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Twitter Sentiment Analysis of the Low-Cost Airline Services After COVID-19 Outbreak: The Case of AirAsia

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Abstract

Background: Public opinion about experience and expectation on services that appear on Twitter platforms provides valuable insights into satisfaction and experience. **Objectives:** This research investigates consumer perception and opinion toward AirAsia's services after the COVID-19 outbreak. **Methods/Approach:** A framework is proposed by integrating the customer satisfaction model with the digital service quality dimension: product quality, price, situational factors, personal factors, service quality, and digital service quality. Nvivo is used to extract and analyse Twitter data for sentiment analysis, thematic analysis, and word frequency calculations. **Results:** Findings demonstrated that AirAsia had received more negative sentiments than positive sentiments, indicating a lower level of satisfaction across all dimensions of customer satisfaction. **Conclusions:** This research provides the airline industry, especially AirAsia, with an opportunity to better understand the sentiments and preferences of its customers. AirAsia can use the findings of this research to evaluate the quality of their services, especially in terms of service quality, to improve customer satisfaction, gain customer loyalty, and enhance customer experience.

Keywords: Twitter, sentiment analysis, AirAsia, airline industry, service quality, customer satisfaction

JEL classification: M1
Paper type: Research article

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Introduction

Air transport is the fastest mode of public transport, providing worldwide unbroken journeys over land and sea. It shrunk the world by connecting people from different countries for business and leisure. According to The World Bank, from 2009 to 2019, global air passenger traffic grew from 2.2 billion to 4.5 billion, but the COVID-19 pandemic caused this number to drop by more than half in 2020, with 1.8 billion passengers carried (The World Bank, 2021). Malaysian Airlines was affected as well. Malaysia's air passenger traffic fell from 109.2 million in 2019 to 26.7 million in 2020 (Muller, 2021), as the Malaysian Aviation Commission (MAVCOM) forecast. The decline was about 72.8% to 75.7% per year, and the number of passengers carried is between 26.6 million and 29.7 million (MAVCOM, 2020). This phenomenon mirrors Sadi and Henderson's (2000) observations that the air transport industry is sensitive to stresses such as pandemics, economic downturns, political instability, and natural disasters.

The decline in air passenger traffic has greatly affected the economy. Evidence supports an interdependent relationship between the usage of airlines and economic activity, especially tourism (Hansman and Ishutkina, 2009). According to the Aviation Benefits Beyond Borders report on September 2020 (Aviation Benefits, 2020), before COVID-19, the airline industry supported a total of 87.7 million jobs, of which 44.8 million were tourism-related. The total global GDP supported by the airline industry is 4.1%, totalling USD 3.5 trillion. In turn, around 58% of all tourists fly to their destinations, increasing airline usage. This linkage between airline usage and economic activity helps stimulate the economic development of the places that air travel connects (Niewiadomski, 2017). According to an International Air Transport Association (IATA, 2019) report, in 2018, 450 thousand jobs were supported by the airline industry, including tourism-related jobs, accounting for 3.5% of the Malaysian GDP, with a total of USD 10.3 billion.

In general, airlines can be divided into two types: full-service airlines (FSAs) and low-cost airlines (LCAs), which are also as known as budget airlines. An FSA provides a comfortable or luxurious full-board flight experience. The key passengers of FSAs are business passengers who often seek frequent scheduling, inflight flexibility, and ground service linkages, emphasising reliability, quality, connectivity, flight schedules, frequent flyer programmes, and comfort (Berrittella et al., 2009). Conversely, LCAs focus on cost minimisation, providing flights with low-cost tickets and limited in-flight service. LCAs initially attracted many young and leisure travellers who were sensitive to fare costs and then captured a significant proportion of small and medium-sized enterprise (SME) business travellers after the global financial crisis (Rajaguru, 2016). According to a report from MAVCOM (2020), in 2017, Malaysia's passenger traffic was dominated by LCAs, namely AirAsia, which has a domestic and international passenger share of 56.3% and 27.6%, respectively. Over the next few years, AirAsia continued to be the leader of Malaysia's airlines.

As the COVID-19 pandemic spread around the globe, the global airline industry paid a heavy toll, and so did AirAsia. On 12 November 2021, as Air Asia faced a cash crunch due to the pandemic, it planned to undertake debt restructuring with full support from Class A and C creditors and support from 97.6% of Class B creditors, enabling AirAsia to stay solvent and avoid delisting from Bursa Malaysia (Burgos, 2021). To speed up its recovery, AirAsia needs to understand the opinions and behaviours of its passengers better in order to develop a more robust and resilient marketing strategy to strengthen its position.

The main aim of this research is to identify the sentiment of AirAsia's customer satisfaction within service quality and digital service quality dimensions related to the COVID-19 pandemic. This research analyses Twitter sentiments about the service

quality of AirAsia to better understand their preferences and the competitiveness of AirAsia service offerings and to indirectly benefit the airline industry. The research objectives are (i) RQ1: To identify the topic discussion on customer satisfaction and identify the sentiments that emerge from Twitter communications among Twitter users with respect to AirAsia, and (ii) RQ2: To explore the textual patterns and identify the sentiments that emerge from Twitter communications among Twitter users with respect to AirAsia.

Literature Review

Customer Satisfaction

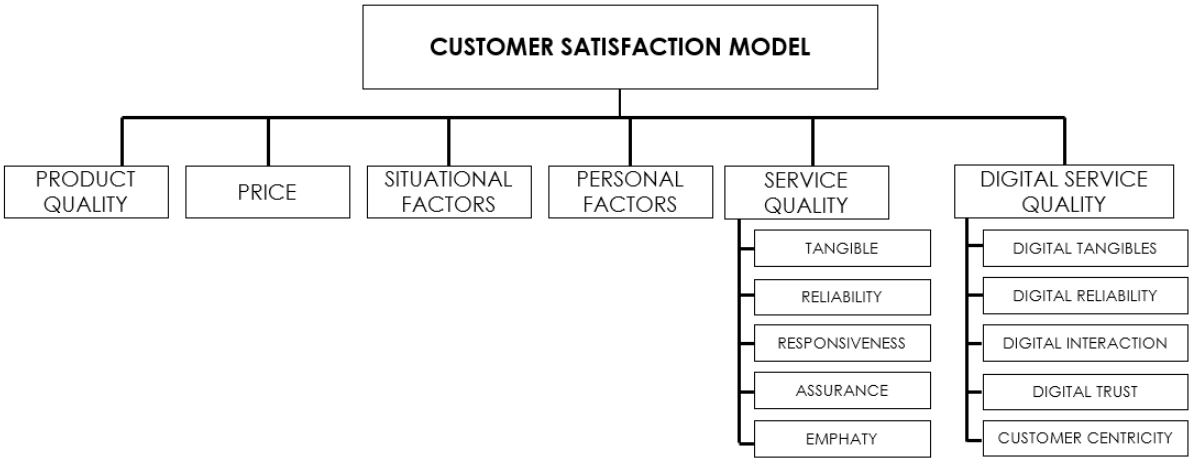
Customers are the people who make purchases from an organisation, whether those purchases be of the goods or the services that the business offers. Customers, in other words, are participants of the business since they are the ones who pay money in return for the offer that is presented to them by the organisation with the intention of satisfying a need and bringing about the highest satisfaction (Masorgo, et al. 2022). Customer satisfaction based on the experience concept has spread across the service industry at a rate that has never been seen before, and the body of academic research is coming to a consensus on what is and is not (Becker and Jaakkola, 2020; De Keyser et al., 2020). Satisfaction is determined by whether the customer has a positive or negative opinion regarding the result of the consumption. This concept is generally accepted in both academic literature and corporate practice because it is favourably related to a wide variety of critical outcomes such as brand or company recognition, customer loyalty and retention, and customer value.

In the context of transportation, the degree to which passengers are content with the quality of the services being offered has a critical influence on whether or not a particular carrier will remain in business over the long run. As a result of the poor service delivered, disgruntled customers may lose faith in the airlines and be less likely to choose that carrier for future travel. It is critically necessary for airlines to guarantee that consumers will get the level of service quality that they demand. Hence, some companies analyse their customers' satisfaction through social media platforms to assess and improve their product or service quality. Park et al. (2019) stated that customer satisfaction is a core factor of success in a competitive market.

This research adopted the customer satisfaction model developed by Wilson et al. (2016), in which customer satisfaction depends on the perception of service quality, product quality, price, situational factors, and personal factors. In this model, the perception of service quality is measured with the SERVQUAL model developed by Parasuraman et al. in 1988. They proposed five service quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman et al., 1988). However, the understanding of service quality has changed with the widespread use of digital technologies. Büyüközkan et al. (2020) suggested that the main dimensions of the SERVQUAL model and the evaluation criteria need to be updated to reflect digital transformation, proposed a new digital service quality (DSQ) model to measure the changed perception of service quality due to digital transformation, and validated it with a real case in the Turkish airline industry. The DSQ model consists of five primary dimensions: digital tangibles, reliability, digital interaction, digital trust, and customer-centricity. This research adopted the customer satisfaction model and DSQ model as a framework for a more comprehensive understanding of passengers' sentiments from multiple dimensions. This integrated framework consists of six essential perceptions: product quality, price, situational factors, personal factors, service

quality, and digital service quality, as depicted in Figure 1. This framework describes the various evaluation criteria for researching customer satisfaction connotations.

Figure 1
Customer Satisfaction Model



Source: Authors' illustration

Elements of the above customer satisfaction model will be elaborated on in the rest of the chapter.

Product Quality

This research focuses on a quality metric directly connected to the product's travel convenience in terms of the itinerary's directness (measured by the flight distance between the passengers' origin and destination) (Gayle and Thomas, 2015). In the airline industry, product quality refers to routing quality (Chen and Gayle, 2019). It describes the convenience of the air travel itinerary. The higher the value of the routing quality measure, the closer the flight distance of the airlines' route is to the direct route and the more desirable the travel itinerary is for passengers(Chen and Gayle, 2015).

Price

Price is the actual amount customers pay in exchange for a product or service (Lovelock and Wirtz, 2007). In the airline industry, price refers to the fare. As the air travel market is an oligopoly, airlines are constantly reacting to competitors' actions, monitoring their prices and trying to price fares accordingly. In the airline industry, pricing is intended to maximise profit by targeting different market segments, but it also leads to price differentiation (Suhartanto and Noor, 2012).In general, the level of satisfaction established with the perceived price, as well as the overall process, is proportional to both the perceived price and the degree of compromise made. The lower the perceived price and the greater the degree of compromise, the greater the level of satisfaction established (Parasuraman et al., 1988).

Situational Factors

Situational factors usually involve external factors beyond service providers' control that affect customers' perceptions at a specific time and place within the context of the service delivery environment (Kalaiarasan et al., 2018). In general, the situational factor influences how customers come into contact with and engage with a product or service, which in turn shapes the consumer's view at that precise instant in time. For

example, in the airline industry, boarding location, events, weather, health or economic conditions can be situational factors (DeCelles and Norton, 2016; Parasuraman et al., 1988).

Personal Factors

According to the research that has been conducted, personal factors refer to personal characteristics such as age, occupation, education level, income or salary, lifestyle, personality, and self-concept that have been identified as having a substantial effect on the aspects of customer satisfaction (Hapsari et al., 2017; Oyewole, 2001). According to Oyewole (2001), passengers' satisfaction with airline service is affected by various personal factors. The findings discovered that the level of customer satisfaction with various services offered by the airline passengers flew with was significantly influenced by the passengers' occupation, marital status, gender, and level of education.

Service Quality

Many research adopt the SERVQUAL method to evaluate airline service quality (Erdil and Yıldız, 2011; Jahmani, 2017; Young et al., 1994). In the airline industry, service quality is related to an airline's ability to transport passengers to their desired destinations while providing a high standard of service (Jahmani, 2017). According to Jahmani (2017), the five dimensions of service quality in airline service delivery are defined as:

- Tangibles or the physical appearance of employees, facilities, equipment, personnel, and communication material used to provide airline service.
- Reliability, or the ability to perform the promised service dependably under routine and unexpected conditions, which includes punctuality, check-in efficiency, and ticketing accuracy.
- Responsiveness or the willingness to quickly and properly solve service problems such as flight cancellations, luggage loss, emergency response, and luggage delivery.
- Assurance of employees' knowledge and courtesy and their ability to display trust and confidence when addressing customers, for instance, politeness, respect, and general interest for passengers.
- Empathy or providing reliable, valuing, individualised attention to passengers, for instance, offering them preferred seating or a frequent flyer program.

Digital Service Quality

In the airline industry, digital service quality is related to the efficiency and reliability of digital services, as well as the latest technologies used (Low et al., 2020). The same dimensions appear in this model from a different perspective. Hence, they are differentiated by the addition of "digital" to distinguish the two models. According to Büyüközkan et al. (2020), the five dimensions of digital service quality are:

- Digital tangibles, digitalised equipment, facilities, and their digital properties can be wirelessly networked or linked to various digital representations.
- Digital reliability is the ability to manage digital processing and fulfil the promised digital services effectively.
- Digital interaction, or the digital communication networks established between passengers and airlines through digital platforms.
- Digital trust, or the acquisition and retention of passengers and shareholder value through confidence in digital services and channels.

- Customer-centricity or prioritising passengers and fulfilling their emotional needs through innovative service delivery experiences.

Company Background

AirAsia Group Berhad (called AirAsia) is a Malaysian multinational LCA that was established in 1993 and is headquartered in Kuala Lumpur, Malaysia. A government-owned group initially formed AirAsia, but in its early years, it was heavily indebted, which led to its acquisition by Tony Fernandez in 2001 for MYR 1 and the agreement to take on millions of dollars in debt (QUARTZ, 2015). AirAsia initially provided airline services and then launched into offering digital business services. During the last two decades, AirAsia's operation has improved, and it has become a leading LCA. According to the Daily Express (2021), AirAsia was named the World's Best Low-Cost Airline at the Skytrax 2021 World Airline Awards; this is the 12th consecutive year the airline has won the award.

As AirAsia focuses on offering lower fares without a plethora of other amenities, it makes air travel more affordable and lives up to its famous slogan, "Now Everyone Can Fly". In addition, AirAsia has developed several subsidiaries in Asia, utilising the AirAsia brand and adopting identical low-cost business models, including Indonesia AirAsia, Philippines AirAsia, Thai AirAsia, and AirAsia India. The company has also developed its long-haul airline brand, the AirAsia X Group, which includes AirAsia X and Thai AirAsia X. To cope with its substantial route networks, AirAsia currently has 101 aircraft. All but one are from the A320 family, and that is an A330-300 (Planespotters, 2021). With subsidiaries located across the continent, AirAsia will grow even stronger in the future.

According to the Skytrax 2021 World Airline Awards, AirAsia received the title of "World's Best Low-Cost Airline" for a record-breaking twelve years, which comes after it was given another outstanding award for business innovation at Flight Global's 2021 Airline Strategy Awards (AirAsia Group Berhad, 2021a). In addition, at the 28th annual World Travel Awards 2021, AirAsia was recognised as having Asia's Leading Low-Cost Airline Cabin Crew for the sixth year in a row and was granted the title of Asia's Leading Low-Cost Airline for the fifth year in a row. AirAsia came out on top in this category after receiving the most votes from customers, industry professionals, and other industry participants from all over the area (AirAsia Group Berhad, 2021b).

AirAsia Group Berhad has changed the name of its listed holding company to 'Capital A' effective on 28 January 2022 (Burgos, 2022). The new name reflects the group's new core business strategy as an investment holding company with a portfolio of synergistic travel and lifestyle businesses, including logistics, aircraft engineering, venture capital, education and mobile applications (CNA, 2022). However, the airline still operates under the AirAsia brand name. These businesses have rapidly transformed the AirAsia brand into more than just an airline, and the name change reflects this change in overall business strategy (Hospitality-on.com, 2022).

Problem Statement

Due to growing competition, providing high-quality service has become a marketing need for the airline industry. The airline industry began concentrating on how service quality improvements impact revenue and whether perceived service quality is a crucial factor in customer happiness and loyalty. Service quality is the most heavily stressed airline industry's competitive variable, such as rates, frequency, equipment, service quality, market access, and advertising. Customer service standards set an airline apart from its rivals, determine market share, and eventually decide profitability

(Martin-Domingo et al., 2019). Most significant conventional airlines have adopted this strategy. Airlines must be aware of passengers' requirements and expectations to provide better services, as consumers' expectations serve as a benchmark by which businesses are measured.

As the airline industry faced decreasing passenger traffic due to the COVID-19 pandemic, the competition among airlines increased. As a result, airlines have sought ways to understand passengers' needs and desires to improve their marketing strategies and attract more passengers while increasing customer satisfaction. Nowadays, social media has become an integral part of people's daily routines. It not only offers personal communication but also serves in business operations. More and more people use social media platforms such as Facebook and Twitter to review and share opinions on specific products and services, which is valid for airline passengers. Passenger reviews and opinions from social media can be transformed into meaningful information about airlines, helping them better understand the topics of discussion about their brands (Gensler et al., 2015). This analysis of brand-specific opinions is called sentiment analysis. There has been much research on sentiment classification in the field of airline service (Rane and Kumar, 2018; Sreeja et al., 2020; Anitsal et al., 2019), but few studies use sentiment analysis based on Twitter about specific airline brands, particularly Malaysian airlines.

Although it is evident that the COVID-19 epidemic influenced airlines' traffic and financial performance, the effect on customers' perceptions of airlines is not as evident. AirAsia and its subsidiary AirAsia X (AAX) grounded hundreds of flights in 2020 and 2021 due to the Malaysian government's decision to close state and international borders to prevent the spread of COVID-19 (AirAsia Group Berhad, 2021c). Since commercial and international travel has begun to resume and vaccination rates have risen from September 2021, the number of passengers flying each day across a wide range of countries, including Malaysia, is quickly approaching the levels seen before the epidemic began (AirAsia Group Berhad, 2021d). Because of this inflow, airlines and airports have had difficulty accommodating passengers, leading to longer wait times at customer service counters, considerable flight delays, and unexpected cancellations.

On 21 October, AirAsia started to reactivate everyone aboard after the government announced the return of interstate travel and tourist operations. AirAsia had the most excellent quarterly load rate of 80%, with a 3.4 million capacity in Q4 of 2021 after introducing quarantine-free travel bubbles for Malaysia and the loosening of travel restrictions. (AirAsia Group Berhad, 2021e). Nevertheless, months after the low-cost airline started flights after the October removal of interstate and international border restrictions for Malaysians, hundreds of passengers took to social media to complain about poor customer care and lengthy refund wait times (Daniele, 2022). For the airline industry, this means a sudden increase in demand, new expectations, and complex operational and service challenges, not to mention regaining the competitive advantage via service quality.

Using data collected from Twitter towards AirAsia, this study contributes to the big data analysis, text mining and sentiment analysis literature on customer satisfaction and service quality. This research is practical and contributes to existing airline service operations literature by suggesting a procedure for the analysis of the textual content of Twitter of customer satisfaction and service quality. Most research papers have collected airline service operations data using quantitative techniques such as surveys, qualitative techniques, or, in general, in-depth interviews to elicit customer satisfaction and service quality. However, the wide availability of consumer opinions on social media platforms, together with the increasing number of computer tools for

the analysis of unstructured data, this study has shifted attention to the study of customer satisfaction and service quality using text mining and sentiment analysis via social media platforms. In addition, this research integrates the customer satisfaction model and digital service quality dimension as a framework for a more comprehensive understanding of passengers' sentiments from multiple dimensions that are important for all service providers, especially in the airline industry.

The rest of this article is structured as follows: first, we provide a brief literature and theory background on text mining, sentiment analysis, and customer satisfaction model, then develop a relevant theoretical model. Next, in the research methodology section, we explain data collection and analysis procedures. After that, the findings and discussion section present the interpretation of the analytics results. Lastly, the conclusion section discusses some of the limitations of the current study and the future scope of work.

Methodology

Text Mining

Text mining can be considered as a process of editing, organising, analysing and interpreting unstructured text into structured format (Berezina et al.,2016; Fan et al., 2006). The main purpose of text mining is to find relevant patterns in a prepared document and discover the hidden information embedded within the documents (Tian et al., 2020). Text mining has become more practical, using automated computer algorithms and natural language processing techniques to analyse and interpret a large amount of unstructured text (Fan et al., 2006). Text mining has been extensively used in analysing user-generated content produced by users of social media platforms that are available publicly (He et al., 2017). These types of content include opinions, comments, views, expressions, and interactions between users and brands.

