s overall capabilities to define threats and sources of disruption, with the potential to improve resilience and long-term operational sustainability. Furthermore, the identification and recognition of unexpected events is a precondition for the possibility of managing the supply chain resiliently.

2.2 Role of Big Data in Supply Chain Management

Due to the overall complexity of the supply chains and the whole set of influencing interconnected factors, digitalisation can help to monitor the supply chain environment, create transparency and optimise processes (Ivanov et al., 2019; Bahrami & Shokouhyar, 2021; Modgil et al., 2021). These can contribute to a better understanding of the behaviour of individual entities within the supply chains.

Tseng et al. (2021) and Diófási-Kovács (2021) state that sustainable supply chain operations can be facilitated by the digital support of labour and manufacturing processes, diverse digital platforms, and extending digital communication. Core digital technologies like the Internet of Things (IoT) make the collection and exchange of large-scale data and the transmission of processing systems possible (Birkel & Hartmann, 2020). Additive technologies like 3D printing enable shorter lead times and manufacturing flexibility, increase product customisation, and reduce inventory (Ivanov et al., 2019). High levels of digital supply chain integration also can improve companies' financial performance and positively impact sustainability (Tseng et al., 2021; Negri et al., 2021). Digital technologies might impact supply chain risk management positively in numerous ways.

The next chapter focuses specifically on Big Data from among all digital technologies. Big Data is created in multiple organisational processes in high volume, with high velocity and in a wide variety, which exceeds the capabilities of traditional data processing systems (Wang et al., 2016). The most significant impact of digitalisation is the possibility to capture, share, and process it. Data on its own is not worth much, and systems are needed that can process it. It will be explored how Big Data Analytics, as an important feature of digitalisation, can support the maintenance of supply chain security. The paper aims to present and propose the construction of a system to anticipate unexpected adverse events and thereby improve the resilience of supply chains.

2.3 Role of Big Data and Early Warning Systems in Preventing Supply Chain Disruptions

There are many forms of digital technologies in the supply chain that can help increase communication, collaboration, and the efficiency of information sharing. The widespread use of platforms raises agility, reliability, and efficiency while managing risks (Tseng et al., 2021). Big Data Analytics includes technologies, skills, and practices to structure and process data and provide helpful information for decision-makers.

Identifying risks threatening the supply chain is crucial when estimating the likelihood of disruptive events and possible consequences (Rehak, 2016). The management also has to assess the consequences, their magnitude, nature, complexity, and connectivity; all have to be studied in preparation for the possible occurrence. The volatility and time-related factors of threats should also be considered, as well as the effectiveness of the existing control mechanisms.

The paper focuses on how Big Data Analytics (BDA) can support these processes, what kind of data and from what sources should be collected and processed as Early Warning Signals to gain helpful information in preventing risks and helping supply chains to become resilient.

2.4 Use of Early Warning Systems

Scholars have already started to deal with how to use early warning systems in the supply chain. There are several case studies in the food industry on how EWS can help to predict quantity and quality problems (Li et al., 2010; Beulens et al., 2006) and identify the extent of risks (Xu et al., 2010). EWS can also be helpful in the fashion industry in predicting

a range of risks – information, demand, supply, and environmental (Sumei, 2010) – and is also used in preventing customer loss (Lo & Hong, 2012). Customer churn detection is crucial in the banking and insurance sectors (Er Kara et al., 2018). Genc et al. (2014) studied an EWS to assess risks threatening production control, and Jahns et al. (2006) consider it a suitable tool for anticipating unexpected events in supply management.

Although examples can be found in the literature for EWS application for specific problems in the supply chain, the supply chain-level prediction and systematic analysis of disruptive events are not addressed yet. This study aims to fill this gap and provide a framework for using free access data as Early Warning Signals to prevent disruptive events in the maritime transportation process of global supply chains.

2.5 Role of EWS in Preventing Supply Chain Disruptions

Developing the analytical capabilities of supply chains and placing a strong emphasis on ensuring that they have the knowledge and decision-making capacity to deal with difficult situations allow them to operate resiliently (Modgil et al., 2021). However, the availability of large amounts of data tends to make the decision-makers' job difficult nowadays. Therefore, there is a strong need for building BDA systems capable of filtering, structuring, and analysing data in large volumes, variety, and from various sources (Demeter et al., 2021). Wamba et al. (2017) indicated that infrastructure, management skills, and staff expertise are needed to use BDA to the correct standard.

According to the limited case studies, Ford (Simchi-Levi et al., 2014) and IBM (Lu et al., 2015) use various quantitative modelling approaches to predict disruptive events threatening their supply chains. However, unexpected events significantly impact supply chain functionality – such as an earthquake or terrorist act – but are impossible to build accurate forecasting systems (Fattahi & Govindan, 2020). BDA can support the resilience of supply chains in numerous ways. According to Papadopoulos et al. (2017), big data has great potential for finding appropriate recovery strategies and for supply network management. Bahrami and Shokouhyar (2021) consider the most outstanding achievement of BDA the fact that it provides a deep insight into understanding the changes of the business and market environment, which allows companies to prepare for disruptions.

After reviewing the literature, it was found that although there are isolated examples of Big Data used in Early Warning Systems (EWS) in the supply chain, their prevalence and theoretical development are far from complete.

3. Research Aims and Methodology

The possible supply chain disruptions represent threats to the overall capabilities of the long-term sustainability of business continuity. As seen from the literature review, the range of threats to supply chains is very wide and it is not possible to address them in the same way. To this end, the analysis is narrowed down to the transportation process, a critical supply chain process that spans the entire supply chain from upstream to downstream. At the same time, the time horizon is crucial. The shorter the time horizon, the more accurate the possibility of prediction can be. On the contrary, in a longer time horizon, the probability of predicting potential threats and disruption of distribution chains is significantly lower.

In the era of global supply chains, transportation is particularly important, with maritime transport being the main performer of the flow of goods between global regions. Consequently, the success of this process is a key determinant of supply chain performance. It is therefore addressed in detail in this paper.

The study will focus on the type of intentional disruptions that poses a particular threat to the international maritime flow of goods and will further examine what data sets are available to predict the likely impacts when this type of contingency occurs and what indicators can be used to infer the extent of the impacts when operating the supply chain.