The analysis of consumers' thoughts and comments on brand-related tweets yields valuable information that has a direct impact on changing brand perceptions. The inclusion of user-generated material pertaining to brands allows consumers to articulate their opinions and perspectives on items and services, therefore empowering businesses to transform this data into valuable insights into customers' preferences and requirements (Pejić Bach et al., 2019). Numerous scholarly investigations have used sentiment analysis as a key component in their examination of Twitter data, with a particular emphasis on a wide range of sectors such as retail (Ibrahim & Wang, 2019), banking (Krstić et al., 2019; Pejić Bach et al., 2019), and airlines (Kwon et al., 2021; Yee Liau and Pei Tan, 2014).

In the context of airline services, text mining and sentiment analysis are essential because they enable managers to generate meaningful insights into passengers' opinions, which, in turn, may help refine strategic responses or become the basis for further research (Zaki and McColl-Kennedy, 2020). Several studies in the airlines' service literature provide an alternative customer satisfaction and service quality analysis using customer review content for hearing the voice of their customers by using text mining techniques (Dwesar and Sahoo, 2022; Tian et al., 2020; Sezgen et al., 2019). Airline companies can improve their ability to manage their service recovery efforts and strategies for the prioritisation of service quality elements by better-understanding passengers' experiences and expectations (Sezgen et al., 2019).

Sentiment Analysis

The field of research known as sentiment analysis, which is also known as opinion mining, examines people's opinions, attitudes, and emotions concerning entities such as products, services, organisations, individuals, issues, events, topics, and their characteristics. Because consumers are expressing their opinions more freely using social media than ever before, sentiment analysis is becoming an essential tool for understanding the emotions of consumers and becomes vital for businesses, as it allows them to understand better customers' opinions, reactions, experiences, and perceptions of a phenomenon. Hence, airlines should consider passengers' sentiments as online opinions will continue to influence service companies' reputations and brand images (Devedi et al., 2017) and other customers' decision-making (Gensler et al., 2015). At a deeper level, online reviews or opinions suggest customers' requirements for products and services (Chen et al., 2020). Sentiment analysis involves developing automatic learning models that detect whether customers' sentiments are positive, negative, or neutral, as well as their degree of intensity (Melville et al., 2009).

This research examines content from Twitter for sentiments about AirAsia in Malaysia. The field of airline services includes much sentiment analysis research, most of which analyses Twitter data extracted about the airline industry. Twitter data is a reliable data source as users tweet their genuine feelings and feedback, making it suitable for investigation (Rane and Kumar, 2018). Since Twitter launched in 2006, it has become one of the most preferred information-sharing platforms for travellers. Millions of travellers travel with airlines and share their views on Twitter in the form of text, photos, videos, and website links. Users' posts on Twitter are limited to 280 characters and are called "tweets" (Boot et al., 2019). In 2020, there were over 500 million daily tweets and 187 million active Twitter users globally (Sayce, 2020).

Research process

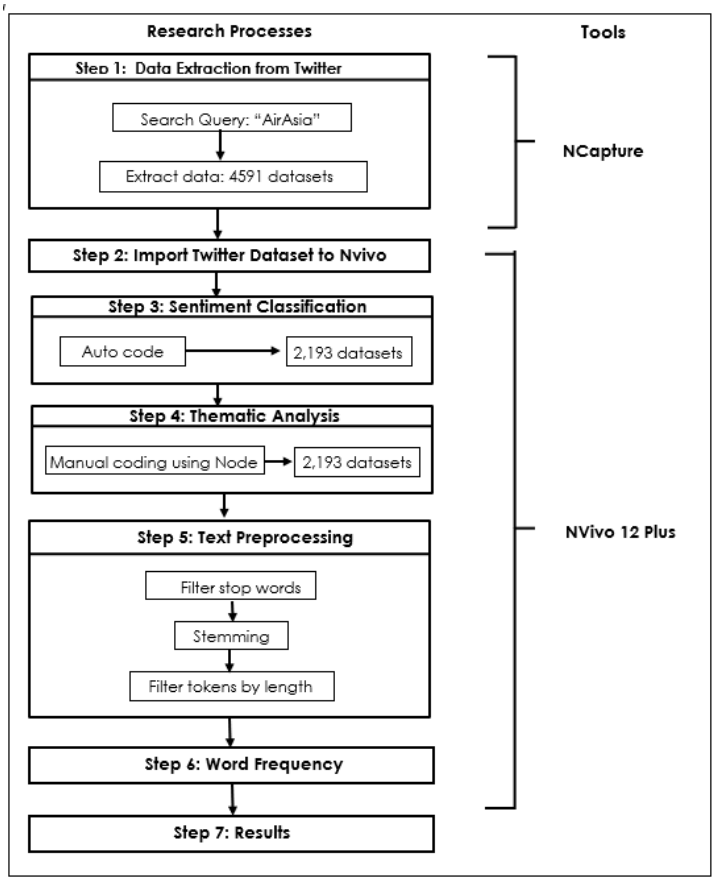
A sequence of steps was designed to demonstrate the research process, including the seven main steps depicted in Figure 2:

- Step 1: This research uses NCapture to capture the consumer sentiment formed concerning the keywords "AirAsia" on Twitter. NCapture is a browser add-on designed for NVivo to capture web content that can be analysed on NVivo. NCapture is a browser extension built for NVivo to capture online information for NVivo analysis. Only recent tweets written in English were used in this research. The data were extracted on 17 November 2021 and consisted of 4,591 tweets from 8 November to 17 November, including original tweets and retweets.
- Step 2: Tweets extracted from Twitter were imported into NVivo 12 Plus as a dataset for further analysis.
- Step 3: In this step, the auto code function in NVivo 12 Plus was used to identify the sentiment in tweets automatically. The tweets were coded according to sentences. After auto-coding, a total of 2,193 results were automatically categorised into four main groups by sentiment: very negative, moderately negative, moderately positive, and very positive.
- Step 4: Manual coding using Nvivo's node function was used to perform a theme analysis of the comments. The textual content was coded based on the dimensions of the customer satisfaction model. The thematic analysis consisted of carefully analysing each remark, locating patterns, deciding on appropriate codes, and developing themes and sub-themes based on the accumulated data (Bonello and Meehan, 2019). The coding process was done manually with pre-constructed coding schemes where the nodes are first created from the six dimensions of the customer satisfaction model (digital tangibles, reliability, digital interaction, digital

trust, and customer-centricity), including the five sub-dimensions of service quality (tangibles, reliability, responsiveness, assurance, empathy) and five sub-dimensions of digital service quality (digital tangibles, digital reliability, digital interaction, digital trust, customer-centricity). In order to achieve maximum analytical rigour, the data were independently analysed and coded by three coders. The codes were examined, contrasted, and debated to find a consensus.

- Step 5: Before assessing word frequency, text preprocessing was required to ensure efficient and accurate text analysis. In this research, stop words that do not provide meaningful information, such as "http", will be omitted. Mamgain et al. (2016) define stop words as common words that do not contribute to sentence sentiment and should be removed, which allows the researcher to focus on the important words. Stemming is also applied in this step. Srividhya and Anitha (2010) describe stemming as the process of removing the suffixes from words and extracting the root or stem. In this research, words will be grouped with their stems; for instance, "reimbursed" and "reimbursement" is stemmed to "reimburse" and grouped. Filtering tokens by length is another of the text preprocessing steps. It involves removing tokens that are shorter or longer than a specified character length; in this research, the minimum character length is 3, as many common words are shorter than three characters and offer little information, such as "in", "am", and "is".
- Step 6: The top 25 most frequent words were used in the word cloud for further investigation.
- Step 7: The final step was to interpret the results

Figure 2
Flowchart of Research Process



Source: Authors' illustration

Findings

Sentiment Analysis

Table 1 shows the overall distribution of sentiments in tweets related to the keyword "AirAsia". Out of 2,193 results, 125 were coded as very negative, 1,312 as moderately negative, 693 as moderately positive, and 63 as very positive. Moderately negative sentiments predominated, accounting for 59.83% of all sentiments, while very positive sentiments were least common at 2.87%. Overall, 65% of the sentiments were negative.

Table 1
Distribution of Sentiment Analysis

Sentiment	Very Negative	Moderately Negative	Moderately Positive	Very Positive
Frequency	125	1,312	693	63
Percentage	5.70	59.83	31.60	2.87

Note: n = 2,193; Source: Authors' work

Sentiment Analysis of Customer Satisfaction

Table 2 summarises the sentiment analysis by nodes. For all types of sentiment, passengers primarily discuss service quality. It dominates all sentiment related to AirAsia on Twitter at 85.57%, followed by situational factors at 6.02%, digital service quality factors at 5.45%, personal factors at 2.05%, price factors at 0.60%, and product quality factors at 0.31%. As mentioned earlier, moderately negative sentiments predominated, and when people discuss AirAsia on Twitter, moderately negative sentiments are the most common regarding all factors except for price and digital service quality. Price received more moderately positive sentiments, while digital service quality received mostly very negative sentiments. Interestingly, none of the tweets discussing price indicated moderately negative sentiments. Meanwhile, none of the tweets discussed product quality and situational factors with very positive sentiments.

Table 2
Summary Sentiment Analysis of Customer Satisfaction Model

	Product Quality		Price		Situational Factors		Personal Factors		Service Quality		Digital Service Quality	
	F	%	F	%	F	%	F	%	F	%	F	%
VN	1	0.04	5	0.23	19	0.87	12	0.55	46	2.10	42	1.93
MN	4	0.18	0	0.00	69	3.15	20	0.91	1,184	54.00	35	1.56
MP	2	0.09	6	0.28	44	2.00	6	0.27	610	27.83	25	1.14
VP	0	0.00	2	0.09	0	0.00	7	0.32	36	1.64	18	0.82
T	5	0.31	13	0.60	132	6.02	45	2.05	1,876	85.57	120	5.45

Note: VN = Very Negative Sentiment; MN = Moderately Negative Sentiment; MP = Moderately Positive Sentiment; VP = Very Positive Sentiment; T = Total; F = Frequency; % = Percentage; n= 2,193; Source: Authors' work

Sentiment Analysis of Service Quality

Table 3 summarises the sentiment analysis of service quality factors. Around 65% of tweets conveyed negative sentiments. Responsiveness dominates with 93.29% of tweets, followed by reliability at 3.25%, empathy at 1.97%, assurance at 1.07%, and tangibles at 0.42%.

Table 3
Summary Sentiment Analysis of Service Quality

	Tangibles		Reliability		Responsiveness		Assurance		Empathy	
	F	%	F	%	F	%	F	%	F	%
VN	1	0.05	14	0.75	14	0.75	5	0.27	12	0.63
MN	5	0.27	33	1.76	1,124	59.91	5	0.27	17	0.91
MP	1	0.05	7	0.37	589	31.40	7	0.37	6	0.32
VP	1	0.05	7	0.37	23	1.23	3	0.16	2	0.11
T	8	0.42	48	3.25	1,750	93.29	20	1.07	37	1.97

Note: VN = Very Negative Sentiment; MN = Moderately Negative Sentiment; MP = Moderately Positive Sentiment; VP = Very Positive Sentiment; T = Total; F = Frequency; % = Percentage; n= 1,876; Source: Authors' work

Sentiment Analysis of Digital Service Quality

Table 4 presents the sentiment analysis of digital service quality factors. Around 60% of tweets about digital service quality conveyed negative sentiments. Digital tangibles feature in 50% of tweets, followed by customer-centricity at 22.5%, digital reliability at 18.33%, and digital trust at 9.17%. Interestingly, no tweets discussed digital interaction, and very positive sentiments appear only for digital tangibles.

Table 4
Summary Sentiment Analysis of Digital Service Quality

	Digital Tangibles		Digital Reliability		Digital Interaction		Digital Trust		Customer-centricity	
	F	%	F	%	F	%	F	%	F	%
VN	8	6.67	10	8.33	0	0.00	8	6.67	16	13.34
MN	15	12.50	10	8.33	0	0.00	3	2.50	7	5.83
MP	19	15.83	2	1.67	0	0.00	0	0.00	4	3.33
VP	18	15.00	0	0.00	0	0.00	0	0.00	0	0.00
T	60	50.00	22	18.33	0	0.00	11	9.17	27	22.50

Note: VN = Very Negative Sentiment; MN = Moderately Negative Sentiment; MP = Moderately Positive Sentiment; VP = Very Positive Sentiment; T = Total; F = Frequency; % = Percentage; n = 120; Source: Authors' work

Word Frequency

A word cloud is a visualisation for text analytics. Word clouds were used to visualise the 25 most frequent words in the dataset and sentiment analyses. The stop words "http," "lmao," "duhhhh," and "amp" were omitted in favour of other words that could offer more meaningful insights.

Figure 3 shows the words frequently used in tweets related to AirAsia. Among all AirAsia-related tweets, the most frequently used term is "AirAsia", followed by "customers"', "taking", "MAVCOM", and "ticket".

Figure 4 shows "AirAsia" as the most frequent word used in negative-sentiment tweets, followed by "MAVCOM", "ticket", "take", and "fails".

For positive-sentiment tweets, shown in Figure 5, "AirAsia" was again the most frequently used word, followed by "refunding", "customers", "money", and "taking".

Some organisations and target groups repeatedly appear in word clouds for different datasets, such as "AirAsia", "customers", and "MAVCOM". Naturally, "AirAsia" is used most frequently as it is the brand name and the keyword for this research, so the tweets used in the research dataset must contain it. Twitter users use hashtags (#) or mentions (@) of AirAsia to categorise tweets and link to other tweets with the same hashtags or mentions, as well as to connect with a specific topic. "Customers" and

"customers" also appear frequently in all three-word clouds. Customers are important in business; in the airline industry, they are passengers, and "customers" refers to passengers' belongings. "MAVCOM" is the name of an organisation in Malaysia, the Malaysian Aviation Commission.

Verbs also appear repeatedly in the three word clouds, including "taking" and its stem word, "take". "Take" means "use or ready to use". If "take" is combined with "action", it means to do something for a particular result. Some goods or items are also listed in the word clouds, such as "ticket" and "money". In the airline industry, a ticket is a proof that a passenger is entitled to a seat on a flight, and it can be paper or electronic. "Money" is a medium of exchange that allows people to obtain what they need or want. Word clouds visually represent passengers' thoughts. The most popular topic of discussion among AirAsia passengers was the refund issues due to flight cancellations during the COVID-19 pandemic. During the pandemic, AirAsia cancelled all flights but did not refund customers' tickets. After a few months or a year, passengers hoped MAVCOM would act against AirAsia to return their money.

Figure 3
Word Cloud Analysis for AirAsia

Source: Authors' work

Figure 4
Word Cloud Analysis for Negative Sentiment Tweets for AirAsia

Source: Authors' work

Figure 5
Word Cloud Analysis for Positive Sentiment Tweets for AirAsia

Source: Authors' work

By comparing the above three figures, we can see that there are more similarities between Figures 3 and Figure 4 than between Figures 3 and Figure 5. Because passengers' discussions of popular topics featured more tweets with negative sentiment labels than positive sentiment labels, it is unsurprising that the common words in Figure 3 are similar to the most frequently used words overall.

Discussion

One of the significant challenges of the airlines is keeping pace with customers' changing perceptions and requirements of service quality and other aspects of user experiences. With the development of information and communication technologies (ICTs), sentiment analysis permits understanding and exploring customers' attitudes towards airline services from their posts on various social media platforms. Various studies have been conducted to explore and understand the different polarities of customers' perceptions by utilising sentiment analysis or data mining approach to interpret customer satisfaction (Kumar and Zymbler, 2019), user experience (Song et al., 2020), and service quality (Martin-Domingo et al., 2019). In this research, sentiment analysis was performed on 2,193 tweets to understand the passengers' sentiments towards AirAsia and other popular topics related to the airline industry and services. The data analysis includes sentiment analysis, sentiment analysis by nodes, word frequency, and word maps related to AirAsia.

The first research objective was to identify the topic discussion on customer satisfaction and identify the sentiments that emerge from Twitter communications among Twitter users with respect to AirAsia. The dominant themes were categorised by nodes that identified the factors determining passengers' sentiments towards AirAsia. Service quality appeared to be the most common factor that AirAsia passengers cited, and most of the tweets were negatively coded. Service quality is a multidimensional construct described by various forms of interaction between customers and service providers. The SERVQUAL model proposed by Parasuraman et al. (1988) contains ten dimensions for service quality: tangibles, reliability, responsiveness, competence, courtesy, credibility, security, access, communication, and understanding of the customer.

Like other transportation industries, service quality is critical in the airline industry. The success and growth of the industry depend on users' perceptions of the value, comfort, and quality of user experiences. Passengers always have high expectations of the quality of services provided by airline carriers, which must be effective, efficient, regularly available, safe and secure, adequate, and comfortable at a reasonable cost (Adisasmitha et al., 2020). Increasing numbers of airline passengers have increased the demand for service quality from airline carriers (Oghojafor Ben et al., 2016). Numerous studies have observed a significant relationship between service quality and customer satisfaction in airline industries worldwide (Ashraf, 2017; Hapsari et al., 2017; Giao et al., 2021). For example, Hapsari et al. (2017) identified the significant positive effect of service quality on Indonesian airline passengers' satisfaction, which was also mediated by perceived value.

Furthermore, passengers' sentiments towards service quality were described by five core aspects of customer service quality: responsiveness, reliability, empathy, assurance, and tangibles. Of these five dimensions, responsiveness was most often highlighted by passengers in describing their frustration and negative feelings towards the airline service. Responsiveness refers to service providers' willingness to help or assist their customers and provide the prompt services expected (Pizam, 2010). Conceptually, it is a dimension of service performance in which customers' demands are met through market solutions (Lagat and Uyoga, 2019). In this research, issues of

ticket refunds due to communication failures with the bot, as well as the lack of in-person support, were highlighted. This issue became especially critical during the COVID-19 pandemic when many passengers needed to cancel and reschedule their flights due to travel restrictions. Other studies similarly emphasised issues related to responsiveness in the airline industry (Riantama et al., 2021; Zhu, 2017; Lagat and Uyoga, 2019). Riantama et al. (2021) found that responsiveness was the most important attribute of airline passengers' satisfaction after the pandemic.

Digital service quality was also identified as one of the factors determining passengers' sentiments towards AirAsia, although Twitter users did not highly emphasise it. Nowadays, digital technology bridges passengers' satisfaction and is the key method for airline carriers to promote their services and improve their overall efficiency. Digital service quality can affect the trend of air travel globally, aside from changing demographics and customer behaviour (Revfine, 2021). In this research, the most highlighted aspect of digital service quality was digital tangibles, followed by customer-centricity, digital reliability, and digital trust. While there was a balance of positive and negative sentiments for digital tangibles, more negative sentiments were recorded for all other aspects. This finding generally aligns with the digital service quality model for the airline industry by Büyüközkan et al. (2020), where digital trust, proactive customer service, cybersecurity, and customer insights were reported as the most important dimensions. Issues of digital service quality for airline passengers' satisfaction were also noted in other studies, such as a poor complaint management system (Rizki et al., 2021) and problems with the ticket reservation system (Abisoye et al., 2017).

Apart from the service-quality-related factors, other factors were identified as situational factors, personal factors, price factors, and product quality. However, these factors occurred with less than 10% frequency, suggesting that they were not highly emphasised by passengers reviewing AirAsia services. Other recent studies discussed these factors, which affect passengers' perceptions and satisfaction with their airline travel experiences. For example, an aspect related to airline product quality is the lack of destination variety (Rizki et al., 2021), and personal factors influencing airline passengers' satisfaction include gender, income, and education (Jiang and Zhang, 2016). Additionally, situational factors affecting airline passengers' satisfaction include lavatory cleanliness and odour control (Hamid et al., 2021).

The second research objective was to explore the textual patterns and identify the sentiments that emerge from Twitter communications among Twitter users with respect to AirAsia. Based on the word cloud diagrams, the most frequent word in AirAsia-related tweets is "AirAsia", followed by "customers", "taking", "MAVCOM", and "ticket". "AirAsia" was the most frequent word in both the negative- and positive-sentiment clouds. Other frequent positive-sentiment words are "refunding", "customers", "money", and "taking", while frequent negative-sentiment words include "MAVCOM", "ticket", "take", and "fails". These results suggest that "AirAsia" is a hot topic with mixed sentiments among Twitter users. The popularly discussed aspects on Twitter include the Malaysian Aviation Commission (MAVCOM), as well as ticketing and refunding issues. Although the airline industry has been severely affected by the COVID-19 pandemic, AirAsia still ranked the highest among all other airlines in the ASEAN region, occupying 20th place among the world's most valuable airline brands (TTR Weekly, 2021). AirAsia is also striving to become a leading e-commerce platform through AirAsia.com for one-stop travel and lifestyle in this region (AirAsia Group Berhad, 2020f). Meanwhile, AirAsia India, which has been a joint venture between Tata Sons and Malaysia-based AirAsia Berhad since 2014, retained its leadership position with 90.8% on-time performance (OTP) in April 2022 (ETTravelWorld, 2022).