3.1 Research Goal

Based on the identified research gap, the primary effort was focused on identifying the suitable data sources and their interconnections, as well as the available BDA applications and their potential use as advanced prediction tools for possible supply chain disruptions. The focal question is *how supply chains can prepare for unexpected adverse events and take advantage of the opportunities offered by digitalisation to anticipate events that threaten them.*

The study approaches the subject primarily from a theoretical point of view, and an EWS will be proposed for supply chain disruptions. The research questions are the following: in case of a specific risk

type – e.g., intentional but non-sudden threats – what kind of (big) data is needed, and what kind of free access data is available for use as an EWS to predict the possible occurrence of a supply chain disruption in the global maritime transportation process. The goals of the presented research are:

1) How can big data be used to predict disruption in the transportation process of supply chains?
2) How can it be used to anticipate events and support preparedness?

3.2 Data

When we started to analyse the research question, we faced the problem that even though there are many information sources, there is a lack of structured data which can be used to predict potential supply chain disruptions and be used as an Early Warning Signal for early identification of these threats. The lack of suitable data led the authors to the need to identify the main factors influencing the core tasks of supply chain management and the key aspects and factors influencing the performance of core supply chain processes.

A substantial question is how we can measure the performance of the supply chain processes, taking into account the uncertainty in their conditions and environment, and how to identify the possible sources of changes in advance (through the Early Warning Signals) to be able to identify the sources of potential disruptions and their probability.

Similar to critical success factors (Parmenter, 2015) and the proposed Key Result Indicators (KRIs), Result Indicators (RIs), Performance Indicators (PIs), and Key Performance Indicators (KPIs), the overall performance and effectivity of supply chain management can be assessed, based on previous results (past), results in real or almost-real time (present), with the possibility to forecast the future.

To find appropriate data sources to forecast disruptive events for maritime transportation in global supply chains, the authors overviewed the biggest economic shocks of the last decades having huge effects on supply chain operations, such as the recession in 2001-2002, the financial crisis in 2009, the Hanjin Shg bankruptcy in 2016, and the Covid-19 pandemic (Table 1). Based on the identified big shocks, keywords were defined that can describe that specific shock. These search words were applied in a bibliometric analysis in the Web of Science (WoS) and Scopus databases to catch their effects on supply chains. All in all, the keywords of the big economic downturns of past decades and their supply chain effects serve as the basis to define the appropriate Early Warning Signals for future intentional but non-sudden supply chain disruptions.

3.3 Methodological Approach

Since this study is theoretical, the methodology is a proposal for constructing an EWS framework. As discussed earlier, a large amount of data is available, much of which is freely available. However, deciding which data to select and from which source to predict a disruptive event is not always easy.

The authors have identified a research gap through the literature review and, by using publicly available data as an example, developed an analytical framework for predicting a specific supply chain disruptive event which currently poses the greatest threat to maritime freight transport, namely port congestion and container shortages. To this end, an example is presented of how and what data should be collected and what signs indicate that the emergency mentioned above is about to occur. For this purpose, past data from previous crises and the patterns observed in those crises are examined.

3.4 Research Limitations

The presented research primarily focuses on the theoretical background and system analysis. Due to the lack of appropriate data, the individual research steps come from the mind-maps experiments. This approach could be mainly subjective, with the general effort of objectification. This objectification could be considered a certain limitation of the research results.

The presented research is mainly theoretically focused on identifying possible interconnections between data availability, BDA, and EWS. At the same time, due to the lack of Big Data, there are certain research limitations because of using the theoretical mind-maps experiments, which from their purpose, bring subjective considerations, which were objectified in discussion with experts. For this reason, this objectification of the mind-maps experiments could be considered the main limitation of research results, but it also brings new possible points of view.

The research is focused on intentional threats that can be at least partially predicted. In the case of natural disasters, the possibility of predictability is very limited in terms of the time and place where

they will happen and the extent of the impacts and affected actors. For this reason, the research is focused only on intentional sources of potential disruption of supply chains (Srinivasa, 2022).

4. Analysis and Results

Supply chain risk management has several inevitable steps. Its process is (1) identifying risk sources, (2) defining the circumstances under which such risks can occur, (3) estimating the potential consequences, and (4) providing possible routes to mitigating and handling these consequences (Tang et al., 2008, p. 210).

Signs or metrics are needed to measure the supply chains' performance to notice deviations from the normal supply chain operations. Planning and controlling the supply chain effectivity is usually possible through previously defined KPIs. Within the preliminary analytical part of the planning process, keywords can be sources of possible indices such as Early Warning Signs. From a macro point of view, it is hard to narrow managerial decision-making to only a few indicators or KPIs regarding the supply chain. For this reason, it is necessary to look at its main parts when optimising these and identify suitable analytical approaches next to the supply chain's system approach. The selected illustrative area in this paper is transportation. In this process of supply chains, it is possible to identify visible metrics for monitoring resilience and early warning signs by using BDA. The parameters for the transportation process of the supply chain are based on cross-sectorial and sectoral criteria. For this reason, the analytical framework covers the following:

(1) basic transport parameters, i.e., intensity, density, and permeability,

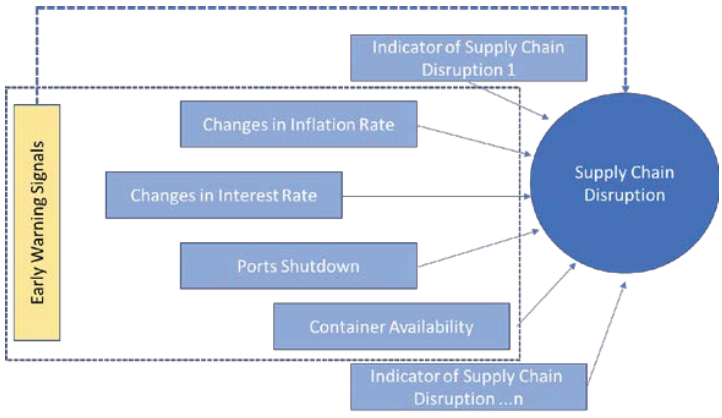
(2) parameters of the physical infrastructure (i.e., parts of tunnels, bridges, bridging, the height of bridges...), and especially the difficulty of possible restoration (costs and duration of restoration to the original parameters), the costs of detouring the designated object or the cultural and historical uniqueness of the object,

(3) transport services, which can be person or freight. In the case of one-person transport, the service is the transport of one person over a distance of km and is calculated as the product of the transport performance (i.e., the distance travelled by the given means of transport) and the number of transported persons [pkm]; for freight transport, transport performance represents the transport of one ton of goods per km,

(4) transport structure indicators, especially throughput and intensity.

Based on the parameters mentioned above, it is advisable, as a next step, to identify suitable examples of information sources that can be used as EWS for preservation or increasing the resilience of supply chains (Figure 1). Due to a large number of information sources, it is necessary to use the Big Data approach to find and compile a suitable data source and subsequently identify search algorithms and keywords.

Figure 1 Logic of the research process: Finding the right Early Warning Signals

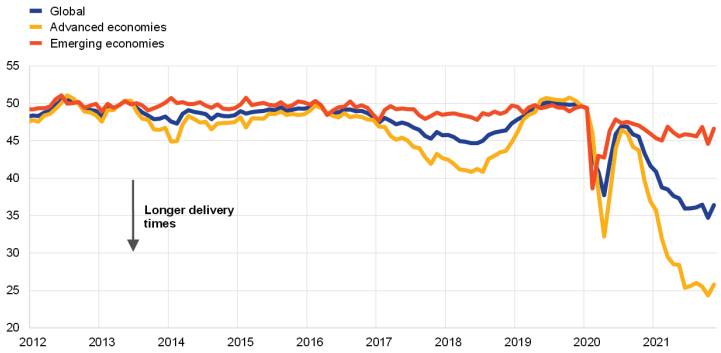


Source: Authors

4.1 Possible Identification of Supply Chain Disruption Proxies

One of the indicators most commonly used as a proxy for such strains is the global Purchasing Managers Index suppliers' delivery times (from now on referred to as the "PMI SDT"), which quantifies developments in the time required for the delivery of inputs to firms. A key advantage of the PMI SDT is that it can capture capacity constraints of a different nature (e.g. intermediate goods shortages, transportation delays or labour supply shortages) (Figure 2), making it an all-encompassing indicator of strains in global production networks (Attinasi et al., 2021).

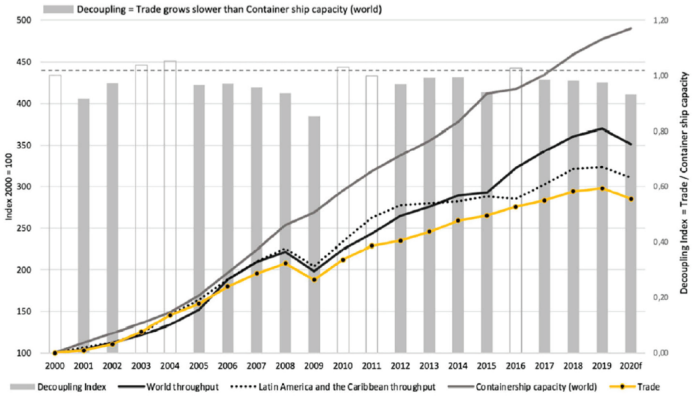
Figure 2 Suppliers' delivery times a) PMI SDT across regions (diffusion indices)



Source: Attinasi et al. (2021)

Key indicators in the transportation sector could be ship capacities and container availability. At the same time, shortages in ship and container capacity result from port congestion tying up the supply of ships, meaning that more ships are required to serve the same amount of demand (World Bank, 2021). Indeed, the presence of ships waiting to berth at ports suggests that the quantity of ships is not a binding constraint. Similarly, many experts, such as Drewry's John Fossey, note that overall container supply remains adequate to serve existing demand. Still, there is a mismatch between where containers are needed and where they are, and port congestion makes reallocation more difficult (Miller, 2021). The evolution of the trade and container ship availabilities is presented in Figure 3.

Figure 3 Maritime shipping capacity has generally grown faster than volumes

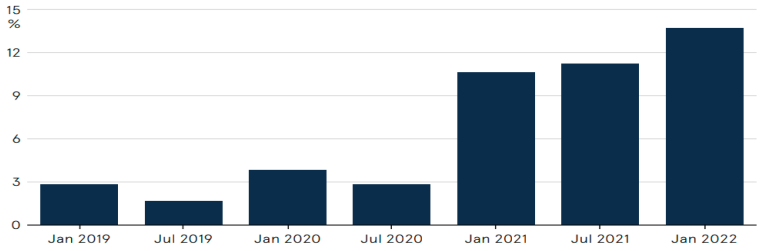


Source: World Bank (2021)

Maritime transport is a key indicator of changes in international trade. Changes in the availability of shipping capacity indicate subsequent changes. Figure 3 shows the effects of significant security changes, e.g. in

connection with the increase in security measures due to the terrorist attacks on 11 September 2001, with their gradual onset in 2002. These years, international trade grew more slowly than the availability of free container capacities by ship. It was similar between 2005 and 2009 due to the global economic crisis. Military operations in the Persian Gulf and Afghanistan also occurred during this period. It was similar from 2012 to 2015 and grew from 2017 to 2019. The end of 2019 is the beginning of the Covid-19 pandemic, which is also visible on the international trade level and overall transportation capabilities. The important effect was the limited throughput of the international ports due to anti-Covid-19 restrictions. An example of container capacity lost due to port congestions and vessel delays is presented in Fig. 4.