Overall, the research findings from the sentiment analysis of the tweets related to AirAsia showed that the passengers' sentiments were generally negative rather than positive. More than half of the sentiments were negative, and these were typically moderate, which suggests that the airline carrier should investigate emerging concerns among its passengers to improve the quality of its services and products. This finding concurs with many recent studies, which also revealed negative customer perceptions and sentiments regarding their air travel experiences (Hoang, 2020; Herjanto et al., 2022; Sulu et al., 2021; Song et al., 2020). For example, Hoang (2020) revealed negative emotions like anger, regret, and frustration towards airline services, which have led to complaining, switching travel intentions, and spreading negative word-of-mouth among Vietnam's airline passengers. Similarly, Herjanto et al. (2022) generated 17 different negative emotions based on the online reviews of LCA passengers, including shock, disappointment, and surprise due to the failures of the airline services.

In addition, respondents' negative sentiments towards airline services could be influenced by travel restrictions and other pandemic-related challenges. As Monmousseau et al. (2020) stated, travel restriction measures due to COVID-19 cases have caused major disruptions and unprecedented impacts on airlines globally. AirAsia has faced backlash and a wave of complaints from passengers who have taken to social media to express their dissatisfaction with its customer service and delays in refunding due to the pandemic (Daniele, 2022). Piccinelli et al. (2021) revealed the relationship between the rising numbers of COVID-19 and air travellers' negative sentiments based on online comments about airline cancellations, compensation, and customer service. They further explained that the pandemic has led to financial difficulties for users, who then complain heavily about refund issues from airline service providers. Similarly, Sulu et al. (2021) found that the COVID-19 pandemic is a dominant theme describing the airline passengers' perceptions of service quality, in which their dissatisfactory airline experience was linked to airline cancellations and refund processes due to COVID-19 and airport services.

Another interesting finding from this research is that there were fewer negative than positive sentiments about price compared to the other five factors. Most AirAsia passengers do not consider price the main hurdle in determining their travels. Rather, LCA passengers' satisfaction is more likely to be determined by other non-price-related factors, particularly the service quality dimensions discussed previously, which is similarly noted in several studies, which found that price was not the main decisive factor affecting passengers' travel preferences among LCAs (Akamavi et al., 2015; Calisir et al., 2016). However, Jiang and Zhang (2016) found that the impact of ticket pricing differs by the type of passengers; while it strengthens leisure travellers' satisfaction and loyalty, no significant impact was observed among business passengers.

Conclusion

The airline industry is one of the fastest-growing major players in the public transportation market in many countries. This research provides some helpful insights for the key players and policymakers in the airline industry. The findings have also enriched the existing literature, particularly on the use of social media for insightful real-time insight into how passengers perceive airline services and the possible factors influencing airline travellers' changing preferences and behaviours. The airline industry will recover once it has a better understanding of customer expectations, increased service quality management, and expanded digitalisation across the ecosystem,

which will ensure that the industry emerges from the pandemic with greater financial sustainability, responsiveness and agility than it has ever had before.

In summary, the research findings reinforce the following key points:

- Passenger-first approach: Airline services need to focus on their customers by emphasising the five dimensions of service quality, especially responsiveness. This will also be useful in attracting more loyal passengers who will recommend their services to others.
- The use of digital and social media: Airline carriers' ability to adapt to rapid technological and digital progress will determine their competitiveness and sustainability in the airline industry. Social media is also instrumental for airline carriers not only to maintain effective engagement with passengers but also to monitor and understand their sentiments towards the services provided.
- Varying marketing strategies: Customers' satisfaction is subjective and varies across individuals. Thus, different customer segments may have different preferences regarding airfare and service quality. Lower prices do not imply that the quality of airline service is expected to be low as well. Therefore, other non-price-related marketing strategies can be designed to improve the airline industry's sustainability in a post-pandemic setting.

Although the research makes some contributions to both theoretical and empirical literature, it still has some limitations. The study is limited to satisfaction factors and service quality dimensions of only one LCC airline, AirAsia passengers. Our sample might not represent all LCC airlines in Malaysia and the rest of the world. Consequently, the findings may not be generalisable to the general population of airline companies. Future research may address these concerns by replicating this research on different airlines in Malaysia and outside of Malaysia. This will enable us to investigate whether the factors of passenger response satisfaction and service quality dimensions of airline passengers are similar across different airlines and national boundaries. Another limitation arises from the use of single-source data collection on the Twitter platform. It would be beneficial to cover other social media platforms, such as Facebook and Instagram; this can be incorporated into future work.

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Digital Content Marketing and EWOM: A Mediational Serial Approach

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Abstract

Background: In this study, the parameters that directly impact purchase intentions were analysed, such as electronic word of mouth, customer engagement, brand awareness, and customer retention. **Objectives:** This study aimed to explore the impact of digital content marketing on customer purchase intentions. **Methods/Approach:** The study used Partial Least Square Structural Equation Modeling (PLS-SEM) to explore the hypothesised relationships between variables and the extent to which digital content marketing strategies influence purchase intention. **Results:** The study's findings highlighted that content marketing positively impacts electronic word of mouth, brand awareness, customer retention, and customer engagement. In contrast, the results revealed that content marketing does not directly impact purchase intentions. **Conclusions:** The study's results indicate that digital content marketing affects purchase intentions indirectly, primarily through customer engagement, brand awareness, customer retention, and electronic word of mouth. In essence, the complete impact of digital content marketing on purchase intention is realised through these indirect factors. The findings enrich the literature on digital content marketing and provide some practical implications for companies to invest more in this direction to improve their performance.

Keywords: Brand awareness, customer engagement, customer retention, digital content marketing, e-WOM, purchase intention.

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Introduction

The era of digitisation has an essential impact on the digitalisation of society in general, and the business world is not exempt from it. Studies argue that digitalisation has significantly impacted the transformation of company processes (Kraus et al., 2021; Ramadani et al., 2022). In this transformation, companies cannot think of operating successfully by ignoring the digital context (Gautam & Sharma, 2017). These changes also affect consumers' behaviour since they always focus on communication with companies through digital tools (Verhoef et al., 2021). There is a consensus among researchers that the digital era brought evident changes in the way of doing business, changes in the functioning of markets, consumer behaviour, and the country's economy in general (Ioanas, 2020; Sya'idah et al., 2019; Zeqiri et al., 2022b). In the present day, marketing strategies are increasingly geared toward reaching digital customers, emphasising online communications and transactions. This shift in strategy has become imperative due to the ongoing technological transformation (Sya'idah et al., 2019).

Moreover, technology has empowered consumers more than ever before, allowing them to easily select devices as their means of interaction (Opreana & Vinerean, 2015). Nowadays, the virtual market is seen as a more real form of making transactions than the conventional market (Istrefi-Jahja & Zeqiri, 2021; Sya'idah et al., 2019). Furthermore, the rapid and convenient access provided by online technology has empowered consumers to easily engage with marketing content and make comparisons between online offers, as noted by Pektas and Hassan (2020). Consequently, companies need to exercise caution in their online communications, recognising that this channel plays a pivotal role in establishing and nurturing long-term relationships with customers, as emphasised by Desai and Vidyapeeth (2019).

Digital content marketing has not been satisfactorily investigated by various researchers, specifically in determining the different dimensions of content marketing, which helps in its proper implementation (Gabbianelli & Conti, 2018; Naseri & Noruzi, 2018). The studies evidenced so far on the effects of content marketing come mostly from developed countries. Since the markets have unique specifics, and consumer behaviour is different in different countries, it is in the academic community's interest to bring studies from developing countries, such as North Macedonia, as this will help enrich the literature of digital context.

On the other hand, a lack of research provides conceptual and empirical frameworks for investigating the complexity of the impact of digital content marketing on purchase intention. Even more, the role of important constructs such as customer engagement (CE), brand awareness (BA), customer retention (CR), or e-WOM as mediating variables of the relationship between digital content marketing and purchase intention.

This study investigates the impact of digital content marketing on purchase intentions, focusing on the experience of North Macedonia as a developing country. The results of this paper will have practical implications by helping the business community in this region to design appropriate content marketing strategies in online communications. Second, theoretically, we attempt to investigate the complexity of this influence using a serial mediation approach that includes several vital constructs.

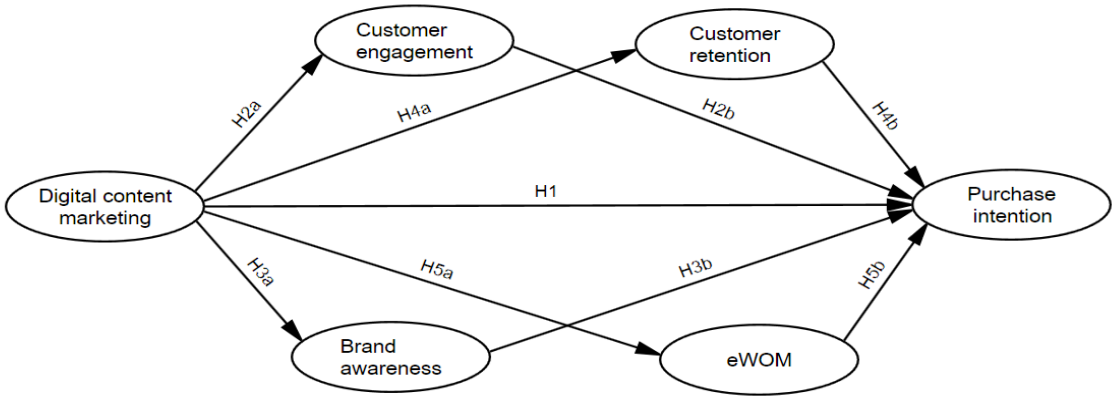
The research paper is structured as follows. The subsequent second section presents the literature review focusing on digital content marketing and its theoretical foundations, followed by a conceptual research framework and the hypotheses in section three. Section four presents the methodological part. Then, the data analysis, results, and discussion are detailed in Sections five and six, respectively. In the end,

section seven presents the conclusion, including the main findings, contributions, limitations, and avenues for future research.

Research model

The research model presented in Figure 1 explains the purpose of this study in more detail. This study analyses several variables. It considers digital marketing content, engagement, brand awareness, eWOM, and customer retention as independent variables, whereas purchase intention is a dependent variable. The study's primary objective is to investigate the influence of these independent variables on the dependent variable within this specific context.

Figure 1
Research Model



Source: Authors' illustration

Digital content marketing

Recent studies have concluded that digital content marketing (DCM) is regarded as among the most essential strategies in the context of digital marketing, relying on many industries (Mathew & Soliman, 2021). Content marketing is considered a strategy in which companies communicate online with their target customers by publishing their content (Prasetva & Susilo, 2022). Digital content marketing (DCM) involves online communication where companies generate relevant content targeted at both existing and prospective customers. This approach aims to expand the audience of potential customers and engage them in content creation and sharing, as highlighted by Desai and Vidyapeeth (2019), Gabianneli and Conti (2018), and Hollebeek and Macky (2019). Ultimately, content marketing adds value for both consumers and the company, as emphasised by Gabbianelli and Conti (2018).

Customers in the digital era can create information themselves; therefore, they are not dependent on classical advertising information for products and services (Ramos, 2014). Therefore, the old formats are no longer attractive to digital customers. Studies argue that customer-oriented content is more effective and should focus on concerns, problems, and other issues of concern of customers (Lies, 2021; Ramos, 2014; Terho et al., 2022). Companies, through content marketing, measure more easily consumer reactions (Rancati & Gordini, 2014). Also, through digital analytical tools, businesses can measure how successful the communication campaigns have been by providing immediate results (Ramos, 2014). Digital marketing offers the added benefit of being cost-effective. Content marketing through methods such as SEO,

SMO, and social media is recognised as an economical means to reach and engage with customers, as noted by Opreana and Vinerean (2015). Studies state that content marketing creates long-term customer relationships and influences repeat purchases (Lieb, 2011; Yaghtin et al., 2020). As the challenge for businesses in various industries is customer retention (Desai & Vidyapeeth, 2019), content marketing affects audience growth and purchase intentions (Gupta & Nimkar, 2020). Also, in other studies, we find consistency in the influence of digital marketing content on intention to purchase (Kajtazi & Zeqiri, 2020; Prasetya & Susilo, 2022). Therefore, based on the above, we come up with the next hypothesis:

- *H1: Digital content marketing has a positive effect on purchase intention*

Customer engagement

To gain a sustainable competitive advantage, marketing researchers and practitioners have recognised the need to achieve consumer engagement in a variety of areas (Hollebeek et al., 2014; Brodie et al., 2011; Kumar et al., 2018; Lim & Rasul, 2022; Pansari & Kumar, 2016). Customer brand engagement (CBE) is a customer's behaviour relation with a brand that extends beyond the essential act of purchase and goes beyond the goal of satisfaction (Pansari & Kumar, 2016). Marketing researchers have struggled to develop a clear consensus on the nature of engagement and its dimensions (Lim & Rasul, 2022). Therefore, research recognises the critical role of domain and context in determining the research perspective and the chosen measure of customer engagement (Lim & Rasul, 2022; Brodie et al., 2011). Scientific evidence provides different explanations in the context of customer engagement (CE). CE represents a psychological and spiritual element that originates from customer-company interactions (Brodie et al., 2011; Hollebeek et al., 2011). CE can also be seen as a set of general customer activities towards the brand or company (Vivek et al., 2012). It should be emphasised that customer engagement was enabled by digital marketing tools, like social media and other online tools, which had an impact on changing consumer behaviour (Khan et al., 2016). Customer engagement cannot be seen based on getting a certain number of followers. Moreover, customer engagement considers activities such as information sharing, comments, likes, co-creations, and other actions leading to consumer advocacy (Barger et al., 2016; Denham-Smith & Harviddsson, 2017; Lee & Park, 2022). Therefore, the activities created on social media by companies can induce high consumer engagement based on these arguments (Harrigan et al., 2017).

Researchers conclude that such activities on social media and other online tools help companies increase traffic on online platforms while also improving sales performance. Since the challenge is increasing the number of followers on online platforms, attractive marketing content is necessary to achieve this goal (Ramzan & Syed, 2018). Therefore, some successful brands create distinctive images that enable consumers to distinguish themselves from users of other brands and also enable greater engagement (Harrigan et al., 2017). In this line, Weerasinghe (2019) states that the first step of making an online purchase comes from customer engagement. According to this research, brand engagement through online content is more likely to influence prospects to buy more products and eventually transform them into loyal customers in the future (Weerasinghe, 2019).

Additionally, marketers can help customers stay connected, engaged, and involved with the brand by regularly providing high-quality content (Bansal & Chaudhary, 2016). Such content increases the likelihood that customers would like and share information when they consider it to have added social value, which helps increase customer trust, which means not penetrating the company's competitors,

adding new customers by sharing information, and the possibility of the company's information going viral (Gupta & Nimkar, 2020). Such content marketing activities on social networks help engage consumers by increasing company sales, attracting new customers, and improving sales performance in many aspects (Kee & Yazdanifard, 2015; Prasteya & Susilo, 2022). Engaged customers can become loyal by making repeat purchases (Ramzan & Syed, 2018). Based on the above discussions, we can conclude that online marketers try to create digital content that drives consumer engagement (Denham-Smith & Harvidsson, 2017). Customer engagement affects the emotional context, creating high commitment, loyalty, and interactive behaviour (Vivek et al., 2012). Studies also find that good digital marketing content leads to consumer engagement and drives purchase intentions (Hollebeek & Macky, 2019). Based on the previous discussion, we assess how content marketing affects customer engagement activities. Therefore, the following hypotheses are stated:

- *H2a: There is a positive relationship between digital content marketing and consumer engagement on social media.*
- *H2b: Customer engagement mediates the impact of digital content marketing on purchase intention.*

Brand awareness

When discussing communications in digital marketing tools, brands and their awareness cannot be overlooked. Today, customers at successful brands see added value for them in online communications. Therefore, brand awareness is a critical factor that directly impacts consumer decision-making and purchase intentions (Moisescu, 2009; Rowley, 2008). Brands include distinctive elements from the competition (Latif et al., 2014; Seyyedamiri & Tajrobehkar, 2021). Brand awareness means a strong positioning in the consumer's mind that is remembered when they think about specific products and services (Kee & Yazdanifard, 2015). Consumers have expectations of quality and other benefits associated with successful brands. They have this expectation from previous experiences or even referrals from others (Dabbous & Barakat, 2020; Keller, 2013; Moisescu, 2009).

Studies argue the importance of DCM, which plays in brand awareness through informative digital campaigns that positively impact brand image and stimulate purchase intentions (Lou & Xie, 2021). Scientific evidence concludes that content marketing successfully improved brand awareness (Ahmad et al., 2016). Through content marketing, companies can inform, remind, and convince the target audience about the brand image and thus increase its awareness (Lou & Xie, 2021; Kee & Yazdanifard, 2015; Yaghtin et al., 2020). Solid content directed at the target audience can also encourage current customers to share the message further, influencing brand awareness among potential customers (Kee & Yazdanifard, 2015). Studies also show that content marketing through social media (SMCM) plays a crucial role in overall brand healthiness, an essential indicator of how well the brand performs in a particular market or audience. Content marketing also helps to improve overall brand health, market positioning, and long-term prosperity (Ahmad et al., 2016). Based on the above discussions, the following hypotheses are proposed:

- *H3a: There is a positive relationship between digital content marketing and brand awareness. Based on the above discussions, the following hypotheses are stated:*
- *H3b: Brand awareness mediates the impact of digital content marketing on purchase intention.*

Customer Retention

Since the cost of acquiring a new customer is very high, the retention of existing customers can be seen as an essential concern for companies today. Establishing a new customer base is not a quick process; on the contrary, it takes plenty of time. Therefore, the authors Gupta and Nimkar (2020) conclude that as much as the company is important to finding new customers, it is equally important to maintain existing customers.

Through digital content marketing, companies can use successful methods for customer retention, influencing the creation of trust and other long-term relationships (Kee & Yazdanifard, 2015; Ramzan & Syed, 2018). Several studies highlight that online shopping poses a challenge to consumers in cases they do not receive the product as promised. Therefore, informational content on social media can be checked/verified by consumers when they receive the ordered product. As a result, the congruence of expected and actual content in product/service acceptance is important in creating loyal customers and repeat purchases (Rahimnia & Hassanzadeh, 2013). Studies indicate a strong correlation between customer engagement, trust, social media marketing, and consumer loyalty (Rahimnia & Hassanzadeh,2013; Yousaf et al., 2021).

Companies must make efforts to create rational value in their marketing content to retain customers (Ginn et al., 2010). Consumers are inclined to visit digital marketing channels repeatedly if the company manages to keep the audience interested with attractive information (Gupta & Nimkar, 2020). A company that works in this aspect must constantly update information in online tools (Ahmad et al., 2016). Such updating boosts purchase intentions and reduces consumers' likelihood of switching to the company's competition (Ahmad et al., 2016). Therefore, from the arguments mentioned above, we can conclude that content marketing significantly impacts customer retention by creating long-term relationships with them (Ajina, 2019; Kee & Yazdanifard, 2015). Based on the above discussions, the following hypotheses are stated:

- *H4a: There is a positive relationship between digital content marketing and customer retention.*
- *H4b: Customer retention mediates the effect of digital content marketing on purchase intention.*

Electronic word-of-mouth

While word-of-mouth marketing has been heard a lot, what is crucial to underscore is that in the pre-digital era, assessing the effectiveness of this marketing approach was a considerably lengthy task. Thanks to information technology, word of mouth can be easily and quickly measured online (Bataineh, 2015; Bu et al., 2021; Kudeshia & Kumar, 2017). This is already known in digital marketing terminology as electronic word-of-mouth (eWOM) and includes evaluations and positive and negative comments shared by consumers among themselves on digitally available platforms (Hennig-Thurau et al., 2004). Some of the most applied forms of eWOM today are reviews of products/services, customer recommendations, and different opinions, which can impact the decision-making and behaviour of new and potential customers (Zhang et al., 2018). Numerous studies underscore the significance of eWOM for businesses. According to Bataineh (2015), eWOM exerts a substantial influence on consumer attitudes, with noticeable effects on purchase intentions. Therefore, companies should be careful in online communications because the quantity and quality of eWOM can be decisive for new and potential consumers in their purchase intentions. Based on

the above discussion, digital content marketing can impact eWOM, and eWOM can impact purchase intentions. Therefore, we are stating the following hypotheses:

- *H5a: There is a positive relationship between digital content marketing and eWOM.*
- *H5b: eWOM mediates the effect of digital content marketing on purchase intention.*

Methodology

Research instrument

The research instrument consisted of a questionnaire structured into two parts: the first part included the demographic questions addressed to the respondents. In contrast, the second part included questions that dealt with the consumers' attitudes and their perceptions regarding digital content marketing and purchase intention. Respondents had to select from the Lickert scale where one denoted strongly disagree and five denoted strongly agree.