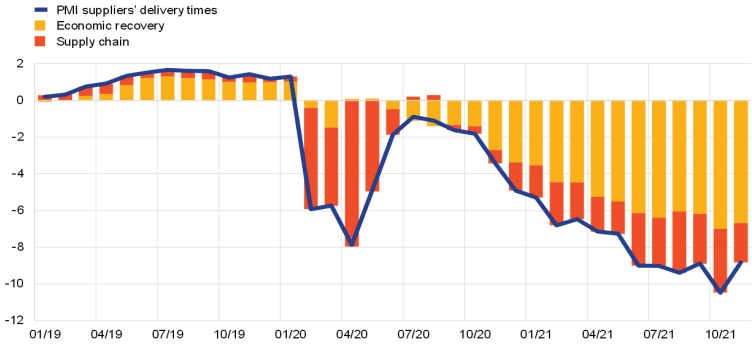
Figure 4 Share of the Global Container Fleet Capacity Lost due to Port Congestions and Vessel Delays [in %]



Source: Weinberg (2022)

However, the significant changes in available capacities can be challenging to predict in the longer term. So there remains the possibility of critical factor predictions focused on changes in trends in the availability of transport capacities and transport infrastructure. From a predictive point of view, the PMI, an indicator of the prevailing direction of economic trends in the manufacturing and service sectors, can be considered more appropriate. It consists of a diffusion index that summarises whether market conditions are increasing, staying at the same level, or decreasing from the perspective of purchasing managers. The PMI index provides information on current and future business conditions (Krúpa, 2022). The decomposition of PMI suppliers' delivery times is highlighted in Figure 5.

Figure 5 A model decomposition of PMI suppliers' delivery times (deviations from the mean; percentage point contributions)



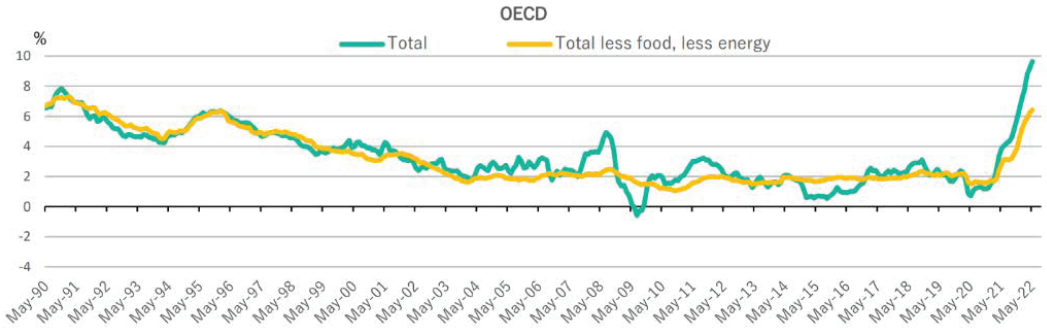
Source: World Bank (2021)

Supply chain disruptions have a negative impact on global industrial production and trade and a positive impact on inflation. Figure 5 also shows the interconnectedness of supply chain capabilities and the potential for economic recovery. There is also a visible interconnection and a possible explanation of the main shocks and consequences for supply chain performance.

4.2 Identification of the disruptions

As a potential metric for identifying possible disruptions, the inflation trend (see Figure 6) and the inactive containership capacity (see Figure 7) were selected. According to the annual data, the bottoms and peaks follow inflation. Significant threats or disruptions happened in periods of inflation peaks, e.g., in 1996, 2000, 2005 and 2006, 2007 (end of the year), 2011, and 2018 – and there were bottoms in inflation in 2009 and from 2014 to 2015. These inflation trends (Figure 6) present the interconnection with container capacity availability and offers a possible explanation of the main shocks and consequences for supply chain performance.

Figure 6 Inflation since the 1990s: All items and all items excluding food and energy OECD (CPI), year-on-year inflation rate

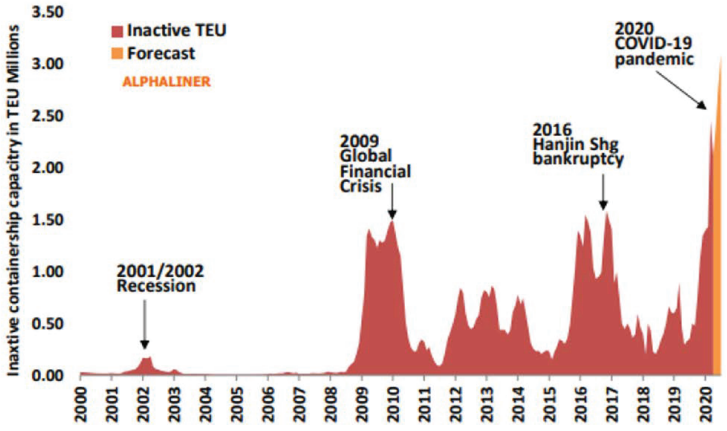


Source: OECD (2022)

4.3 Approach Verification through Data Sets

The World Bank Analysis offers good examples of the sources of possible supply chain disruptions. However, it is necessary to identify suitable keywords, or sets of keywords, which could be helpful when searching database sources for disruption forecasting. In the currently proposed theoretical framework, the applied keywords were selected based on the frequency of keywords in the articles in the WoS/Scopus databases. In searching words sequence, the four threats were used, mentioned in Figure 7, and "supply chain" was added as the fifth keyword.

Figure 7 Inactive containership capacity (2000-2020(F))



Source: World Bank (2021)

As the first example, the keywords "recession" and "supply chain" were analysed, sorting articles by frequency of citations. The most quoted articles found with this method also list the keywords "financial risk" and "world economy". It is possible to use more keywords, but only the first two were selected for research purposes. For the second search, "supply chain" and "global financial crisis" were used, and for the third, "supply chain" and" bankruptcy". Finally, "supply chain" and "Covid-19" were used for the fourth search.

Table 1 Examples of BDA keywords and data sources

threat	period	possible additional keywords	possible source of data	reasoning
economic recession	2001/2002	- financial risk - world economy	- The World Bank – Economy[1]	- set of economic indicators
global financial crisis	2009	- supply chain resilience - supply chain vulnerability	- FM Global Resilience Index[2]	- 15 key drivers of resilience
Hanjin Shg bankruptcy	2016	- international business - risk management	- World Bank – Statistical Performance Indicators (SPI)[3]	- assessment of global performance
Covid-19	2020	- transportation services - exports of goods and services	- World Bank – Transport Services[4]	- level of transportation capabilities

Notes:

[1)] The World Bank – Economy, set of indicators (https://datatopics.worldbank.org/world-development-indicators/themes/economy.html)

[2)] FM Global Resilience Index – set of indicators (https://www.fmglobal.com/research-and-resources/tools-and-resources/resilienceindex/explore-the-data/?)

[3)] The World Bank – Statistical Performance Indicators (SPI) (https://www.worldbank.org/en/programs/statistical-performance-indicators)

[4)] The World Bank – Transportation (https://data.worldbank.org/indicator/BX.GSR.TRAN.ZS)

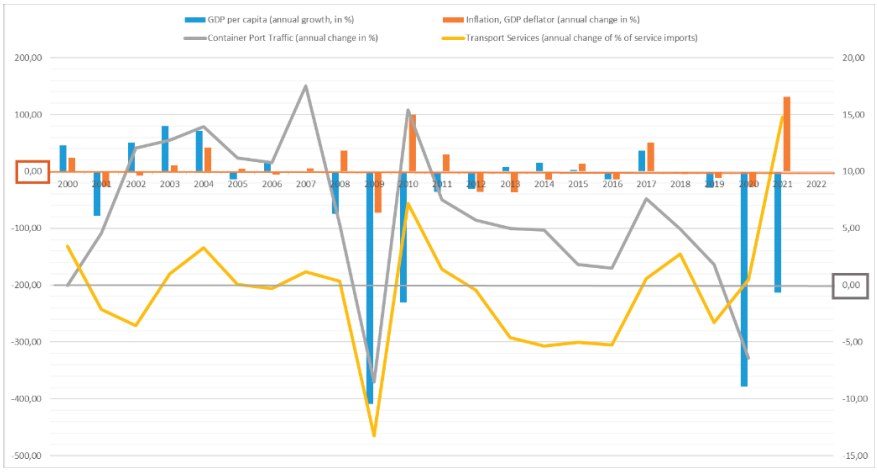
Source: Authors

From all identified sources, the economic indicators were found as the most important EWSs of the intentional but non-sudden threats endangering the supply chain with disruptions, which have predictable potential. Due to the nature of possible disruption to the supply chain functionality, uncertainty in the chain can manifest in three basic forms: internal chain deviations, chain disruptions, and disruptions due to a disaster (Tang et al., 2008, p. 206). The following selected macroeconomic and supply chains indicators were selected as EWS (World Bank, 2022):

- GDP per capita growth (annual %), as an indicator of the annual percentage growth rate of GDP per capita based on constant local currency;
- Inflation, GDP deflator (annual %), as an indicator measured by the annual growth rate of the GDP implicit deflator, which shows the rate of price change in the economy as a whole; GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency;
- Container Port Traffic (TEU: 20-feet equivalent units), as an indicator of measures the flow of containers from land to sea transport modes, and vice versa, in twenty-foot equivalent units (TEUs), a standard-size container;
- Transport Services (% of service imports), as an indicator of transport services performed by the residents of an economy for those of another, involving the carriage of passengers, the movement of goods (freight), rental of carriers with crew, and related support and auxiliary services.

The trendiness and interconnection of world economic and supply chain indicators are shown in Figure 8. The individual indicators were adjusted to a year-on-year percentage change to monitor correlating trends. This adjustment makes it possible to capture the change in trend and compare it with the changing trends of other indicators. To capture changes in trends in the selected variables, two basic levels (value 0) were set in the graph: on the left axis of the chart for column variables, i.e. world GDP per capita and world inflation (as a GDP deflator). In the right axis of the graph, the basic level (value 0) is set for the global indicators like Container Port Traffic and Transport Services. By interlacing the data in one chart, it is subsequently possible to identify the interconnectedness of the trends of annual changes.

Figure 8 World macroeconomic and supply chain indicators – annual change [%], years 2000-2021



Source: Modified from World Bank Data (2022)

Following the identified critical events disrupting the availability of container capacities (Figure 7) and connecting them with the selected indicators suitable for BDA (Table 1), in Figure 8 it is possible to identify predictive potential and make the following statements on the global level:

- In 2001-2002, when there was an economic recession, the economy's performance expressed in GDP per capita was the lowest in 2001, and in the following year, there was positive growth again. An increase in Container Port Traffic accompanied this change. In these two years, however, there was still a year-on-year decline in Transport Services, which began to increase again only in the middle of 2002 and reached its peak only in 2004. Also, Inflation (GDP deflator) reacted with a delay in the year-on-year comparison and gradually began to increase only from 2003.
- The global financial crisis in 2009 caused a significant decline in the economy's performance, expressed in the year-on-year change in GDP per capita. However, the year-on-year change in Inflation was not that significant, again with a delay of approximately one year, as was the case with the economic recession in 2001-2002. In the case of Transport Services, there was a significant year-on-year drop in the services provided, which was also matched by the drop in Container Port Traffic. For both indicators, however, there was a significant increase in the year-on-year comparison and the year-on-year trend. Container Port Traffic is pointed to as the pro-growth indicator of changes in economic performance.
- In the case of Hanjin Shg bankruptcy, a slight drop in economic performance and a correlating drop in inflation can be identified. Conversely, in the area of supply chain efficiency, there was a significant increase in the year-on-year trend change for Container Port Traffic and Transport Services.

- Regarding the effects of the Covid-19 pandemic, there was a fundamental drop in economic performance during 2020. This drop deepened even further in 2021, also reflected in a significant year-on-year change in inflation. In the case of Container Port Traffic, there was a year-on-year drop, but the level of Transport Services reached its 20-year high.

According to the above findings, authors identified a predictive potential based on BDA and EWS keywords:

- The events of the economic recession in 2001-2002 resulted in the possibility of predicting the development of GDP per capita and partially also Inflation according to the change in the Container Port Traffic trend.
- In the case of the global financial crisis in 2009, it is possible to identify a significant change in the Container Port Traffic trend already in 2008, i.e. before the financial crisis reached its maximum. The year-on-year change in trend is also visible on the Transport Services indicator, which reached an almost doubled level when economic growth resumed, representing a significant increase in the capacities of the global supply chain.
- The global effects of Hanjin Shg bankruptcy on the global economic performance and inflation indicators cannot be confirmed due to the chosen macro view on the sustainability of supply chains.
- Regarding the effects of the Covid-19 pandemic, it was possible to identify the year-on-year changes in Transport Services as a suitable indicator predicting changes in economic performance, which, assuming ceteris paribus, would occur in the second half of 2022.

5. Conclusions

It is hard to predict the disruptive effects of High Impact Low Probability (HILP) events on the supply chains because of the unpredictability of these events. Similarly, it is hard to predict big natural disasters since these threats are accidental. Only several high-frequency natural disruptions, e.g., annual floods, can be predicted, but forecasting events like flash floods is impossible.