The study used a survey instrument with six dimensions that represented the research concept model. The dimensions were developed as follows: The four items for the digital content marketing construct were adapted from Emini & Zeqiri (2021) and Habib et al. (2021). The customer engagement dimension comprised of six items was based on Algesheimer et al. (2005) and Yoong and Lian (2019). The three eWOM construct items were developed based on the work of Jahn and Kunz (2012) and Kajtazi and Zeqiri (2020). Brand awareness constructs consisting of seven items were adapted from Emini and Zeqiri (2021). Customer retention comprising five items was adapted based on the work of Kang and Kim (2017), and finally, the six purchase intention items were developed based on Emini and Zeqiri (2021) and Jahn and Kunz (2012) (see Table 1).

Table 1
Research instrument description

Construct	Code	Item
Digital content marketing (DCM)	DCM1	Companies that post digital content on their social media draw my attention.
	DCM2	I like following companies on social media that provide informative and educational digital content.
	DCM3	I prefer to subscribe to the social media pages of companies that provide content rather than advertisements.
	DCM4	Companies that interact with their audience are attractive to me as a buyer.
Customer Engagement (CE)	CE1	Sharing digital content is interesting.
	CE2	I like being engaged with brands through digital content.
	CE3	I like to share digital content on my social networks if I find it relevant, informative and interesting.
	CE4	I like to share digital content on my social networks if I believe my connections will benefit from it.
	CE5	I prefer to share content with my friends in private messages rather than publicly.
	CE6	Engaging with companies on social media through digital content draws my attention to their products.
Electronic word of mouth (eWOM)	eWOM1	I say positive things to other people about companies that provide high-quality digital content.

	eWOM2	I recommend companies that provide high-quality content to anyone who seeks my advice.
	eWOM3	I encourage friends and others to buy products from companies that provide high-quality digital content.
Brand awareness (BA)	BA1	I more easily remember brands that are present on social media with interesting content.
	BA2	Digital content marketing makes me aware of new brands.
	BA3	Digital content marketing helps me recognise and distinguish brands.
	BA4	Digital content marketing on social media helps me remember brands that post it.
	BA5	I often feel intrigued by a brand after seeing an interesting video, photo, or article on its social media channels.
	BA6	I have become aware of particular brands due to the digital content shared by third parties (bloggers, YouTubers, independent individuals).
	BA7	I learn about brands through the digital content they provide.
Customer retention (CR)	CR1	I feel positive towards brands that provide digital content on social media.
	CR2	I trust companies that provide relevant, correct and informative digital content.
	CR3	I prefer to stay loyal to companies with which I am engaged.
	CR4	I stay loyal to companies that are present on social media with relevant, correct and informative content.
	CR5	Companies that provide digital content rather than promo materials gain my trust more easily.
Purchase intention (PI)	PI1	I intend to purchase products from companies that are present on social media with high-quality content.
	PI2	I tend to purchase products from brands with which I am engaged on social media.
	PI3	I prefer to recommend brands that contribute to the online community with digital content.
	PI4	I plan to stay loyal to companies that are present on social media with informative and correct content.
	PI5	Companies' regular social media presence with informative content positively influences my desire to buy a product.
	PI6	I tend to use brands that actively participate in the digital community.

Source: Authors' illustration

Sample description

The study aimed to investigate the influence of digital content marketing on consumers' purchase intentions. To this end, data was collected from consumers in North Macedonia using a well-structured questionnaire over six weeks, specifically from February to March 2022.

A probability sampling technique was employed, ensuring that every social media user had an equal opportunity to participate in the study. This approach enhances the generalizability of the findings, as highlighted by Taherdost (2016). Initially, 342 responses were received, but to maintain data quality, 38 incomplete questionnaires were excluded, ultimately analysing 304 valid questionnaires.

Strict ethical guidelines were adhered to throughout the data collection process. Respondents were provided with information about the study, and their consent was obtained in advance, ensuring their active participation. Furthermore, the anonymity of all respondents was rigorously preserved throughout the study.

Statistical model

Data collected from a structured questionnaire was analysed using different steps. First, a confirmatory factor analysis (CFA) was carried out to check convergent and discriminant validity (Pejić Bach et al., 2023). Second, structural equation modelling with SmartPLS 4, using a bootstrapping technique with 5000 subsamples, was used to test the research hypotheses.

Results

This study collected 304 valid responses, and a quantitative approach was used to collect responses administered by an online survey. The research performed statistical analysis through SPSS 26 software and PLS-SEM.

Table 2
Demographic profile of respondents

Items	Choices	Frequencies	Percent
Age	Less than 20	2	0.66
	21-29	110	36.18
	30-39	154	50.66
	40-50	19	6.25
	More than 50	19	6.25
Education	Secondary	42	13.80
	Bachelor	159	52.30
	Master	96	31.60
	PhD	7	2.30
Time with social media	Less than 1 hour	34	11.20
	1-2 hours	88	28.90
	2-3 hours	95	31.30
	3-4 hours	41	13.50
	4+ hours	46	15.10
Years using social media	0-1 years	8	2.60
	2-3 years	18	5.93
	4-5 years	18	5.93
	more than five years	260	85.54

Source: Authors' illustration

The table above shows some of the demographic characteristics of the respondents included in this study, such as age, education, time spent on social media, and years used social media.

Measurement model

The measurement model was deployed to evaluate construct quality by examining the factor loadings, construct validity, and reliability (Emini & Zeqiri, 2021; Toska et al., 2022). Firstly, it evaluates convergent validity to check how closely construct components are related to one another. Therefore, concurrent validity tests are used to investigate Cronbach's alpha, composite reliability, average variance extracted AVE), and factor loadings. With values ranging from 0.759 to 0.880 for each dimension,

as can be seen in Table 3, the findings show that all Cronbach alpha's values are above the specified threshold of 0.70, regarded as suitable for research in social science (Ursachi et al., 2015). Moreover, the values of the composite reliability are higher than the recommended threshold value of 0.70, which varies from 0.772 to 0.883. In addition, the AVE values range from 0.517 to 0.709, implying that all values are greater than the proposed threshold of 0.50 (Fornell & Larcker, 1981). The findings in Table 3 show that convergent validity was attained (Henseler, 2017).

Table 3
Construct of reliability

	Cronbach's alpha	CR	AVE
Brand awareness	0.856	0.857	0.582
Digital content marketing	0.759	0.772	0.579
E-Word of mouth	0.795	0.801	0.709
Customer engagement	0.769	0.774	0.517
Purchase intention	0.880	0.883	0.627
Customer retention	0.781	0.789	0.533

Source: Authors' illustration

The discriminant validity assessment is performed to ensure that the model does not have any variables that are the same as other variables (Zeqiri et al., 2022a). When any of the two variables are strongly related to one another, then a redundant variable exists in a model. Therefore, a discriminant validity test is performed in order to establish whether or not discriminant validity is an issue (Hair et al., 2020). In other words, if the square root of the corresponding variable's AVE is larger than its correlation value with other constructs in the model, then the variable's discriminant validity has been attained (Fornell & Larcker, 1981; Awang et al., 2015). The results presented in the report in Table 4 show that the discriminant validity criterion was achieved. Therefore, the findings in this study evidence that discriminant validity was achieved for all variables in the model.

Table 4
Discriminant validity

	BA	DCM	e-WOM	CE	PI	CR
Brand awareness (BA)	**0.763**					
Digital content marketing (DCM)	0.575	**0.761**				
E-Word of mouth (e-WOM)	0.675	0.505	**0.842**			
Customer engagement (CE)	0.592	0.564	0.544	**0.719**		
Purchase intention (PI)	0.723	0.546	0.663	0.627	**0.792**	
Customer retention (CR)	0.703	0.619	0.614	0.590	0.777	**0.730**

Source: Authors' illustration

Factor loadings provide information concerning the degrees of association of item loadings with a given factor. The values of factor loadings values might vary from -1.0 to +1.0, and according to Pett et al. (2003), greater loading values indicate a higher correlation of items with a specific factor (Muça & Zeqiri, 2020). Table 5 denotes that all items, except BA6 and CE5, had factor loadings over the suggested level of 0.50, as indicated by Hair et al. (2016).

Moreover, in a multivariate regression study, multicollinearity problems arise when there is a strong connection between one independent variable and additional factors (Thanasi-Boçe et al., 2022). Values of the Variance Inflation Factor (VIF) help to examine concerns or issues with multicollinearity within indicators (Fornell & Bokstein,

1982). Hair et al. (2016) suggested that multicollinearity problems exist when VIF values are above the cutoff of 5. (Table 5).

Table 5
Factor loadings, STDEV, Mean, and VIF values

	Outer loadings	Mean	STDEV	VIF
DCM1 <- Digital content marketing	0.804	3.663	0.774	1.546
DCM2 <- Digital content marketing	0.764	3.904	0.801	1.545
DCM3 <- Digital content marketing	0.691	3.670	0.884	1.402
DCM4 <- Digital content marketing	0.779	3.746	0.851	1.472
BA1 <- Brand awareness	0.777	3.990	0.764	1.802
BA2 <- Brand awareness	0.761	3.977	0.687	1.804
BA3 <- Brand awareness	0.755	3.799	0.737	1.818
BA4 <- Brand awareness	0.789	3.818	0.724	1.930
BA5 <- Brand awareness	0.737	3.815	0.824	1.602
BA7 <- Brand awareness	0.755	3.756	0.708	1.693
CE1 <- Customer engagement	0.740	3.611	0.718	1.456
CE2 <- Customer engagement	0.737	3.498	0.828	1.432
CE3 <- Customer engagement	0.696	3.399	0.956	1.738
CE4 <- Customer engagement	0.699	3.419	0.908	1.743
CE6 <- Customer engagement	0.721	3.630	0.710	1.337
PI1 <- Purchase intention	0.785	3.686	0.769	1.864
PI2 <- Purchase intention	0.821	3.538	0.878	2.256
PI3 <- Purchase intention	0.844	3.479	0.791	2.587
PI4 <- Purchase intention	0.743	3.554	0.777	1.710
PI5 <- Purchase intention	0.700	3.657	0.776	1.560
PI6 <- Purchase intention	0.848	3.525	0.795	2.427
CR1 <- Customer retention	0.685	3.733	0.697	1.296
CR2 <- Customer retention	0.739	3.792	0.771	1.540
CR3 <- Customer retention	0.650	3.581	0.852	1.598
CR4 <- Customer retention	0.793	3.591	0.827	1.926
CR5 <- Customer retention	0.775	3.548	0.823	1.607
eWOM1 <- Electronic word of mouth	0.852	3.812	0.754	1.684
eWOM2 <- Electronic word of mouth	0.870	3.815	0.761	1.900
eWOM3 <- Electronic word of mouth	0.803	3.465	0.855	1.583

Source: Authors' illustration

The predictors (DCM, CE, BA, CR, and e-WOM) explain purchase intention (PI) with 69.4% based on the adjusted R square seen in Figure 2. Moreover, DCM explains CE at 31.5%, BA at 32.9%, CR at 38.1%, and e-WOM at 25.2%.

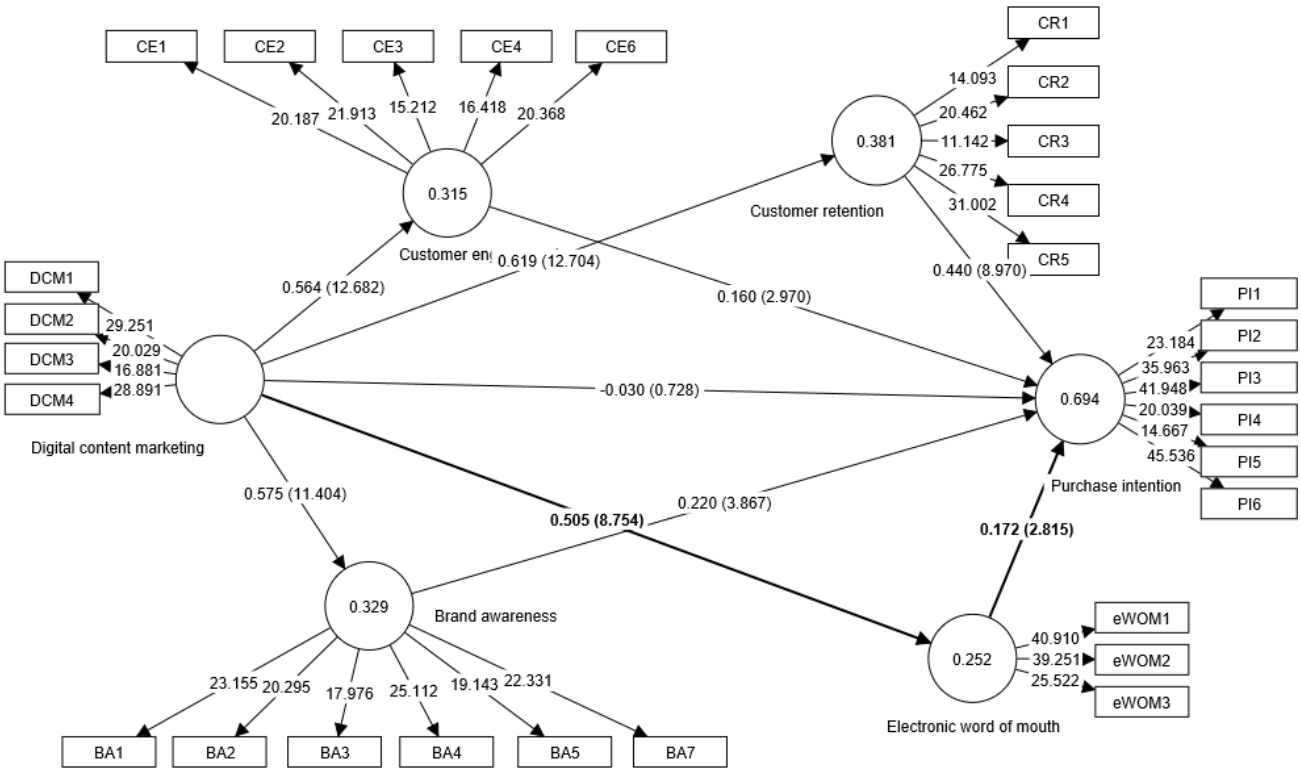
The obtained results from Table 6 revealed that Digital content marketing (DCM) does not have a direct positive effect on purchase intention (PI) (B = -0.030, t = 0.728, p < 0.467). Thus, H1 was not supported. Moreover, digital content marketing (DCM) had a positive impact on customer engagement (B = 0.564, t = 12.682, p < 0.000) in support of H2a. The result also revealed that Digital content marketing (DCM) had a strong positive and significant relationship with brand awareness (B = 0.575, t = 11.404, p <0 .000). Henceforth, H3a is supported. In addition, the results showed that digital content marketing (DCM) significantly impacts customer retention (B = 0.619, t = 12.704, p <0 .000). Hence H4a was supported. In addition, H5a evaluated whether digital content marketing (DCM) influenced eWOM. The results revealed that Digital content marketing (DCM) has a significant impact on e-WOM (B = 0.505, t = 8.754, p <0 .000). Therefore, H5a was supported.

Table 6
Hypothesis testing

Hypotheses	Path coefficient	STDEV	T values	P values
H1. Digital content marketing -> Purchase intention	-0.030	0.041	0.728	0.467
H2a. Digital content marketing -> Customer engagement	0.564	0.044	12.682	0.000
H3a. Digital content marketing -> Brand awareness	0.575	0.050	11.404	0.000
H4a. Digital content marketing -> Customer retention	0.619	0.049	12.704	0.000
H5a. Digital content marketing -> Electronic word of mouth	0.505	0.058	8.754	0.000

Source: Authors' illustration

Figure 2
Structural equation modelling



Source: Authors' illustration

Mediation effect

The researched model analysed the mediation effect of engagement, retention, brand recognition, and eWOM.

As can be seen in Table 7, the results showed that engagement fully mediates the relationship between DCM and PI (B = 0.090, t = 2.900, p < 0.004) in support of H2b. In addition, brand recognition mediates the effects of DCM on PI (B = 0.127, t = 3.749, p < 0.000), thus supporting H3b. Furthermore, retention also fully mediates the effects of DCM on PI (B = 0.273, t = 6.850, p < 0.000) (H4b), and finally, eWOM mediates the

effects of DCM on PI (B = 0.087, t = 2.695, p < 0.007), in support for H5b. Since the direct effect of the predictor was not significant, we can conclude that the mediators fully mediated the relationship between the predictors and the observed variables.

Table 7
Mediation effect

Hypotheses	Path coefficient	STDEV	T values	P values
H2b: Digital content marketing -> Customer engagement -> Purchase intention	0.090	0.031	2.900	0.004
H3b: Digital content marketing -> Brand awareness-> Purchase intention	0.127	0.034	3.749	0.000
H4b: Digital content marketing -> Customer retention -> Purchase intention	0.273	0.040	6.850	0.000
H5b: Digital content marketing -> Electronic word of mouth -> Purchase intention	0.087	0.032	2.695	0.007

Source: Authors' illustration

Discussion and conclusion

This study aimed to explore the impact of digital content marketing on customer purchase intentions, as well as eWOM. Using DCM proved to be a very important channel for companies to get close to their customers. This study supplements the literature on the role of digital content marketing on customer intention to purchase products. First of all, this study addresses some relevant research issues regarding the use of digital content in order to impact purchase intention and to provoke the eventual use of e-word of mouth.

The study provides evidence that customer engagement has been proven to play a positive role in leading customers to purchase certain products. Our findings are supported by many previous studies (Mathew & Soliman, 2021; Harrigan et al., 2017; Ramzan & Syed, 2018; Yaghtin et al., 2020) that customer engagement is significantly and positively related to PI.

Moreover, digital content marketing enables companies to inform and provide necessary information to consumers to retain and engage them in activities in their customer journey that eventually lead to purchase intention. The empirical findings revealed that creating content and using digital devices to share that content does not necessarily lead to purchase intention. This obtained result is not related to many previous studies. For example, studies by several authors (Kajtazi & Zeqiri, 2020; Pektas & Hassan, 2020; Al-Gasawneh & Al-Adamat, 2020) confirmed that DCM had a significant positive effect on PI. Therefore, this implies that companies are not secured by just posting good content. They need to engineer their marketing efforts to gain attention and try to engage their customers in order to increase conversion and turn cold prospects into promoters and rabid fans (Tsai & Men, 2017; Duh, 2021). This indicates that unless local firms concentrate on content marketing initiatives that enhance engagement, eWOM, brand recognition, and client retention, they cannot anticipate having a favourable impact on purchase intentions.

Furthermore, our findings supported the hypothesis that digital content marketing engages customers. These findings support a plethora of previous studies, for example, studies by Paramita et al. (2021), Bazi et al. (2020), Hollebeek and Macky (2019), and Rasool et al. (2020). Valuable content generally takes the form of online videos, podcasts and blog posts that need to be freely available to the target audience. Further on, we can conclude that digital content marketing positively affects brand

retention. The obtained results are in the same course as several previous studies (Lou & Xie, 2021; Constantinides, 2014; Yaghtin et al., 2020). The results also show that DCM produces positive effects on BA. These findings support many previous studies (like., Emini & Zeqiri, 2021; Dabbous & Barakat, 2020; Moisescu, 2009). Therefore, using different digital tactics helps customers move on their journey and become aware of what the brands stand for.

In addition, this study provides several implications for the theory. First of all, it enriches the current literature on digital content marketing and purchasing intention with a sample from a developing country, namely, North Macedonia. Moreover, previous studies have analysed mainly the direct effect of DCM on PI and eWOM. This study proves that creating content and posting it on any digital device does not necessarily have a direct influence on purchasing intention. On the contrary, creating good content engages consumers, which eventually leads to conversion and intention to purchase. Therefore, marketing theories need to consider content creation strategies that help consumers and boost consumer engagement in activities that lead to purchase intention.

Moreover, the results provide some practical implications for managers and companies. The research suggests that businesses should concentrate their marketing activities on contemporary content marketing strategies in order to boost sales and, ultimately, profitability. Instead of investing in old-fashioned traditional marketing tactics, such an investment has a more favourable impact on customers' readiness to buy their goods and services. Basically, the research proves that customers prefer to be educated and informed with content that is in their interest.