The importance of the time horizon for the prediction of potential disruptions is highlighted in this paper. Based on the relevant information, it is possible to predict short time disruptions and their possible consequences. In long-term prediction, the probability is significantly decreasing with time.

For the maritime transportation process in the global supply chain, the expected performance can be measured by several KPIs. If there is any significant deviation in these KPIs when an intentional and non-sudden event occurs in the environment or the market the supply chain operates in, Early Warning Signals can be observed; thus, the disruption and its effects can be predicted. To carry this out, supply chains and companies must define and continuously measure transportation KPIs throughout the chain and use BDA systems that assess economic data – suggested as examples in Table 1 – that can forecast specific types of economic downturns threatening the supply chain.

We proved that general business indicators (PMI delivery time, container capacity, inflation rate, etc.) can indicate the increasing possibility of maritime traffic problems in ports and container unavailability as usual supply chain disruption type of recent years. The companies in the supply chains need to find, collect and analyse the appropriate data, which are, in some cases, free and available. However, it is a substantial task of data analysts to identify the most relevant data and work out the analytical methodology which can be applied as Early Warning Systems (EWS).

As a part of the research carried out, it was confirmed that through identified EWS, it is possible to predict some changes in transportation capabilities and infrastructures. These indicators and indices will need further testing in real applications, using real data development and then checking the probabilities of successful predictions. It is necessary to verify further the interconnectedness of the identified trends of the selected indicators on a longer time series and specific events. Further research will therefore aim to confirm this connection between indicators and events on national level. The trends and early warning signals should also be tested on the country level to identify direct links to specific events and national-level indicators to call the attention of country/ies to the threats they need to deal with.

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A REVIEW OF PROSUMERS' BEHAVIOURS IN SMART GRIDS AND THE IMPORTANCE OF SMART GRID MANAGEMENT

Abstract

Purpose: The concept of the smart grid is relatively new. The first aim of the study is to understand the behaviour of prosumers in smart grids. The other goal is to raise awareness of the management tasks and risks of smart grids by highlighting the relevant issues of some business networks (PPP projects, outsourcing, strategic alliances etc.).

Methodology: Systemized literature review was used in the paper.

Results: The discussed management problems of various business networks indicate that management challenges can also be expected in smart grids, so it is worth preparing in time.

Conclusion: We found a lack of empirical research about the behaviour of prosumers and believe that studying the electric power grid of the future from a management perspective, that is, examining the possible behaviours and decisions of various actors, can provide valuable and useful information for smart grid design and safe operation insurance.

Keywords: Smart grid management, systemised literature review, business networks

1. Introduction

The classical electric supply chain was first established over a century ago, and since it has been growing in size and capacity (Wulf, 2000). The limited one-way interaction makes it difficult for the grid to respond to the ever-changing and rising energy demands of the 21st century. The term Smart Grid (SG) was first referenced by Amin and Wollenberg (2005). Smart grids are automated, widely distributed power supply networks characterised by two-way electricity flow and information that can track and respond to everything from power plants to customer preferences to individual devices (Planko et al., 2017).

Our focus is on the behaviour and cooperation of the various actors of the smart grids, so we looked at how the actors work together in some widespread business networks and business models. The parties involved must work together during outsourcing to achieve the planned benefits. In the case of a strategic alliance, legally separate companies cooperate for a complex goal, during which there is significant interdependence. Not only companies participate in PPP projects, but also actors from the state and the public sector.

To better understand the actors of smart grids and the possible behavioural risks, we formulated the following research questions:

- What behaviour problems of prosumers were found in smart grids according to relevant literature?

- What management problems appeared in the examined business models and networks?

To answer our questions, we write a critical literature review and finally identify some actual research goals and recommendations.

2. Systemized literature review on prosumers in smart grids

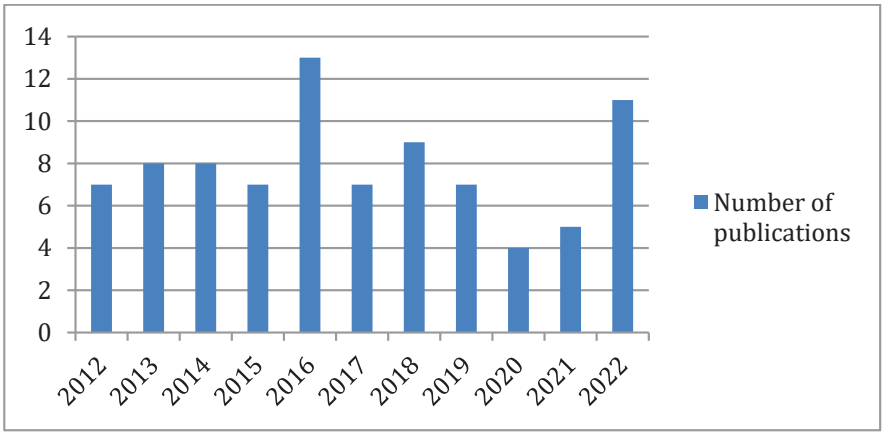
In a traditional electrical supply chain, the flow of both electricity and information is essentially one-way, starting from the power plant and moving toward the end user. In smart grids, it is all a two-way process; in addition, communication takes place through a parallel and complex network of contacts due to the increased role of the participant. In smart grids, not only conventional power plants will be involved in electricity generation, but also renewable power plants. Electric vehicle owners (business and private) will also have an active role in electricity generation through the V2G (vehicle-to-grid) process, which recharges electricity from the electric vehicle to the grid (Hannan et al., 2017). In the age of smart grids, the importance of international electricity transactions is expected to increase. Electricity production is not only done by traditional power plants but also by the renewable power plants of (organisational or private) consumers; therefore, these end consumers are also producers, i.e. prosumers (combining the words producer and consumer) (Yanine et al., 2021). An important difference is that production and consumption are separated in the traditional system but not in smart networks, so these activities must be optimised.

We planned to get a more objective picture of the relevant literature situation by using the method of systematic literature review. A systematic literature review is transparent, made with scientific methodology, and high-level comprehensive studies collected and analysed in relation to a given problem and all existing research results (Davis et al., 2014).