Therefore, when it comes to digitalisation and marketing strategies, businesses should operate in accordance with consumer interests and preferences about customer awareness and perceptions. Customers respond favourably to a customised, interactive, and content-focused marketing strategy; they are more likely to make larger purchases from businesses that satisfy their interests and remain loyal to those same businesses. Thus, from a practical standpoint, when managers use digital content marketing, they should consider which marketing communication strategies to use to tailor the content they provide to their targets. All of this information from the customer insights demonstrates that companies should not focus only on transactions promoting their marketing offer but try to engineer a content delivery strategy that focuses on the needs of the consumer and addresses their issues and needs. This study is among the first studies that demonstrate how content marketing can serve as a means of customer engagement, which is very crucial in developing a research model for digital content marketing.

This study has some limitations. First, it was limited to the primary data collected from a quantitative research approach, only from customers' perspectives, and relied on data analysis based on customers' insights. The inclusion of both company and customer perspectives would provide more robust research results. Moreover, the sample size is derived only from a developing country, so that the results can be generalised mainly in developing contexts. Secondly, expanding the sample with respondents and multi-group analyses from different countries, both developed and developing, can provide more robust results for generalizability.

Third, the study confirmed that DCM positively contributes to company purchase intentions, and its positive impact is also highlighted in eWOM. Therefore, this provides more scientific evidence for companies to invest in this direction since such an investment can improve business performance.

Finally, researching the differences among various demographic groups and how they respond to various content marketing forms and styles may be a useful tool for

businesses looking to enhance audience segmentation and target audiences more effectively.

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Shaping Startup Culture in Croatia: The Role of Internal Marketing in Fostering Growth

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Abstract

Background: The startup scene in Croatia has been accelerating in development in the last decade, partly due to the available European Union funds. Organisational culture is one of the main prerequisites for the growth and development of successful startups. Internal marketing is often crucial to reshaping positive organisational culture and fostering innovative employee behaviour. **Objectives:** The purpose of this article was to investigate a main characteristic of the startup culture in the Republic of Croatia in order to recommend actions and activities of internal marketing that can help companies achieve their goals faster by engaging and motivating their employees and fostering a positive culture change. **Methods/Approach:** Survey research was conducted on a sample of employees of Croatian startups. The main informant approach was used to collect the answers. **Results:** The analysis reveals that as startups grow, they enhance gender diversity and opportunities for idea sharing yet face challenges in maintaining autonomy and constructive feedback. Additionally, mentoring, as one of the venues of internal marketing within startups, significantly bolsters adherence to company principles and fosters a culture of constructive problem-solving, highlighting the critical role of mentorship in shaping a positive organisational environment. **Conclusions:** Results show that startups in the Republic of Croatia still have an opportunity to develop further and improve employee-focused culture and to apply several internal marketing activities in order to engage and retain their employees, such as internal communication, professional development, employee benefits, employee recognition and employee engagement.

Keywords: Startup, Organizational Culture, Internal Marketing, Croatia

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Introduction

The labour market has never been as competitive as it is today. As a result of globalisation, the world is more interconnected than ever before. Technological advances enable interconnection and demand for the development of innovative solutions for specific industries. Companies must adapt to the new demands and dynamics of the market and use their resources properly to achieve maximum profitability and maintain their competitiveness. In response to market demands, companies create innovation as value (Zhao et al., 2020). This is exactly the reason why startup companies emerge. They are described in the literature as newly founded companies that experience rapid growth and development but often have limited business experience (Nikolić & Zorić, 2014). With a low initial investment, startup companies bring developed ideas, product prototypes, and the entrepreneur's desire to present their product, which offers innovative solutions, to the market (de Freitas Michelin et al., 2023). According to recent research, startups play a significant role in creating job opportunities in the United States and are responsible for almost all net new jobs in recent years (Kauffman, 2020). Startups' focus on knowledge and innovation drives market dynamism and competitiveness, resulting in quick growth, betterment, and increased productivity (Decker et al., 2014). Startups' size and lack of hierarchy and bureaucracy make them more agile and flexible, allowing them to respond to market demands more quickly than larger organisations, giving them a competitive advantage (Kollmann et al., 2016). Additionally, startups are recognised for shaping society's values, emphasising a proactive and unique cultural mindset towards work (Schein, 2010).

Startup companies emerged primarily in response to technological advances in the United States in the 1990s. Still, because of their global span, the culture of startup companies quickly spread throughout the world. Indeed, specific and fast solutions created with an innovative approach and modern management methods have proven to be a very successful form of business. Employees of startup companies often do not follow traditional work patterns. For example, they could work remotely, work from other countries, further their education, and bring pets to work, which can reflect supervisors' concern for their employees and thinking outside the box in terms of work styles, considering that they often emerge from Z-generation (Nguyen Ngoc et al., 2022). Accordingly, a different form of leadership can also be observed in startup companies (Rubik, 2021), with universities often playing an important role in their development (Guzikova, 2020). Namely, because they are smaller companies to begin with, in terms of the number of employees, there is not much of an organisational hierarchy, so immediate supervisors are available and often involved in operational decisions. In addition, supervisors grant freedom of decision-making within the team and encourage knowledge transfer, recognising that investing in the knowledge of colleagues not only benefits themselves but also fosters team spirit and a sense of belonging to the company, which is one of the determinants of corporate culture. Currently, there are about 60 startup companies in Croatia, although there is no legal framework defining them, and the definition is based on the European Union's determination. However, several companies in Croatia call themselves startup companies and successfully run their business with the characteristics of startup culture. Companies such as Bellabeat, FIVE, Infinium, Rimac, and similar offer their employees the working conditions mentioned above and have significant growth and expansion in the global marketplace typical of startup companies, even though some of them have outgrown the above definition.

Based on this, the purpose of the paper is to research a main characteristic of the startup culture in the Republic of Croatia to recommend actions and activities of

internal marketing that can help companies achieve their goals faster by engaging and motivating their employees and fostering a positive culture change. The paper aims to provide insights into the startup scene in Croatia and suggest ways companies can improve their employee-focused culture through internal marketing activities. There are two main research goals:

- RG1: Will the Croatian startups with a positive and supportive work environment, as measured by factors such as mentorship, decision-making autonomy, and workload balance, have higher employee satisfaction and retention rates than those with a negative work environment?
- RG2: Will the level of education and duration of employment of employees in Croatian startups have a significant impact on their understanding of the company's mission and vision, as well as their perception of the workplace atmosphere and the way mistakes are handled in the team?

The paper is organised into several sections. It begins with an introduction that sets the context for the study, followed by a background section discussing the startup scene in the Republic of Croatia, followed by a section regarding the significance of organisational culture, leadership, and employee demographics within the startup environment. The methodology section outlines the research approach, including the use of a web survey to collect data from Croatian startup employees. The results section presents the key findings, highlighting elements of organisational culture, leadership characteristics, and correlations between variables. The conclusion summarises the primary research outcomes, emphasising the positive and proactive nature of organisational culture in Croatian startups. It also suggests the need for further exploration in specific areas. The recommendations for managers at the end of the paper offer practical advice for startup leaders, focusing on fostering a positive work environment, addressing gender-related differences, promoting mentorship, and supporting employees' decision-making autonomy. The limitations section acknowledges the constraints of the study, primarily the small sample size due to the limited number of startup companies in Croatia.

Startup scene in the Republic of Croatia

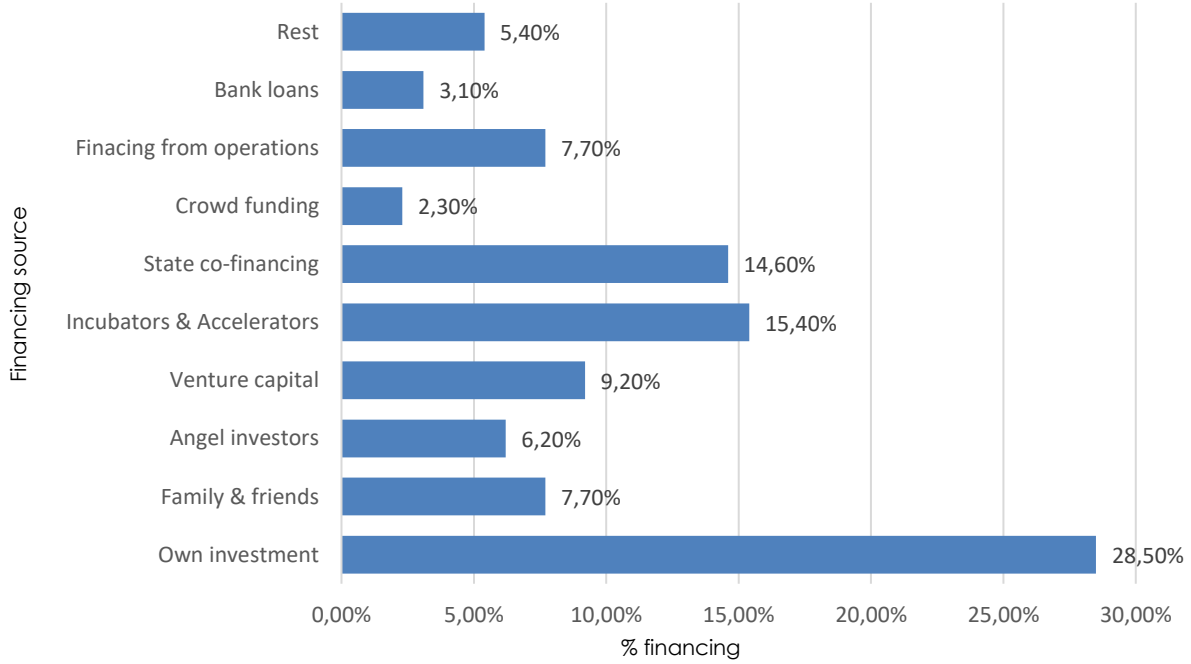
To describe the atmosphere of startup companies more accurately in Croatia, it is necessary also to examine the participants in the startup ecosystem or the active participants who support the development of startup companies. Institutional sponsors of startups are the Ministry of Economy and Sustainable Development, the Croatian Agency for SMEs, the Croatian Chamber of Commerce, the Croatian Employers' Association and the Croatian Bank for Reconstruction and Development. Development of the initial phase of startup companies (excluding financing) can also be supported by entrepreneurial centres, entrepreneurial incubators, and entrepreneurial accelerators (Nikolić & Zorić, 2014). These sponsors provide their support if the startup company applies to a public tender according to certain criteria. Furthermore, entrepreneurial centres are defined as a form of organised advisory assistance to entrepreneurs at the county level, and there are 35 such centres in Croatia. Entrepreneurial accelerators support startups for a longer period because it takes some time to attract investors (three to six months). Like entrepreneurial accelerators, entrepreneurial incubators are support before the official opening of startup companies (Morić Milovanović et al., 2021). Such incubators support an entrepreneur-to-be from the initial idea to the moment of starting a company. They are the first step towards self-employment and additional motivation for entrepreneurs to dare to take the next step towards their own company. During the incubator time, an entrepreneur learns about solving the daily operational business challenges,

encounters and creates a network of business associates, and develops the brand and its value propositions with the help of the incubator staff (Nikolić & Zorić, 2014).

There are several types of entrepreneurial incubators: state incubators, corporate incubators, franchise incubators, incubators as independent enterprises and incubators of different universities. In the official register of entrepreneurial infrastructure in the Republic of Croatia (Single Register of Entrepreneurial Infrastructure - JRPI), there are around 60 currently active business incubators. They do not necessarily help in the beginning only of startup companies because the startup is not regulated in the legal framework of the Republic of Croatia. Still, they significantly help in launching a number of different new companies (some of them can be startups). Regarding startups, Croatia is far from Silicon Valley, which has up to 40,000 active startups; recent Croatian history, including the independence war and transition to a market economy, formed a startup culture relatively late. Compared to most markets, Croatia is also a very small country with only a 1.8 million work active population (Croatian Bureau of Statistics, 2022) and an ageing population with an average age of 43 years (CBS, 2021). When it comes to financing startups in Croatia, recent research (Sokić, 2021) shows that the most important source of financing is the founders' investment (28.5%), followed by incubators or accelerators (15.4%) and state co-financing (14.4%) (Figure 1).

Figure 1

Main financing sources of Croatian startups



Source: Sokić (2021)

It can be concluded that in Croatia, motivation and financial assistance remain under the influence of individual entrepreneurs. Own financing by the founders, also called *bootstrapping,* is defined as financing without external investment. Thus, the initial resources are brought by the founders themselves, which can mean greater control over the development of the startup company. However, this is possible only if

the new startup company does not require significant investments and is quickly profitable. On the other hand, state co-financing within Croatia refers to the support of state institutions when taking out bank loans. An example of a state subsidy is HBOR (Croatian Bank for Reconstruction and Development), which provides lower interest rates for small enterprises and self-employed workers. Also, being a member of the European Union contributes to subsidies where European Union (EU) funds can support the development of newly founded companies. Sokić (2021), in his thesis, identified around 60 startups in Croatia.

StartupBlink (2022), a webpage devoted to following startups around the world, cites a larger number of 152 startups in Croatia. Most startups are found in Zagreb (82), as it is the biggest city and capital of the country, followed by Rijeka (32) and Split (14). According to the same report, Croatia lost 8 spots in the Global Startup Ecosystem index since year 2022, having now positioned itself as 45th worldwide.

Literature review

Organisational culture in startups

With the development of technology and increased globalisation, the market turns towards modern organisational cultures. To identify a healthy organisational culture, indicators such as loyalty to the enterprise, easier acceptance of tasks, good interpersonal relationships within the company, employee satisfaction, and many others can be used. A positive company culture should be maintained by managers and by employees themselves, following the values of the company.

In startup companies, culture is the set of values, beliefs, and practices that guide the behaviour of individuals within the organisation. It shapes the way things are done in the company, including the way employees interact with one another, the way decisions are made, and the way work is done (Schein, 2010). Culture in startup companies is made up of several elements, including values, norms, symbols, and language. Values are the beliefs and principles that the startup company considers essential. They guide the behaviour of employees and are a crucial aspect of the company culture (Azeem et al., 2021). Norms represent the unwritten rules that guide behaviour in the organisation. Norms are the accepted ways of doing things and are an essential aspect of the company's culture (Canning et al., 2020). Symbols are the visible representations of the company's culture. Symbols can be logos, artefacts, or even office designs (Schein, 2010). The language used in the company reflects its culture. The choice of words and tone of communication can impact the company's culture (Azeem et al., 2021).

Culture has a significant impact on the success or failure of startup companies. A positive culture can attract and retain talented employees, increase productivity and innovation, and enhance the company's reputation. On the other hand, a negative culture can lead to high turnover rates, low morale, and a lack of innovation. A toxic culture can also lead to legal and financial issues, as well as reputational damage (Ali et al., 2023). Creating and maintaining a positive culture in a startup company requires effort and commitment from the company's leadership. The first step is to define the company's values, norms, symbols, and language. The startup company should also hire employees who share these values and beliefs. To maintain a positive culture, the company should reinforce these values through employee training, performance management, and leadership behaviour. The company should also seek feedback from employees to identify areas where the culture can be improved (Bhardwaj & Kalia, 2021). Establishing and maintaining a positive culture in startup companies can be challenging. It requires time and effort to define the company's values, norms,

symbols, and language. Startups may also face challenges in hiring employees who share these values and beliefs. The company's leadership may struggle to maintain a positive culture as the company grows and changes (Paais & Pattiruhu, 2020).

Startups are primarily a newly founded companies with a smaller number of employees (initially) within which teamwork and cooperation are encouraged. Startup enterprises often provide "alternative" forms of work, such as remote work. According to the EU Startup Monitor Report 2020/2021, 10% of startups plan to relocate their business to another country. The most popular countries for moving startups, according to the report, are Germany (17%), the United States (13%), and Portugal (13%). Startups that a group of founders founded usually try to display a sense of belonging and teamwork. They are usually open for employees to show diversity and encourage innovation. Employees are given autonomy of work and the ability to make independent decisions, which significantly improves the time from idea to realisation because there are not so many steps in making decisions. Employees there get a direct insight into the purpose and meaning of their work. Founders, as first employees, often take better care of the working space and conditions, providing space for resting, entertainment, exercising, food availability, green corners with plants, and similar. Since employees have the freedom and opportunity to use the space where they work also for fun and recreational activities, they will have more inspiration for innovative solutions. In addition, access to pets is allowed, which also aims to affect pleasure. Startup founders are open to receiving feedback and are easily accessible to all employees because the hierarchy is not as formal as is the case with the traditional organisational culture in large companies (Lee, 2022). The determinants of a startup ecosystem can also foster a positive startup culture as it can be a facilitator of positive behaviour, enabling stimulating educational, legal and financial conditions in which startups will be faster created and developed while also using a good example of other successful startups and their organisational culture.

Internal marketing in startups

Internal marketing refers to the process of promoting and communicating the values, goals, and objectives of an organisation to its employees. This involves creating a positive and supportive work environment, providing training and development opportunities, and promoting a strong corporate culture. The ultimate goal of internal marketing is to engage employees, increase their motivation and commitment, and align their goals with those of the organisation (Huang, 2020).

Startups often face a range of challenges in the early stages of their development, including limited resources, intense competition, and the need to build brand awareness quickly (Wiesenberg et al., 2020). In this environment, internal marketing can play a critical role in helping companies achieve their goals by engaging and motivating employees, fostering a positive corporate culture, and aligning employees' goals with the company's overall mission and vision (Wolf et al., 2022). Internal marketing, the process of creating a positive and supportive work environment for employees, is crucial to the success of startups. By focusing on employee engagement and satisfaction, startups can foster a culture of innovation, collaboration, and performance that drives growth and success. The main tasks of internal marketing, therefore, include:

1. Attracting and retaining employees: A positive work environment and supportive culture can help startups attract and retain employees who are committed to the company's mission and values. By investing in employee training and development, startups can also help their employees grow and

develop professionally, which can increase their motivation and engagement (Czinkota & Ronkainen, 2007; Mukul & Saini, 2021).

2. Building a strong brand identity: Internal marketing can help startups build a strong brand identity by promoting the company's values and mission to employees. When employees understand and believe in the company's mission, they can serve as ambassadors, promoting the company to customers, suppliers, and the wider community (Mingione & Abratt, 2020).
3. Improving employee satisfaction and motivation: A positive work environment and supportive culture can improve employee satisfaction and motivation, which can, in turn, increase productivity and enhance the company's overall performance (Kanchana & Jayathilaka, 2023).
4. Enhancing customer satisfaction: By engaging employees and aligning their goals with those of the organisation, internal marketing can help startups deliver a consistent and high-quality customer experience, which can improve customer satisfaction and loyalty (Men et al., 2021).

Effective internal marketing in startups includes employee training and development, engagement initiatives, recognition programs and clear communication. For example, providing employees with training and development opportunities can help startups build a skilled and motivated workforce. This can include providing opportunities for employees to attend workshops and conferences and offering in-house training programs (Heimler et al., 2020). Startups can engage employees by creating opportunities for them to get involved in the company's activities, such as volunteer work, charity events, and team-building activities (Mathwick, Mallett, & La Roe, 2001).

Recognising and rewarding employee achievements can help startups increase employee motivation and satisfaction. This can include acknowledging individual and team successes and providing incentives such as bonuses and promotions (Robbins & Judge, 2017).

Finally, startups can improve employee engagement by communicating clearly and transparently with employees about the company's mission, values, and goals. This can include regular all-hands meetings, company newsletters, and intranet portals (Prommer et al., 2020).

Employee engagement and satisfaction in startups

Employee engagement is a measure of how committed and invested employees are in their work and the success of the company. When employees are engaged, they are more likely to be productive, stay with the company, and be advocates for the company's products and services. In startups, where resources are often limited, and the stakes are high, engaged employees are essential to success. Research has shown that engaged employees are more likely to innovate, collaborate, and work effectively as a team (HBR, 2017).

One of the key drivers of employee engagement is the sense of purpose and meaning in their work. Startups are often built around a mission or purpose that is larger than the individual products or services they offer. When employees understand and are aligned with this mission, they are more likely to be engaged and motivated to contribute to the company's success (Bailey et al., 2016). In addition to engagement, employee satisfaction is also critical to the success of startups. Satisfied employees are more likely to be productive, stay with the company, and provide good customer service (Bailey et al., 2016). A positive work environment, with clear goals and expectations, opportunities for growth and development, and recognition for hard work and achievements, is key to employee satisfaction (Robbins & Judge, 2017).

Internal marketing is an essential aspect of any startup's success, providing a range of benefits, including attracting and retaining employees, building a strong brand identity, and improving employee satisfaction and motivation. By investing in internal marketing, startups can help build a positive and supportive work environment, foster a strong corporate culture, and align employees' goals with the company's overall mission and vision.

Research methodology and sample

To analyse startup culture in the Republic of Croatia, survey research has been conducted on employees of Croatian startups. A highly structured web survey was used to collect responses. The sampling frame included all the registered startup companies in the Republic of Croatia, according to the EU startup database, where 180 startups were registered from the year 2004 – 2022. Out of the total number, 147 were found to be still active and received questionnaires. There were 30 fully completed questionnaires returned, which accounts for a response rate of 20.4%. Responses have been collected during December 2022.

The sample was non-probabilistic, as startup companies in the Republic of Croatia have been actively targeted, and the main purpose of the research was to gain insight into the organisational culture of Croatian startups. The survey consisted of 26 questions that were, according to Schein (2010), divided into three categories: (i) Culture within the company - recognition of the company's vision, assessment of the atmosphere within the team, the attitude of direct superiors towards employees; (ii) Leadership - evaluation of the superior as an implementer of the mission and vision of the company, relationships within the team, feeling of the possibility of making mistakes; (iii) Startup features - autonomy in decision-making, belief in the innovativeness of the product. Additionally, sociodemographic characteristics of respondents, such as gender, age, level of education, and length of the employment in the company, were also collected.

For most questions, where appropriate, a 5-point Likert scale has been provided with points from 1 strongly disagree to 5 strongly agree with the survey statements. There have been correctly recorded 30 surveys, which puts some limitations on advanced statistics such as factor analysis. However, because of a very small and limited startup scene in Croatia, a large sample was not expected. Data have been processed in IBM SPSS v. 24 software.

Sample descriptions according to the gender, age structure, education level and duration of employment are provided in Table 1. The gender structure indicates that 56.7% of the participants were male, while 43.3% were female. In terms of age structure, the majority fell into the 26-32 age range (46.7%), followed by those aged 33-40 (26.7%), with 18-25-year-olds representing the smallest group at 6.7%. Those over 40 years of age accounted for 20% of the sample. When it comes to education level, the most common category was "MS" (Master degree), with 76.7% of the participants holding this degree, followed by "MSc" (Master of Science) at 6.7%. High school and bachelor's degree holders made up 3.3% and 10% of the sample, respectively, and one participant had a Ph.D. In terms of duration of employment, 33.3% had worked for up to 1 year, 23.3% had been employed for between 1 and 2 years, and 43.3% had more than 2 years of employment. Regarding first employment, 16.7% of the sample reported that it was their first job, while the majority (83.3%) had previous work experience.

Table 1
Sample characteristics (N=30)

Characteristic	Modalities	Frequency	Percent	Cumulative %
Gender	**Male**	17	56.7	56.7
	Female	13	43.3	100
	Total	30	100	
Age	**18-25**	2	6.7	6.7
	26-32	14	46.7	53.3
	33-40	8	26.7	80
	over 40	6	20	100
	Total	30	100	
Education	**High School**	1	3.3	3.3
	Bachelor's Degree	3	10	13.3
	MS	23	76.7	90
	MSc	2	6.7	96.7
	PhD	1	3.3	100
	Total	30	100	
Employment	**up to 1 year**	10	33.3	33.3
	1- 2 years	7	23.3	56.7
	+2 years	13	43.3	100
	Total	30	100	
First employment	**Yes**	5	16.7	16.7
	No	25	83.3	100
	Total	30	100	

Source: Authors' work

Results

Startup characteristics

The characteristics of the startups for which the respondents work show that most of them came from larger startups with more than 50 employees (46.7%), while only 3.3% came from small startups employing less than ten employees, as shown in Table 2.

As startup companies often produce innovative solutions for existing larger companies, it was important in the research to gain insight into mentorship and its recognition by employees. In addition, mentoring means transferring part of the culture to the startup company. Regarding the question about mentorship, the majority of respondents, i.e., 46.7%, answered that initial mentorship was present within the startup company.

Table 2
Number of employees and the utilization of mentoring in Croatian startups (N = 30)

Characteristic	Modalities	Frequency	Percent	Cumulative %
Number of employees	**up to 10**	1	3.3	3.3
	11-25	6	20.0	23.3
	26-50	9	30.0	53.3
	over 50	14	46.7	100.0
	Total	30	100.0	
Mentoring available	**No**	14	46.7	46.7
	Yes	16	53.3	100.0
	Total	30	100.0	

Source: Authors' work

Organizational culture and leadership characteristics of Croatian startups

Table 3 presents the descriptive statistics for the selected cultural value statements. Key insights reveal that employees have a strong grasp of their work's meaning, scoring an average of 4.53, with a relatively low standard deviation, indicating consistent responses. This aspect, along with the equal opportunity for idea presentation within teams, which scored the highest average of 4.80, suggests a workplace that fosters a clear sense of purpose and inclusivity in decision-making processes. The innovation metrics also stood out, with perceptions of the company's products being competitive and in demand and considered innovative and cool, both scoring above 4.3 on average.

Conversely, challenges were noted in the realm of work pressure and task overflow, especially highlighted by a lower score of 3.03 for having to do work beyond the job description due to staffing shortages and the pressure to develop new products swiftly, scoring 3.13 on average. These areas indicate potential stress points and workload management issues within the company.

Table 3

Descriptive statistics for the selected cultural values statement (N=30)

Statements:	N	Min	Max	Mean	SD
Understand the mission and vision of the company	30	1	5	4.23	1.006
The company has clear values that it stands for	30	1	5	4.17	1.053
Contribution to social well-being by the company	30	1	5	3.97	1.189
Can clearly understand the meaning of work in their workplace	30	1	5	4.53	0.900
Satisfaction with the current position	30	2	5	4.07	0.828
The atmosphere in the workplace is motivating and positive and encourages innovation.	30	1	5	4.10	1.062
Sense of security in the workplace	30	2	5	4.13	0.973
Due to a lack of employees, they have to do work beyond the job description	30	1	5	3.03	1.474
Decisions are quickly implemented into a specific product	30	2	5	3.77	0.935
Products the company produce are competitive and in demand	30	2	5	4.30	0.794
Believe the products of the company are innovative and cool	30	2	5	4.40	0.968
Mistakes are not judged but solved constructively in the team	30	1	5	4.40	0.855
Mistakes are constructively communicated by superiors searching for a solution	30	1	5	4.47	0.937
Often under pressure from job requirements to develop a new product as soon as possible.	30	1	5	3.13	1.196
Can make own decisions within a team	30	2	5	4.20	0.847
Decisions are easily confirmed with a small number of superiors (max 2)	30	2	5	4.37	0.850
Immediate superiors adhere to and promote the main principles of the company	30	1	5	4.33	1.184
Immediate superiors clearly communicate business objectives	30	1	5	4.10	1.125
Equal opportunity for idea presentation in a team	30	3	5	4.80	0.484

Source: Authors' work

Differences in attitudes according to gender, age and duration of employment

The results indicate that statistically significant differences between men and women were found regarding the assessment of the *atmosphere in the workplace is motivating, positive and encourages innovative thinking* (M_{MEN}=4.50 and M_{WOMEN}=3.77) and *sense of security in the workplace* (M_{MEN}=4.50 and M_{WOMEN}=3.85), with a significance level of less than 5%. For the assessment of the workplace atmosphere: $t = 2.06$, $p < 0.05$, which means that there is a statistically significant difference between men and women in assessing the workplace atmosphere. For a sense of security: $t = 2.05$, $p < 0.05$, which indicates a statistically significant difference between men and women in assessing workplace sense of security. In both cases, the p-value is less than 0.05, which means that the differences are significant at a significance level of less than 5%. However, it is important to note that statistical significance does not necessarily imply a large practical significance, and further investigation should be conducted to explore how these differences impact the experience of employees in the workplace.

Results in employee attitudes considering age: the initial four age categories (18-25, 26-32, 33-40, and over 40) were combined into two. The largest differences were observed in attitudes about the ability to make *independent decisions within the team*. Differences between the two groups are statistically significant ($t = 3.03$, $p < 0.05$).

For the duration of employment variable, two original categories of work experience were also combined into one - Up to one year and Between one to two years. The largest differences exist in terms of job demand pressure to develop a new product as soon as possible, with longer duration of employment being associated with greater pressure. Then, in cases where respondents have to do work outside their job description due to a lack of employees, the situation is reversed - individuals with shorter work experience, on average, agreed more often with the statement. In this case, the difference is also statistically significant ($t = 2.6$, $p < 0.05$). Respondents with shorter duration of employment time agree to a greater extent that decisions made are quickly realised into a concrete product, compared to those with longer duration of employment ($t = 2.06$, $p < 0.05$). Although differences were observed between the two groups of employees with different durations of employment for other statements, they were not found to be statistically significant.

The correlation analysis revealed the following statistically significant correlations between the following variables. When delving into startup environments, it becomes apparent that there are complex connections between employee composition, demographics, workplace culture and the act of mentoring. These relationships weave together to construct a story about the inner workings of contemporary startups in Croatia.

First, number of employees in a startup is positively correlated with number of women employed ($r=0.417$, $p<0.05$). Besides, the number of employees is positively correlated with the statement *Equal opportunity for idea presentation in a team* ($r=0.418$, $p<0.05$) and negatively with *Mistakes are not judged but solved constructively in the team* ($r=-0.382$, $p<0.05$), *Due to lack of employees I have to do work beyond job description* ($r=-0.665$, $p<0.01$), and I *can make my own decision within a team* ($r=-0.422$, $p<0.05$). With the growth of startups comes an increase not only in size but also in gender diversity. A positive correlation has been observed between employee count and female representation. However, this expansion presents both opportunities and challenges for these companies. Although larger startups are more adept at providing equal opportunity to present ideas, tension arises due to negative effects on

problem-solving from errors committed, the ability of employees to refuse extra work because of personnel lacking, decision-making independence as well as communication quality struggles, posing a potential difficulty with maintaining individual empowerment during rapid scaling phase.

Second, age of employees is positively correlated with employment duration ($r=0.509$, $p<0.01$). For younger employees, there is also a greater chance of this being their first employment. There is a negative statistically significant correlation between gender and statement. *Mistakes are constructively communicated by superiors searching for a solution* ($r=-0.370$, $p<0.05$), which implies that women less agree with this statement compared to men. There is also a significant statistical correlation between the age of employees and a statement that an employee *can make his own decisions within a team* ($r=0.473$, $p<0.01$). Therefore, the story of the startup is enriched by its employees' demographics. Age plays a significant role in determining both tenure and decision-making autonomy, with older workers benefiting more than youthful ones. While inexperienced newcomers often see startups as their entryway to professional life, veterans who have been around for longer are given greater leeway. However, there exists a considerable gender gap regarding how feedback is received; women tend to experience communication about errors less positively than men do.

Third, education level is significantly statistically correlated with the size of a startup ($r=0.419$, $p<0.05$), meaning that in a larger startup with more employees, there are more highly educated ones compared to the small startups. Education level is also negatively correlated with *Understanding the mission and vision of the company* ($r=-0.397$, $p<0.05$), with the *atmosphere in the workplace being motivating, positive and encouraging innovative thinking* ($r=-0.398$, $p<0.05$), and with *Mistakes not judged but solved constructively in the team* ($r=-0.438$, $p<0.05$). Another intriguing aspect of a startup's workforce is its educational background. Typically, larger startups have more employees with higher levels of education; however, this can lead to certain drawbacks, such as less comprehension towards the company's mission and vision, a lacklustre work environment regarding innovation and motivation, and fewer opportunities for constructive problem-solving. Essentially, it highlights an incongruity between highly educated personnel expectations versus what they will encounter in their startup workplace reality.

Fourth, the duration of the employment is negatively correlated with the statement *Due to lack of employees; I have to do work beyond the job description* ($r=-0.505$, $p<0.05$). It is worth noting that a negative relationship exists between tenure and the need to fulfil tasks outside job responsibilities within startups, suggesting roles and duties become more defined as these organizations develop or resources are utilized optimally.

Finally, mentoring of startups is positively correlated with the statement that *Immediate superiors adhere to and promote the main principles of the company* ($r=0.440$, $p<0.05$), *Understand the mission and vision of the company* ($r=0.423$, $p<0.05$), *Mistakes are not judged but solved constructively in the team* ($r=0.445$, $p<0.05$), *Mistakes are constructively communicated by superiors searching for a solution* ($r=0.401$, $p<0.05$). Mentoring within startups is essential to establish a positive organizational culture, clear communication channels and effective problem-solving strategies. A strong correlation exists between mentoring and an unwavering loyalty to the company's principles, comprehensive comprehension of its mission and vision, nurturing constructive approaches towards problems, and encouraging optimistic prospects for growth. Thus, it shows the vital role that mentorship has in establishing firm foundations for successful business operations.

The account presented here conveys a vivid depiction of the intricate and varied system that exists within Croatian startup companies. Aspects such as expansion and variety offer advantages but also pose difficulties, while factors like demographics, education, and guidance work together to mould the fundamental character of these enterprises. The ultimate goal is to create an atmosphere that promotes inclusivity, innovation, and empowerment across all levels of operations.

Conclusion

The research conducted a comprehensive analysis of startup culture in the Republic of Croatia using a descriptive research methodology. The study employed a highly structured web survey to collect responses from Croatian startup employees, targeting multiple aspects of organizational culture, leadership, and employee demographics.

Based on the data and analysis presented in the paper, the cultural characteristics and leadership styles of startups in Croatia can be summarized as follows for the purpose of fulfilling the first research goal (RG1).

Croatian startups exhibit a predominantly positive and proactive organizational culture. This culture is characterized by open communication, collaboration, and a focus on efficiency. Employees tend to understand the mission and vision of their companies, perceive clear corporate values, and believe that their work contributes to social well-being. They also report a motivating and positive work atmosphere that encourages innovative thinking. Mistakes are seen as opportunities for constructive problem-solving rather than harsh judgment. Furthermore, employees have a sense of security in the workplace and believe that their ideas have equal opportunities for presentation within the team.

Leadership within Croatian startups is described as open, communicative, and collaborative. Leaders are focused on achieving goals efficiently. They adhere to and promote the core principles of their companies and clearly communicate business objectives. They also value individual and team autonomy, enabling employees to make their own decisions and quickly implement them into concrete products. In terms of product development, startups aim for competitiveness and innovation.

The second research goal (RG2) aimed to investigate how demographic factors, such as gender, age, education, and work experience, influence employees' perceptions of cultural values in Croatian startups. From the data, it seems that demographic factors do have some influence on employees' perceptions of cultural values within Croatian startups as follows. Results highlight statistically significant differences between men and women in their perceptions of the workplace atmosphere and the sense of security. Women tend to rate these aspects slightly lower than men. Further research may be needed to understand the practical implications of these differences. Younger employees tend to have a greater sense of autonomy in decision-making within their teams compared to older employees. However, no statistically significant differences were found in other cultural value perceptions. Employees with higher education levels tend to work in larger startups with more employees. They may have slightly lower perceptions of understanding the company's mission and vision, the motivating workplace atmosphere, and the constructive handling of mistakes.

Further research might delve deeper into the implications of education level on cultural values. Finally, employees with longer work experience tend to feel more pressure to develop new products quickly. However, they report less frequently doing work beyond their job description due to a lack of employees. Additionally, longer work experience is associated with a higher likelihood of experiencing mentorship within the startup.

In conclusion, the research provides valuable insights into the organizational culture and leadership characteristics of Croatian startups, demonstrating an overall positive environment that fosters innovation and collaboration. On average, employees show that they are very satisfied with their jobs and the companies they work for. Furthermore, they clearly understand corporate mission and vision. The main sources of employee dissatisfaction are understaffing and time pressure to do all the necessary work within a given schedule. The results show that startups in the Republic of Croatia have much room to develop further and improve the employee-focused culture and apply a number of internal marketing activities in order to engage and retain their employees, such as internal communication, professional development, employee benefits, employee recognition, and employee engagement. In order to stay competitive, it is of paramount importance for startups to attract and retain exceptional talents by keeping employee satisfaction and motivation high so that they can work enthusiastically and contribute to the fast growth and development of the startups they work for. However, the study also identifies areas where further exploration is needed in order to understand better the implications of these findings and their potential impact on employees' experiences in the workplace, such as the investigation of gender differences in depth, exploration of the relationship between startup size and cultural aspects, further examination of the impact of mentorship on organizational culture, and to assess the impact of organizational culture on startup success.

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Redefining Success: How Personal Ambitions and Confidence Levels Shape IT Project Dynamic

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Abstract

Background: Failures in information technology (IT) projects continue to concern executives and organisations. Individuals are realising that to remain competitive in the workplace, they must develop skills to become successful project team members and project managers. **Objectives:** The purpose of this paper is to examine the relationship between IT project team members' competencies and their impact on IT project success, considering the iron triangle. **Methods/Approach:** Our study is based on IT projects that have been implemented for a public or private organisation in Slovenia and where contractors are employed in IT development enterprises on a sample of 141 IT companies. Step-wise regression was used to determine which competencies of various project roles are relevant for project success. **Results:** The most intriguing result is the negative association of achievement orientation with project success for analysts or consultants, suggesting that an excessive focus on personal accomplishments could potentially conflict with team objectives. Additionally, the variation in the significance of self-confidence across roles, particularly its less critical impact on project managers, challenges conventional wisdom regarding the universal importance of confidence in leadership positions. **Conclusions:** These insights reveal the nuanced and role-specific contributions of individual characteristics to project success, highlighting the importance of aligning personal traits and professional actions with the project team's collective goals.

Keywords: projects, project management, project team members, competencies, project success, information technology

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Introduction

When companies want to succeed and achieve sustainable development in today's dynamic, rapidly changing and highly competitive business environment, they must learn and adapt as quickly as they can. Sustainable development is an unending process - defined not by fixed goals or the specific means of achieving them but by an approach to creating change through continuous learning and adaptation (Žnidaršič & Jereb, 2011). The ability to learn and to adapt is especially important at times of crisis, such as the Covid-19 pandemic or the past economic crises. Here, individuals and their development in the business environment come to the forefront. The development of an individual means not only improving his/her knowledge but also improving his/her competencies. In the 21st century, an individual's formal education does not always guarantee his/her work performance. Technical skills are not enough to deal with challenges, and product quality is no longer the main value for consumers. Competences are therefore also important. The most important result of introducing competencies is that employees know what is expected of them and how they can achieve this.

Since the failure of IT projects continues to trouble executives and organisations (Sumner et al., 2006), this study aims to determine which competencies of the project team members are necessary for a completed project in the field of information technology (IT). In the reports of The Standish Group (2009), which are published every few years, we see that in 1994, only 16% of projects were completed, 53% were partially successful, and 31% were unsuccessful. In the research that followed, we see that the success of projects increased until 2002 when 34% of IT projects were successful, 51% were partially successful, and 15% of projects were unsuccessful.

To improve the success rate of IT projects, project managers need to develop a better understanding of people as well as organisations (Schwalbe, 2018). If we assume that the competencies of the IT project team have a significant impact on the implementation of the project and that for each IT project in which a competence deficit is identified, it is possible to increase the probability of its successful completion by upgrading competencies or replacing project team members with inappropriate competencies with members with relevant competencies (Varajão et al., 2019). In order to determine the impact of competencies, it is necessary to investigate the presence of competencies of project team members in completed IT projects and the lack of competencies of project team members in unsuccessfully completed projects. Project management has also been investigated in the domain of specific software applications, such as business intelligence (Pejić Bach et al., 2017).

There is no well-defined competence model that allows organisations to assess personnel competencies and establish the relevant training program that allows them to work efficiently in IT project teams, such as software development. However, several studies have already been done in the field of competence identification (Araújo & Pedron, 2015; Boyatzis, 2008; Jha & Iyer, 2007; Dörge, 2010). Araújo & Pedron (2015) also suggested in their study that IT project managers should combine technical skills with interpersonal and managerial competencies so they are better equipped to achieve project success.

Project managers must possess problem-solving expertise, leadership skills, context knowledge and analytical, people and communication expertise in addition to the more commonly emphasised project administration expertise (i.e., setting and managing scope, timelines and budgets) (Brill et al., 2006). However, companies and organisations must strive for the abilities and roles of all project participants in the project team to ensure continuous innovation (Oh & Choi, 2020). Some researchers have shown that a lack of knowledge of project team members leads to unsuccessful

projects (Gemino et al., 2007). Success requires a whole team, and the project manager is by no means able to perform all the tasks of the project team members alone (Alvarenga et al., 2019). The role of the project manager is becoming less important as responsibility for project success is shared with all members of the project team, so each member of the project team must have a clearly defined role (Princes & Said, 2022). With the advent of new technologies and project-driven changes in the working environment, companies are increasingly relying on teams with expertise to achieve organisational goals. Therefore, a company can no longer rely solely on the roles and control of the project manager (Oh & Choi, 2020). There is a lack of study on the competencies of the entire IT project team (Araujo & Pedron, 2015). The roles of project team members are defined according to the needs of project groups of IT companies involved in the development of business applications and depend on the complexity of the project. Every IT project always needs the following roles in the project team in order for the project to run smoothly: project manager, analyst-consultant in charge of the content of the application, application developer (development engineer) and test engineer who also takes care of customer support.