We chose the Google Scholar database because of its extensive coverage. Since the smart grid is a relatively new concept, and we were also interested in the management side, possibly empirical research, we chose the last ten years as the period of the study, i.e. the years 2012-2022. For the sake of a focused search, we did not search for keywords in the text, but in the title, since the terms 'management' or 'project' can easily appear in a text without the publication specifically talking about it. In the examined period, the terms 'smart grid', 'management' and 'project' appeared in 12 publications. The search for 'European smart grid management' gave six results.

Then we tried other keywords. The special actors of smart grids are the prosumers, and we are interested in their behaviour, more precisely, how it appears in research. That is why we used the words 'smart grid prosumer behaviour', for which we found 126 hits. We worked with these 126 results. We reviewed them all and – where possible – copied the abstract. Some publications did not have an abstract or a similar text (e.g. ppt in pdf format); therefore, the scope of the study was narrowed down to 86 publications. The year of publication is shown in Figure 1. The last ten years examined do not show a steady increase, but there was a slight jump in 2016 and 2022. A more extended period could more accurately portray the increase in the importance of the topic.

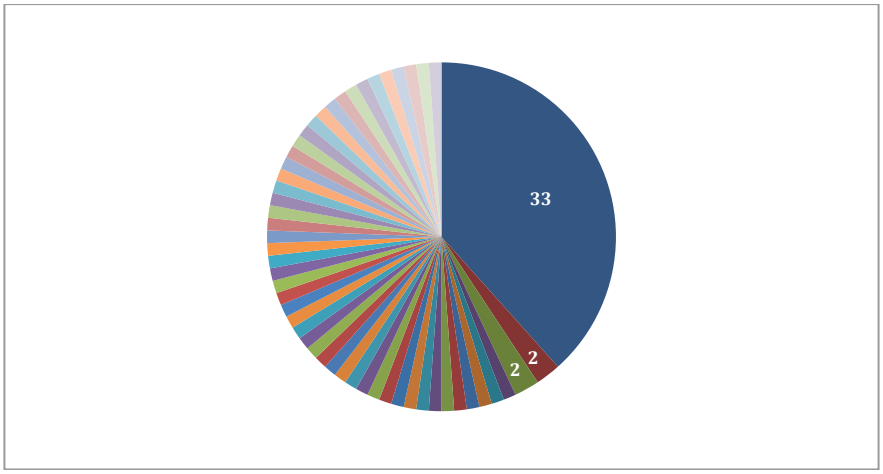
Figure 1 Number of publications on 'smart grid prosumer behaviour'



Source: Author

Figure 2 provides information on the source of the 86 publications. 33 articles are in the IEEE database, two publications are in the journal Energies, and two publications are from the Delft University of Technology library. All other sources provide 1-1 publication.

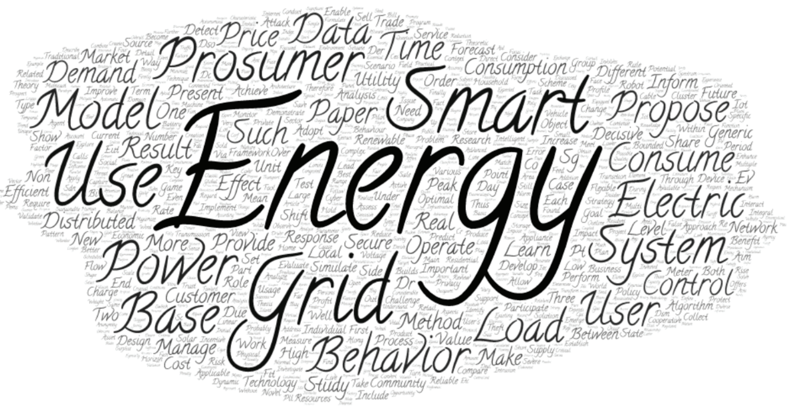
Figure 2 Reviewed publications by source



Source: Author

The word cloud in Figure 3 was created from the abstracts of the 86 publications examined. The search keywords in the title were 'smart grid prosumer behaviour', but the most dominant term is energy. Yes, the smart grid is the electrical network of the near future. However, most of the articles are theoretical and propose 1-1 models based on simulations and other calculations, which is why the word model appears larger too. Other important words in Figure 3 are "price, data, time, purpose, system, and control", indicating the direction of the papers. Papers dealing with the management side of the smart grid often take methods from game theory or artificial intelligence (fuzzy systems, machine learning etc.) showing various simulations. Furthermore, this topic appears in connection with the Internet of Things (IoT) or V2G/G2V issues. About ten of the 86 publications examined deal with the empirical research of prosumers.

Figure 3 Keywords of the 86 publications examined



Source: Author

Concerning our research questions, we found some empirical findings about prosumers' behaviour in the 86 reviewed publications. Rathnayaka et al. (2013) surveyed 500 prosumers and suggested an iterative evaluation process to proactively monitor the quality of service delivered by registered prosumers. Li (2016) noted that the smart grid concept was not well understood by ordinary people, and he recommended education programmes and information campaigns based on his empirical research on 517 citizens. He found that citizens' attitudes and intentions to participate in smart grid applications were the most influential factor of individual electricity-saving behaviour. Two publications applied the Prospect Theory (PT) (Rahi et al., 2016; Rajabpour et al., 2021). Rajabpour et al. (2021) found that the behaviour of prosumers is better described by the PT model than by the Expected utility theory, and that the time horizon of the observation must be well chosen, as it also influences the behaviour of prosumers.

Besides the chosen 86 publications, Saad et al. (2016) propose a probability model that can handle the uncertainties of decision-making in the smart grid, and they lack actual data on the behaviour of end consumers, using a large-scale, empirical survey. Skjølsvold and co-authors (2021) found that in 25 of the 30 Norwegian smart projects examined, there was no societal scientific impact assessment. Geelen et al. (2013, p. 160) also state that "Past research on energy-related behaviour suggests that behavioural aspects and social context for residential end-users as co-providers have to be taken into account".

3. A short literature review of some business networks

In this section, we highlight the difficulties of co-operation between members of different business networks. We think this topic is relevant because the management difficulties of discussed business networks and their solutions can serve as a lesson in the management of smart grids.

Outsourcing is hiring one or more of a company's activities outside the organisation. The 2021 Global Shared Services and Outsourcing Survey Report (Deloitte, found the following purposes of outsourcing: finance (44 %), information technology (54%), payroll (32%), customer service or contact centre (22%) and human resources (17%). After several decades, the organisations involved have more or less learned to manage and pre-negotiate many important details of outsourcing, where two legally separate companies work together as closely (in the outsourced field/activity) as if they were one. Based on their empirical research, Wibisono et al. (2018) see the building of mutual trust and the management of business partners from different backgrounds as key to a successful outsourcing process.

To put it simpler, if outsourcing is considered successful by the parties, there is a good chance they will enter into a strategic alliance. It is a mutually beneficial cooperation between two or more organisations in which the organisational, legal and strategic independence of the parties is maintained. Possible goals are to gain benefits from differences in size, further development of technological or

management knowledge or acquisition of new ones, and gain new markets (Pangarkar et al., 2017). The number of such cooperations is increasing while involved companies can decrease business uncertainties (Hoffmann et al., 2001), improve their competitive advantages (Townsend, 2003), encourage organisational learning (Hulbert et al., 2012), and contribute to the general growth of firms (Powell et al., 1996). According to scholars, the potential limit of strategic alliance can be handling interdependence (Hannah, 2016) and cultural diversity (Elia et al., 2019). The success of a strategic alliance requires trust from parties (e.g. Wong et al., 2017), depends mainly on how companies can cooperate (Rosenkopf & Almeida, 2003) and how they can integrate and systematically use different knowledge (Subramanian et al., 2018).

PPP (Public Private Partnership) is a form of cooperation in which the state involves the private sector in the project. Typically, the private sector is responsible for designing, operating and financing these activities. It is most common in developing infrastructure for roads, bridges, tunnels, railway lines, public utility investments, sports facilities, health investments etc. (Grimsey & Lewis, 2002). This form of cooperation began about 40 years ago (Bovaird, 2004), and its success is perhaps due to the fact that it combines the different skills and approaches of the private and public sectors well. With the help of the private sector, resource utilisation seems more efficient, with lower costs and higher innovation (Schemm & Legner, 2008). However, different control and management mechanisms provide a number of conflicts during PPP collaborations, such as constant struggle over risks associated with partners (Majchrzak et al., 2015), management of driving difficulties (Bamford et al., 2003), different solutions for control (Wilkinson et al., 2013), constant disagreement on formal and informal control and management mechanisms (Ansari et al., 2014). Moreover, Uiterwijk et al. (2013) argue that inadequate risk management can undermine the success of PPP projects in the long run. Several authors highlight the role of knowledge transfer and the complementarity of the parties' knowledge (e.g. Kerkhof et al., 2016), additionally the opportunistic behaviour of the parties, or the limitations of their approach may hinder the processes (Das & Teng, 2001). Umar et al. (2018) interviewed roughly 200 experts globally and stated that the "Private involvement in infrastructure provision has generated more controversies than the problems it was meant to solve" (p. 11). As a possible solution, examining more than 300 PPP projects, Jayasuriya and co-authors (2020) concluded that the effective involvement of stakeholders is a major contributor to the success of this kind of project.

Outsourcing exploded into the business world at the time as it promised to cut costs. However, it took decades for the organisations involved to reap this and the other benefits of outsourcing. The strategic alliance as a business model is also very popular, but in everyday life, there are more management challenges that businesses have to deal with. Perhaps the management problems experienced during PPP projects and their solutions are the most relevant for us because, in that case, the public and private actors have to work closely together for many years. In fact, from this point of view, smart grids can also be considered a special variety of PPP projects.

4. Discussion about potential behaviour risks in smart grids

In different smart grids, individuals, organisations, municipalities, small and large electricity producers, and electricity traders operate closely and systematically, even in several roles. On the one hand, it is important to note that in smart grids, "traditional" actors also have expanded roles (e.g. Mohsenian-Rad et al., 2010; Schiavo et al., 2013); on the other hand, new mechanisms (information flow, changing of monopolies, self-monitoring, achieving resilience etc.) and new, alternative energy sources are integrated into the system (additionally determining the role of weather).

Skjolsvold et al. (2021) consider the forces driving the development of smart grids to save money and manpower, new technologies/digitalisation, and the common understanding of decarbonisation and electrification by society. A sustainable economy and environment are commonly wished for; however, we think individuals' theoretical desires may not be so strong when they have to cooperate closely and limit themselves (e.g. to reduce peak electricity consumption periods). Perhaps the answer can also be the other driving force mentioned by the authors, such as the shared economy and its various branches and solutions. These are indeed very popular among the younger – especially higher-educated – generations, but smart grids will not only be actively used by young, educated, open people.

"How can we avoid producing new high-tech ghettoes for the wealthy while enabling participation in the transition for the less fortunate? Energy justice literature tends to emphasise the distributional, procedural, and recognition-based aspects of energy justice." (Skjolsvold et al., 2021, p. 16).

The management lessons of the briefly presented business networks allow us to conclude that conflicts may occur in smart grids operating not only in pilot projects due to the different routines, approaches, knowledge and beliefs of various actors. Designers and main organisers of smart grids should be aware of the various differences (ownership structure, management mechanisms, decision-making processes etc.) of organisational actors and be prepared to handle them or establish relevant resilient solutions to avoid the challenges mentioned in cases of strategic alliances and PPP projects. Organisational actors need to learn to communicate in the right amount in an understandable way. At the same time, the knowledge of private consumers (prosumers) needs to be expanded in the area of their new duties and responsibilities.

5. Conclusion

More scholars (e.g. Möller & Svahn, 2003; Planko et al., 2017) see a research gap in the management of networks operating in emerging markets. Geelen et al. (2013) suggest investigating smart grids from the aspects of end-users and energy providers. Skjolsvold et al. (2021) see that relevant regulations "take social aspects for granted" (2021, p. 15). Binder et al. (2019) recommend the study of the unpredictable behaviour of end-consumers and electric vehicle owners.

There is also a need for a variety of training for professional and non-business players in smart grids that can reduce some concerns and prevent the spread of misinformation and assumptions. We see that people at different ages have learned to use different technologies and systems, but it also requires knowledge, time, and patience, and these three are permeated by communication.

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