The project team, therefore, consists of four different performers for project activities, all of whom must have the necessary expertise. The central person of the project is still the project manager, who is personally responsible for the effective implementation of the project. A member of the project team can, at the same time, engage in different roles on the project, which, of course, depend on the complexity of the project.

This study is based on IT projects that have been implemented for a public organisation or private company in Slovenia and where contractors are employed in IT development enterprises. The main goal of the study is to examine the success of IT projects (i.e., completed projects within the planned constraints - costs, time frame and quality) according to the competencies of members of the entire project team. The research focused on the competencies of the members of the IT project group. We summarised the competencies of the technical staff. The competency model described in that study is based on the long-lasting research done by different researchers from different countries and continents. Besides that, this study is also the basis for later competency models (e.g., Project Management Institute, 2017).

The study's contribution is providing empirical evidence of the effectiveness of IT projects in relation to the competencies of all members of the project team. Therefore, we focused on the qualifications of the members of the core IT project team and their impact on project success, as this area has not yet been adequately addressed in the literature. In this article, the research question has been posed:

- RQ1: Which competencies are the most important for each specific member of the project team for the successful completion of an IT project?

The first and most important step in the study of competencies is to identify criteria for measuring the performance of all the roles that are presented in the project team. Based on a review of the existing literature, we found that many experts and researchers identified several different criteria for measuring project performance. Taking into consideration the implementing companies (which were also our sample), a project is successful when its total costs do not exceed the total revenues that were incurred within the completed deadline, and the client is fulfilled. A number of criteria determine the success of a project, but many authors (Atkinson, 1999; Jha & Iyer, 2007) mention the most important three criteria: cost, time frame and quality and those three criteria we used in our research.

Our study's contribution to organisational management provides empirical evidence of the effectiveness of IT projects in relation to the competencies of all

project team members. Therefore, we focused on the qualifications of the members of the core IT project team and their impact on project success, as this area has not yet been adequately addressed in the literature.

Literature review

A project is a temporary endeavour undertaken to create a unique product, service or result (Project Management Institute, 2017). IT projects involve using hardware, software, and networks to create a product, service or result (Schwalbe, 2018). Many organisations rely on the use of information technology, and a wide variety of projects use information technology for success. To avoid problems that might occur when the scope, time, and cost goals are not met, project management should be included to manage those constraints. Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements (Project Management Institute, 2017). It is the process of working with a team of people to solve a problem. (Snedaker, 2005). Project managers must not only strive to meet specific scope, time, cost and quality goals of projects but also facilitate the entire process to meet the needs and expectations of people involved in project activities or affected by them (Schwalbe, 2018). The IT project manager should possess project management and IT knowledge, an understanding of the project and how it will fit into the organisation and experience in general management and human relations or soft skills needed to guide the project team (Schwalbe, 2018).

Most technology projects are complex, and lack of funding, lack of staff and lack of time or focus are all blamed in equal measure for project failure). The people involved are responsible for the success or failure of the project (Snedaker, 2005). Because IT projects are diverse, the people involved come from diverse backgrounds and possess different skills. Even with these different educational backgrounds, there are common job titles for people working on most IT projects, such as business analyst, programmer, network specialist, database analyst, quality assurance expert, technical writer, security specialist, hardware engineer, software engineer and system architect. It is important to select team members carefully and to form a team in which all roles are covered. If organisations want to implement IT projects successfully, they need to make effective use of people. People are the most important asset in most projects (Schwalbe, 2018).

When forming a project team, the first step is to define the skills that are needed for the project to finish successfully. Only later will the roles and responsibilities be identified. The tendency for most people is to identify people rather than roles, responsibilities, and competencies.

Competence is the knowledge, skills and behaviours (experience) a person needs to fulfil his or her role. The theory of competence has been studied theoretically and empirically in many research fields from multiple perspectives (Oh & Choi, 2020). Competence is linked with individual behaviour and job performance. Effective job performance is the attainment of specific results (outcomes) required by the job through specific actions while maintaining or being consistent with policies, procedures and conditions of the organisational environment (Boyatzis, 1982). Defining the required competencies and mapping them to roles and responsibilities can help identify the specific people we need to make our project successful. Assessing the skills, abilities and competencies of individuals increases the chances of choosing a team that has the potential to succeed (Snedaker, 2005).

Using the McClelland/McBer job competence assessment methodology, Spencer & Spencer (1993) stated that competency is a feature that is effective concerning the criterion in a job or situation and represents a relatively long-lasting behaviour and

mindset in various situations. In our study, we use the competencies of technical professionals (see Table 1) based on the study described in "Competence at Work" since this study also represents the basis for later competence models (Project Management Institute, 2017).

Table 1
Generic Competency Model for Technical Professionals

Competency	Competency description
Achievement Orientation	• measures performance • improves outcomes • sets challenging goals • innovates
Impact and Influence	• uses direct persuasion, facts and figures • gives presentations tailored to the audience • shows concern with professional reputation
Conceptual thinking	• recognises key actions, underlying problems • makes connections and patterns
Analytical thinking	• anticipates obstacles • breaks problem apart systematically • makes logical conclusions • sees consequences, implications
Initiative	• persists in problem-solving • addresses problems before being asked to
Self-Confidence	• express confidence in own judgement • seeks challenges and independence
Interpersonal Understanding	• Understand the attitudes, interests, and needs of others
Concern for Order	• seeks clarity of roles and information • checks quality of work or information • keeps records
Information – Seeking	• contacts many different sources • reads journals, etc
Teamwork and Cooperation	• brainstorms, solicits input • credits others
Expertise	• expands and uses technical knowledge • enjoys technical work; shares expertise
Customer Service Orientation	• discovers and meets underlying needs

Source: Spencer and Spencer, 1993)

Methodology

Research instrument

The first version of the research instrument, which is a measuring instrument for collecting quantitative data, was prepared at the beginning of 2021 as an online survey supported by the 1KA application.

Firstly, we tested the questionnaire with a retrospective technique of in-depth interviews with two respondents from two different companies involved in the development of IT solutions to determine how respondents understood the questions and take into account possible suggestions for improvement. Respondents had some difficulties in understanding competencies; two. For this reason, we prepared more detailed descriptions of all competencies. Next, we conducted in-depth interviews before the survey to test the questionnaire and possibly acquire an additional set of important competencies of project team members, which was not included in the model "Competence at work". We anticipated that we would also obtain some other

important amendments to the questionnaire. We chose ten appropriate enterprises, taking care that the respondents represented different roles in the project team. In three companies we interviewed with a project manager, three with a developer, two with a customer support technician and two with an analyst. The respondents did not suggest any additional competencies for the roles of IT project team members, so we can conclude that all important competencies, despite the age of the competence model used, are still relevant.

Data collection

To be able to check and compare the competencies of project teams and to eliminate as many external factors as possible that may affect the implementation of the project, we prepared a database of IT companies in Slovenia engaged in software development and competing in the same or related projects. Our research population are Slovenian small and medium-sized enterprises (SMEs) active in the field of IT, specifically in the development of computer applications. In the Slovenian Business Register, which is a central public database on all business entities, we chose NACE (Nomenclature of Economic Activities) code J62 (Computer programming, consultancy, and related activities) and selected 414, which were active at the time of selection (beginning of the year 2021).

The interviews were conducted online and recorded through the Microsoft Teams tool, which allowed for their analysis. Interviews were analysed using the Atlas.ti software tool.

The final version of the survey questionnaire was entered into the 1KA application in August 2021 and was sent to 414 companies. Because the first response rates were not encouraging, we also established contact with some project sponsors (these are usually directors in the case of SMEs) and asked them for assistance. The online survey ended in September 2021. We received 114 completed questionnaires. Statistical analyses were done with the open-source software package PSPP.

Sample characteristics

Out of a total of 141 responses received, more than half were men (55,3%), 21,3% were women, and 23,4% of responses did not indicate their gender. Most responses are in the 41-50 age group (33,3%), 18,4% are in the group aged 31-40, 17,7% of respondents are under 30 years old, and 2,1% are over 61 years old. Thirty-three respondents, or 23,4%, did not declare their age group affiliation. From the distribution of the sample, we can conclude that most respondents who participated in the questionnaire are highly educated since the largest percentage has a level of education VII., spec. After higher education programs, master's degree (39%). The second most represented group of education is VIII. /1. specialisation according to the UN program, Master of Science, which includes 11,3% of respondents, VI/2. Spec. after high school. Program, higher education profession. Prog., 1. Bol. deg., which includes 9,9% of respondents.
The sample's distribution shows that 45,5% of respondents are project managers, the highest number of respondents. Other roles are represented very similarly: 17,7% of respondents are analysts, 15,6% are programmers, and 18,4% are test engineers/user support.

Most respondents (66,7%) cite work experience as a source of knowledge, slightly less than 50% (48,9%) of respondents cite formal education, and 39,7% of respondents cite informal education as a source of acquired knowledge for performing their current role in the project team.

From the project management point of view, most respondents (66%) chose the statement that they have a project manager, 25% stated that they have a project

office, and 7% chose the statement that the company they currently work in does not have a project manager.

Looking further into the descriptive statistics in our study about the competencies of the IT project team, the following results were obtained from the survey questionnaire about the required competencies of the members of the IT project team. The respondents evaluated the variables with scores from 1 to 5, where a score of 1 meant that the selected competency was not necessary at all, and a score of 5 meant that the selected competency was very necessary. The competency "Interpersonal Understanding" has the highest average score of competencies for Project managers (4,69), and the competency "Information Seeking" was rated by the respondents with the lowest average score (3,93) regarding the importance of the competency. According to the results, the competency "Analytical thinking" is rated with the highest average score (4,87), and the competency "Concern for order" is rated with the lowest average score (3,18) for analytics/consultants. The respondents seem to think that the highest average score (4,47) rated the competency "Conceptual thinking" as the most important competency for developers. With the lowest average score, the competency "Concern for order" is the least important for developers. The competency "Concern for order" was rated as the least important (3,18) for test engineer/user support, but the competency "Customer Service Orientation" was valued with the highest average score (4.34).

As the literature lacks studies on the relationship between IT project manager competencies and project success (Turner & Müller, 2005), and especially between IT project team competencies and project success, this research aims to identify which project team member's competencies are more relevant to achieve success in IT project settings. In the first subchapter chapter, we explain the basic characteristics of our respondents. Then, we continue with explanations of the main research question, investigating competencies that are *possibly the most important for each specific member of the project team for the successful completion of an IT project*.

Results

Competencies of project team members

To verify the research question, which competencies of the members of the project team are important for the successful completion of an innovative IT project, data was collected on the following competencies: Achievement orientation, Impact on project implementation, Conceptual thinking, Analytical thinking, Motivation, Self-confidence, Understanding with members of the project group, Taking care of order on the project, Searching for information, Working in a group, Professional knowledge, and Taking care of the client. The data for the different project roles was collected, as presented in Table 2, which shows a summary of the average ratings of competencies that people on the project must possess.

The overall average ratings of the competencies of all project members were evaluated with more than 3.5. Therefore, it is concluded that the competencies of all members are marked as necessary on average. The project leader's competencies were evaluated with the highest average score when the competencies are observed in summary (4.41), and the programmer's competencies were evaluated with the lowest average score (3.86), which would mean that respondents consider the project leader's competencies to be the most important. As for the competencies of the project leader, the results of the descriptive statistics show that, although the respondents rate all competencies highly on average, they emphasise understanding with the members of the project group as the most important, which indicates that

communication with the leader is important to all members. As for the other members, the results of descriptive statistics indicate that group members are primarily expected to have expertise in a narrow area of their activity, so the variable analytical thinking has the highest average score for the analyst, professional knowledge for the programmer, and customer care for the test engineer.

Table 2
Average ratings of competencies for project roles

Code	Project management competencies	Project manager	Analysts consultant	Devel-oper	Test Engineer / User Support
C1	Achievement orientation	4.49	3.97	4.34	4.06
C2	Impact on project implementation	4.53	3.50	3.64	3.40
C3	Conceptual thinking	4.35	4.41	4.47	3.77
C4	Analytical thinking	3.98	4.87	4.03	3.54
C5	Giving initiatives	4.24	3.95	3.85	3.78
C6	Self-confidence	4.47	3.82	3.62	3.78
C7	Understanding with project team members	4.69	4.04	3.99	4.20
C8	Taking care of order on the project	4.51	3.18	3.13	3.16
C9	Searching for information	3.93	4.41	4.10	3.93
C10	Working in a group	4.58	4.02	4.04	4.14
C11	Expertise	4.02	4.60	4.71	4.16
C12	Customer care	4.41	3.70	3.29	4.34

Note: Respondents answered from 1 to 5 (1- not important at all, 2- not important, 3- neither important nor unimportant, 4-important, 5-very important): Source: Author's work

Step-wise regression analysis

The Step-wise regression analysis was used to examine the dependence of the dependent variable, which in this case is the level of the percentage of successful project completion, and the independent variables in the research present the competencies of different team roles. Interdependence was examined through the statistical parameters significance of independent variable in regression models at 1%, 5% or 10% probability.

The dependent variable was defined as binary with a value of 0 for the companies that had lower than 75% of successful projects and a value of 1 for the companies that had equal or higher than 75% of successful projects in the next three years. 40.4% of companies have 75% or more successful projects in the last three years, and 35.5% of companies have less than 75% successful projects in the last three years. 24.1% of respondents did not provide information about the variable. The results indicate a success rate of more than 75% in the majority of cases.

Project manager competencies. From the results of the analysis of the regression model of the dependent variable of the project's success and the independent variables of the project manager's competencies, Table 38 shows that the final regression model (Model 3) obtained from the analysis contains three independent variables C12, C2, and C6. The coefficient of determination is 0.375, which means that the selected model (Model 3) explained 37,5% of the dependent variable. By developing the final model, the average standard error was reduced to 47%.

Table 3
Representativeness of regression models for project manager

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.250	0.062	0.053	0.48800
2	0.321	0.103	0.086	0.47965
3	0.375	0.140	0.115	0.47185
Predictors Model 1: (Constant). C12				
Predictors Model 2: (Constant). C12. C2				
Predictors Model 3: (Constant). C12. C2. C6				
Dependent Variable: Project_success				

Source: Author's work

Table 4 shows the change in the coefficients of determination of the regression models with the independent variable of the project manager's competence. The second model's coefficients of determination changed by 0.041 compared to the first model, which represents a statistically significant difference at 5% probability (with F Values = 4.654, p-value=0.033). The change of the third model compared to the second is 0.037, which is also statistically significant at 5% probability (with F value=4.432, p-value=0.038).

Table 4
Change in the coefficient of regression models for project manager

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	0.062	6.921	1	104	0.010**
2	0.041	4.654	1	103	0.033**
3	0.037	4.432	1	102	0.038**
Predictors Model 1: (Constant). C12					
Predictors Model 2: (Constant). C12. C2					
Predictors Model 3: (Constant). C12. C2. C6					
Dependent Variable: Project_success					

*Note: ** statistically significant at 5% probability; Source: Author's work*

Table 5 shows the regression model that includes the dependent variable of project implementation success and the independent variables of the competencies of the project manager. Step-wise regression analysis was used to form the model. In the selected third model (Model 3), the independent variables C12 and C2 have a statistically significant influence on the dependent variable project success at a 1% probability level. Both variables have a positive influence, which would mean that customer care and level of influence on project success have a positive effect on project success. The third variable, C6, also has a statistically significant impact on the dependent variable project success at a 5% probability level. However, it has a negative impact on the dependent variable, which would mean that the greater the leader's self-awareness at the project level, the more negative the impact on project success is.

Table 5
Estimation of parameters of regression models for project manager

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.218	0.287		-0.757	0.451
	C12	0.169	0.064	0.25	2.631	0.010**
2	(Constant)	-0.821	0.398		-2.065	0.041**
	C12	0.153	0.064	0.227	2.415	0.018**
	C2	0.147	0.068	0.203	2.157	0.033**
3	(Constant)	-0.453	0.429		-1.056	0.294
	C12	0.189	0.065	0.28	2.923	0.004***
	C2	0.196	0.071	0.27	2.761	0.007***
	C6	-0.169	0.08	-0.213	-2.105	0.038**

*Note: ** statistically significant at 5% probability; *** 1%; Source: Author's work*

Analyst/consultant competencies. Table 6 presents the results of the analysis of the regression model of the dependent variable for the successful project and the independent variables of the analyst/consultant. The final regression model (Model 2) obtained from the analysis contains two independent variables: C6 and C1. The coefficient of determination is 0.471, which means that the chosen model (Model 3) explained 47.1% of the deviation of the dependent variable. By developing the final model, the average standard error was reduced to 44.66%.

Table 6
Representativeness of regression models for analyst/consultant

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.426a	0.182	0.174	0.45572
2	0.471b	0.222	0.206	0.44657
Predictors Model 1: (Constant). C6.				
Predictors Model 2: (Constant). C6. C1				
Dependent Variable: Project_success				

Source: Author's work

Table 7 shows the change in the coefficients of determination of the regression models with the independent variable of the analyst's competence. Compared to the first model, the second model had a change in coefficients of determination by 0.040, which represents a statistically significant difference at 5% probability (with F values=5.180, p-value=0.025.

Table 7
Change in the coefficient of determination of regression models for analyst/consultant.

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	0.182	22.418	1	101	0.000***
2	0.040	5.180	1	100	0.025**
Predictors Model 1: (Constant). C6.					
Predictors Model 2: (Constant). C6. C1.					
Dependent Variable: Project_success					

*Note: ** statistically significant at 5% probability; *** 1%; Source: Author's work*

Table 8 shows the regression model that includes the dependent variable for project implementation success and the independent variables for analyst/consultant competencies.

Table 8
Estimation of parameters of regression models for analysts/consultant

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.454	0.213		-2.126	0.036**
	C6	0.258	0.054	0.426	4.735	0.000***
2	(Constant)	-0.237	0.23		-1.032	0.305
	C6	0.342	0.065	0.566	5.267	0.000***
	C1	-0.136	0.06	-0.244	-2.276	0.025**

*Note: ** statistically significant at 5% probability; *** 1%; Source: Author's work*

A step-wise regression analysis was used to form the model. In the selected second model (Model 2), the independent variable C6 has a statistically significant impact on project success at a 1% probability level, and the variable C1 has a statistically significant impact on the dependent variable for project success at a 5% probability. The analyst's self-confidence (C6) has a positive influence on the project's success, which means that the higher the self-confidence, the more successful the project will be. In contrast, achievement orientation has a negative influence. So, a higher degree of achievement orientation will result in a less successful project.

Competencies for developers. From the results of the analysis of the regression model of the dependent variable of the project's success and the independent variables of the developer's competencies, it is evident that the first regression model of the Step-wise analysis is also the final one and contains one variable: Q6b (Impact and Influence). The coefficient of determination is 0.471, which means that the selected model (Model 1) explained 47.1% of the deviation of the dependent variable, and the amount of the standard error is 44.66% (Table 9).

Table 9
Representativeness of regression model for developers

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.471	0.222	0.206	0.44657
Model 1 Predictors: (Constant). C2				
Dependent Variable: Project_success				

Source: Author's work

Table 10 shows a regression model that includes the dependent variable of the project's success and the independent variables of the developer's competencies. Step-wise regression analysis was used to form the model. Variable C2 (Impact and Influences) has a statistically significant influence on the dependent variable, successful project execution, at the 1% probability level. The independent variable has a negative effect on the dependent variable, which is interpreted in such a way that the more focused the developer is on the project, the less successful his performance will be.

Table 10
Estimation of regression model parameters for developer

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.994	0.183		5.419	0.000***
	C2	-0.125	0.049	-0.251	-2.566	0.012**

*Note: ** statistically significant at 5% probability; *** 1%;*

Competencies of test engineer/user support. From the results of the analysis of the regression model of the dependent variable looking at the project's success and the independent variables for the test engineer/user support competencies, Table 11 presents the final regression model (Model 3), where three independent variables were shown: C2, C6 and C11. The coefficient of determination is 0.407, which means that the chosen model (Model 3) explained 40.7% of the deviation of the dependent variable. By developing the final model, the average standard error was reduced to 46.4%.

Table 11
Representativeness of regression models for the test engineer/user support

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.263	0.069	0.060	0.48532
2	0.355	0.126	0.108	0.47259
3	0.407	0.166	0.140	0.46405
a. Predictors: (Constant). C2.				
b. Predictors: (Constant). C2. C6				
c. Predictors: (Constant). C2. C6. C11				
d. Dependent Variable: Project_success				

Source: Author's work

Table 12 shows the change in the coefficients of determination of the regression models with the independent variable of the competence of test engineer/user support.

Table 12
Change in the coefficient of determination of the regression models: dependent variable: Project_success, independent variables: competencies of test engineer/user support.

Model	Change Statistics				
	R Square Change	F Change	df1	df2	Sig. F Change
1	0.069	7.493	1	101	0.007***
2	0.057	6.512	1	100	0.012**
3	0.040	4.716	1	99	0.032**
a. Predictors: (Constant). C2					
b. Predictors: (Constant). C2. C6					
c. Predictors: (Constant). C2. C6. C11					
d. Dependent Variable: Project_success					

*Note: ** statistically significant at 5% probability; *** 1%; Source: Author's work*

The second model's coefficients of determination changed by 0.057 compared to the first model, which represents a statistically significant difference at 5% probability (with F values=6.512, p-value=0.012). The change of the third model compared to the second is 0.04, statistically significant at 1% probability (with F values=4.716, p-value=0.032).

Table 13 shows a regression model that includes the dependent variable for successful project implementation and the independent variables of the competencies of test engineer/user support. Step-wise regression analysis was used to form the model. In the selected third model (Model 3), the independent variables C2 and C6 (Self-confidence) significantly influence the dependent variable, which is a successful project at a probability level of 1%. The variable C11 is significant at a probability level of 5%. The variable C6 has a positive influence on the project performance. The variables C2 and C11 have a negative influence on project success, from which it can be concluded that the more self-aware the test engineer/user support is, the more positively the influence on project performance; also when a test engineer/user support is focused more on performance and has a higher level of professional knowledge, that will negatively affect the project performance.

Table 13
Estimation of parameters of regression models for test engineer/user support

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.923	0.147		6.294	0.000***
	C2	-0.113	0.041	-0.263	-2.737	0.007***
2	(Constant)	0.457	0.232		1.970	0.052**
	C2	-0.123	0.041	-0.286	-3.048	0.003***
	C6	0.134	0.052	0.240	2.552	0.012**
3	(Constant)	0.824	0.284		2.905	0.005**
	C2	-0.120	0.040	-0.277	-3.004	0.003***
	C6	0.186	0.057	0.332	3.270	0.001***
	C11	-0.138	0.064	-0.220	-2.172	0.032**

*Note: ** statistically significant at 5% probability; *** 1%; Source: Author's work*

Table 14 presents the summary of the results of the Step-wise regression.

As for the competencies of the project manager, the results of the step-wise analysis showed that the competence of customer service orientation and impact and influence on project performance are statistically significant at a 1% level and are positively correlated with the dependent variable. The competence Self-Confidence is statistically significant at a 5% probability level and is negatively correlated with the dependent variable. Other competencies did not show an impact on the success of the project. It is concluded that a project manager who is focused on performance and who cares about customers but who at the same time does not have a pronounced self-awareness that would be associated with arrogance and difficulty communicating will have a positive impact on the project's success. In contrast, other competencies will have no impact.

As for analyst/consultant competencies, the Self-confidence competency is statistically significant at 1%. The probability level and the Achievement Orientation

competency are statistically significant at a 5% level, while the other competencies do not affect the project's success. The analyst's self-awareness is positively correlated with the success of the project, which means that a self-aware analyst/consultant will contribute to the project's success. In contrast, the focus on achievement is negatively correlated, according to which it is assumed that the analyst/consultant should focus on his professional framework of action and not on achievement because, in this case, the influence on the successful project will be negative.

Table 14
Results of examining the research question RQ1

	Project role			
	Project manager	Analysts/consultant	Developer	Test engineer/user support
Method	Step-wise regression: Criterion – Probability-of-F-to-enter<=.050, Probability-of-F-to-remove>=.100			
Dependent variable	Project success (0-less than 75% of successful projects in the company; 1-75% and more successful projects in the company)			
Independent variables	Achievement orientation; Impact on the implementation of the project; Conceptual thinking; Analytical thinking; Excitement; Self-confidence; Understanding with members of the project group; Taking care of order on the project; Searching for information; Working in a group; Professional knowledge; Care for a customer			
Criteria for the research question	Statistically significant parameters of the independent variable in the regression model at 1%, 5% or 10% significance			
Statistically significant independent variables	Searching for information (+1%); Impact on the implementation of the project (+1%); Self-confidence (-5%); Other variables (∅)	Self-confidence (+1%); Achievement orientation (-5%); Other variables (∅)	Impact on the implementation of the project (-5%) Other variables (∅)	Impact on the implementation of the project (-1%); Self-confidence (+1%); Professional knowledge (-5%); Other variables (∅)
Conclusion	The project manager who is focused on performance and cares about customers but lacks a high level of awareness will positively influence the project's success.	An analyst/consultant who is self-aware and not focused on achievement will positively influence project success.	A developer who is not oriented on performance will have a positive impact on the project's success.	Test engineer/user support who possesses professional knowledge but is not focused on performance and does not have a high level of self-awareness will positively influence project success.

Source: Authors' work

The results of the developer competencies on project success indicate that only one developer competency impacts project success, and that is Impact and Influence. Impact and influence are negatively correlated with project success at the 5% probability level, which means that as well as for the analyst/consultant, impact and influence will not bring many possibilities to project success. However, quite the opposite, it is assumed that for the project's success, the developer is most expected to act successfully within the framework of expertise.

Regarding the test engineer/user support competency results, the Impact and Influence and Self-Confidence competencies were found to be statistically significant at a 1% probability level, and the Expertise competency at a 5% level. Other competencies of the test engineer/user support were shown to have no impact on the project's success. Expertise competency is positively correlated with project success, which implies that the more knowledge test engineer/user support has, the more will contribute to project success. In contrast, Self-confidence and Impact and Influence competencies are negatively correlated and not desirable for test engineer/user support.

Results reveal that in project management, the significance of specific characteristics varies across roles, as highlighted by step-wise regression analysis findings. For project managers, proactively searching for information and having a tangible impact on project implementation are positively associated with project success, suggesting their crucial role in guiding decision-making and strategy. Conversely, while self-confidence is deemed essential for analysts, consultants, and test engineers, indicating its importance in decision-making and quality advocacy, it is intriguingly less critical for project managers, where excessive confidence might lead to oversight of details. Developers and test engineers who perceive their work as significantly impacting project outcomes are vital for success, emphasising the importance of ownership and quality. However, an overemphasis on personal achievement for analysts or consultants might detract from team goals, indicating that aligning personal ambitions with broader project objectives is crucial. The findings underscore the varied importance of characteristics such as self-confidence, impact perception, and information-seeking across different project roles, each contributing uniquely to project success.

Discussion and conclusion

In an increasingly competitive and globalised market, technological innovation is one of the important key strategies for the survival and growth of high-tech companies (Wang et al., 2022). For this reason, our study has focused on new, innovative IT projects, which means that the results of these IT projects are new or significantly improved products, processes or services that appear on the market or represent a significant novelty or improvement for the user, but not necessarily new to the market (Likar & Fatur, 2006). Suppose these have a significant impact on the implementation of the project for each IT project in which competence deficiencies are identified. In that case, it is possible to increase the probability of its success or to improve the performance indicators of the IT project by upgrading competencies (or replacing project team members with inadequate competencies). To determine the impact of competencies, it is necessary to investigate which competencies of project team members were present in completed IT projects and which competencies of project team members were absent in unsuccessfully completed projects. The literature already confirmed that the competencies of project management personnel are important as they are seen as having a major impact on project performance and,

therefore, on business performance (Crawford, 2005); less is known about the competencies of other project team members who are not managers.

Competencies include knowledge, skills, abilities, personality and behavioural characteristics, beliefs, motives, values, self-image and other abilities of an individual; in short, everything that is a guarantee of successful work performance so that an individual can successfully and efficiently and in accordance with work standards, perform a specific task, achieve goals or play a role in the business process. As more complex and dynamic projects increase, professional and multifunctional requirements are required to build a project team; team members then also need the skills and expertise that managers have, and they must have a high level of communication, management skills, integration capabilities and ability to utilise and understand knowledge, tools and techniques (Oh & Choi, 2020).

The main aim of our research was to create a model of the most important competencies for each role by using the Competence at Work (Spencer & Spencer, 1993) list of competencies, and this aim was achieved. Our work has important implications for IT business owners. It gives them a competency framework that can support them when recruiting new project members. It also considers training for the project team members who currently lack the competencies necessary for a specific role within the project.

Our study confirms previous research which emphasised the importance of soft skills for the project manager (Schwalbe, 2018), not only in IT but also in other industries. The competence of Expertise is very low rate in our study for project managers, and this confirms the conclusion that technical skills are recognised as one of the minimal requirements for a project manager, but excellent interpersonal or soft skills are necessary requisites for success (Gillard, 2009).

In line with previous studies (Jha & Iyer, 2007; Wateridge, 1998), we can also confirm that project managers are the most responsible for project success. However, developers follow closely behind, so we also show that all team members are significant and may play an important role in project success or failure.

A very interesting finding of this study is that the competencies of IT team members, which are important for the successful implementation of a project, are not necessarily the same as the competencies which were lacking in case the project was not completed successfully. The situation when all goes well is not the same as a situation when something is wrong. For example, in the case of a project manager, if a project is successful, "Interpersonal Understanding" and "Teamwork and Cooperation" are considered as the most important competencies. However, if that project was not completed successfully, "Impact and Influence" and "Concern for Order" were the competencies that were lacking the most. Testing engineer/user support has a similar situation: the missing competency is "Initiative", and the desired competency for successful projects is "Customer Service Orientation". However, in the case of analysts and especially developers, competencies in both cases (in successful and unsuccessful projects) significantly overlap.

Therefore, we could conclude from this finding that competencies are more clearly defined for developers and analysts. There is a greater consensus among all four groups regarding the competencies of developers and analysts, as shown by our analysis of the comparison of competency assessments for different team members. To fully understand this inconsistency in understanding the project roles' competencies, we certainly suggest further studies that would pay more attention to this phenomenon.

The limitation of this study is that it was done on Slovenian IT companies only. Since the study deals with understanding the competencies of particular roles which project

members play within the project, there is a probability that other cultural environments would provide different results. Another limitation of this study is that we have focused mostly on productivity (i.e., success of IT projects) only, while other aspects are neglected. Čehovin Zajc and Kohont (2017) emphasise that when managing human resources and the quality of the work process, two perspectives can be considered: a technical aspect, which focuses on productivity as well as the individual, the human aspect that focuses on the person and ensures that they are positively affected. Our study, therefore, presents the organisational perspective for researching the "human aspect", for example, how comfortable or satisfied the respondents are with their role in the IT project.

Future research should delve deeper into the specific competencies required for navigating the complexities of business software implementation projects, building upon the foundational framework established by Pejić Bach, Omazić, and Miloloža (2022). Investigating how project managers can leverage data analytics for risk management and fraud detection presents a pathway for further exploration, underscored by Pejić Bach et al.'s (2020) work on utilising data mining to detect internal fraud within project-based organisations. The importance of adaptive learning competencies that enable project teams to evolve and improve project outcomes over time has been highlighted by Terzieva and Morabito (2016), suggesting a need for research in this area.

Additionally, the critical role of evaluation competencies in determining project success, as focused on by Teixeira, Oliveira, and Varajão (2019), could inspire future studies on how project evaluation frameworks are developed and applied across different project types. With the advent of digital disruption, an exploration into the competencies required for managing projects in rapidly changing digital environments is suggested by Vukadinović and Fabac (2022), particularly in understanding how digital competencies intersect with traditional project management skills.

Lastly, the study by Ćirković, Čubrić, and Čubrić (2022) on project management tools for the fashion and apparel industry opens up an avenue for research into industry-specific project management competencies, investigating how these tools are selected and utilised. Future research should focus on the intersection of traditional project management competencies with digital, analytical, and evaluative skills to address the evolving landscape of project management, including a deeper examination of how competencies are developed, applied, and adapted across industries and project types to drive success in an increasingly complex and dynamic environment.

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How a Perceived Utilisation of IT-enabled Information shapes Customer Satisfaction in B2B Markets

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Abstract

Background: Despite the recognised benefits of IT, we still know very little about how the perceived utilisation of IT-enabled information by suppliers is linked to customer satisfaction in B2B markets. **Objectives:** To address this gap, this study develops a research model, which is then tested through a web-based survey of transport firms' customers. **Methods/Approach:** A web-based survey was conducted in Slovenia. The target population for this study was all export firms that utilise transport services. **Results:** The study makes two key contributions to B2B marketing literature. First, results show that the more a supplier is perceived to utilise IT-enabled information in the service process, the less emphasis its customers place on prices when it comes to determining their satisfaction. Second, the results suggest that customers view the utilisation of IT-enabled information by suppliers of B2B services as a value-adding capability that boosts service quality perceptions. **Conclusions:** Interestingly, although we expected that perceived utilisation of IT-enabled information would also increase the importance of service quality in forming customer satisfaction, the results suggested that this was not the case. Drawing on service quality literature, the study offers possible explanations.

Keywords: customer satisfaction, information technology, information utilisation, B2B, service quality, price

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Introduction

In business-to-business (B2B) markets, customer satisfaction plays a key role in creating, developing, and maintaining long-term relationships with customers (Homburg & Rudolph, 2001). Low levels of satisfaction may encourage customers to explore alternative suppliers and even possibly withdraw from a partnership with a supplier (Homburg et al., 2014). On the contrary, high levels of satisfaction have been found to activate repeat purchases, fuel loyalty, and trigger positive word of mouth (Austen et al., 2012; Kuksov & Xie, 2010). Customer satisfaction has, thus, been repeatedly highlighted as an important driver of firm performance in B2B markets (Salam et al., 2022).

To improve customer satisfaction, B2B suppliers are increasingly making investments in information technology (IT) (Ata & Toker, 2012). IT investments seek to mobilise the utilisation of quality information in interactions between supply chain members (Jonsson & Myrelid, 2016) and, ultimately, to foster long-term supplier-customer relationships (Zhao et al., 2001). As such, IT investments do not only create efficiencies and cost savings in the form of lower inventory, distribution, and transportation costs (Horvath, 2001) but also hold the promise of improving suppliers' customer management capability. Utilising IT-enabled information can enable suppliers of B2B goods and services. This better manages customer knowledge, offers greater responsiveness to customers' demands, and, overall, promotes a better customer experience (e.g. Sanchez-Rodrigues et al., 2010; Sanchez-Rodrigues et al., 2008).

While previous IT research has provided some valuable insights on the business value of IT investments (e.g., Enholm et al., 2022), and B2B marketing research has highlighted the value created for customers by IT investments (e.g. Kim et al., 2010), very few studies have accounted for the B2B customer's perspective on how their perception of suppliers' IT-enabled information utilisation is linked to customer satisfaction. This study seeks to address this void.

Building on literature that identifies price and service quality as key drivers of B2B customer satisfaction (e.g. del Bosque Rodríguez, Agudo, & San Martín Gutiérrez, 2006), along with insights from equity theory (e.g. Carter & Curry, 2010) and studies on the benefits of information utilisation in supply chains (e.g. Davis & Golicic, 2010), this paper develops a research model on how customers' perception of suppliers' IT-enabled information utilisation influences customer satisfaction in B2B markets.

This study makes two key contributions to B2B marketing literature. First, the results illustrate that the more a supplier is perceived to utilise IT-enabled information in the service process, the less emphasis customers are likely to place on prices when it comes to determining their satisfaction. Second, the results suggest that customers view the utilisation of IT-enabled information by suppliers of B2B services as a value-adding capability. This boosts service quality perceptions. Interestingly, although it was expected that the perceived utilisation of IT-enabled information would also increase the importance of service quality in forming customer satisfaction, the results suggested that this was not the case. Drawing on service quality literature, the study offers possible explanations.

The paper is organised as follows. The next section provides a background for the constructs of interest by weaving in previous B2B literature on key determinants of customer satisfaction, with insights from IT and supply chain studies on the benefits of IT-enabled information utilisation from the customer's perspective. A presentation of the research model and the development of hypotheses follows this. Next, the research design is outlined, followed by the study's results. Theoretical and managerial contributions are then discussed. Limitations and future research avenues conclude the paper.

Theoretical background

Customer satisfaction in B2B markets and its key determinants: Price and service quality

Contrary to business-to-consumer (B2C) studies that usually relate satisfaction to a single transaction, customer satisfaction in B2B contexts is a relationship-specific construct (Sureshchandar, 2023). In B2B markets, relationships between sellers and buyers are often close and long-term and involve complex interactions between and within each firm (Pfajfar et al., 2022). Customer satisfaction in B2B markets reflects customers' perceptions of a supplier's ability to meet customers' expectations about the product or service (including key features, product/service-related information, and services) and accompanying activities (e.g. order handling, complaint handling, interaction with salespeople and interaction with internal staff) (Homburg & Rudolph, 2001).

Understanding the antecedents of customer satisfaction is important for B2B marketers, as it has significant implications for the economic performance of firms (Kuksov & Xie, 2010). Customer satisfaction negatively impacts customer complaints and positively impacts customer loyalty (Slack et al., 2020). High levels of customer satisfaction can, therefore, lead to increased revenues and higher market share (Homburg et al., 2013). Although customer satisfaction in B2B markets has not been examined in as much depth as in B2C settings, B2B scholars have begun to unpack its antecedents. Amongst the various financial and non-financial factors highlighted in recent studies, customers' perceptions of a supplier's price (Cahill et al., 2010; Witlox & Vandaele, 2005) and service quality (Chenet et al., 2010; Davis-Sramek et al., 2009; Gil-Saura et al., 2010; Giovanis et al., 2013; Molinari et al., 2008; Vaidyanathan & Devaraj, 2008) have emerged as key drivers of customer satisfaction in B2B markets.

A key antecedent of B2B customer satisfaction is customers' perceptions of the price that they have to pay to receive the product/service (Bag et al., 2020). In the transport sector, for instance, Cahill et al. (2010) have found that prices are an influential factor when it comes to customers' satisfaction with transport firms. Scholars have drawn on equity theory (Huppertz et al., 1978) to conceptualise this influence. According to equity theory, customers look for a fair product for a fair price' (Huppertz et al., 1978). B2B studies have, hence, highlighted that customer satisfaction in B2B markets is very much contingent on how fair or competitive customers perceive the price they pay (Homburg et al., 2013). When customers perceive the supplier's price to be high, this can have a negative effect on their satisfaction (Balasubramanian et al., 2003). On the contrary, when suppliers lower their prices while keeping product/service quality constant, this tends to increase customers' satisfaction (Hidayat et al., 2019). Interestingly, studies have also shown that customers may be willing to accept a relatively high price as long as they perceive pricing formation to be transparent (Carter & Curry, 2010) and fair (Homburg et al., 2013).

Service quality is the other key antecedent of customer satisfaction in B2B markets. Logistics studies, for instance, have emphasised that service quality shapes customer satisfaction and long-term relationship commitment in supply chains (e.g., Chenet et al., 2010; Gil-Saura et al., 2010; Giovanis et al., 2013). Service quality has been conceptualised as an attitude that reflects customers' perceptions about a supplier's performance of specific dimensions important for that service (Cronin & Taylor, 1994). For example, for logistics customers, accommodating unique and/or unplanned requirements and adapting to unexpected operational situations is often very important (Gil-Saura et al., 2010; Amaral et al., 2022). Similarly, Witlox and Vandaele (2005) noted that when it comes to transport services, the frequency, reliability,

flexibility and duration of the service are critical. Cronin and Taylor (1994) have argued that this performance-based conceptualisation of service quality is superior to traditional 'gap theory' conceptualisations (Parasuraman et al., 1985), which viewed the difference between customers' expectations about a general class of suppliers and their assessment of a specific supplier's actual performance as the key driver of service quality.

The value of IT-enabled information utilisation: The customer's perspective

B2B suppliers are increasingly investing in information technology (IT) to enhance their customer satisfaction (Ata & Toker, 2012; Bienstock et al., 2008). Studies in the IT field have traditionally focused on the 'business value of IT', examining the contribution of IT to firm performance (Kohli & Devaraj, 2003; Melville et al., 2004; Mithas et al., 2011). Early research proposed that IT investments were directly linked to firm performance and sustainable competitive advantage (e.g., McFarlane, 1984). However, later studies found no direct IT-performance connection (e.g., Clemons & Row, 1991). Scholars, thus, increasingly proposed that IT capability enables the utilisation of quality information (Popovič et al., 2012), which may enhance key supply chain processes (e.g. managing customer orders, product/service maintenance, human resource acquisition, material acquisition, cash acquisition and product/service development) that, in turn, impact firm performance (Popovič et al., 2012).

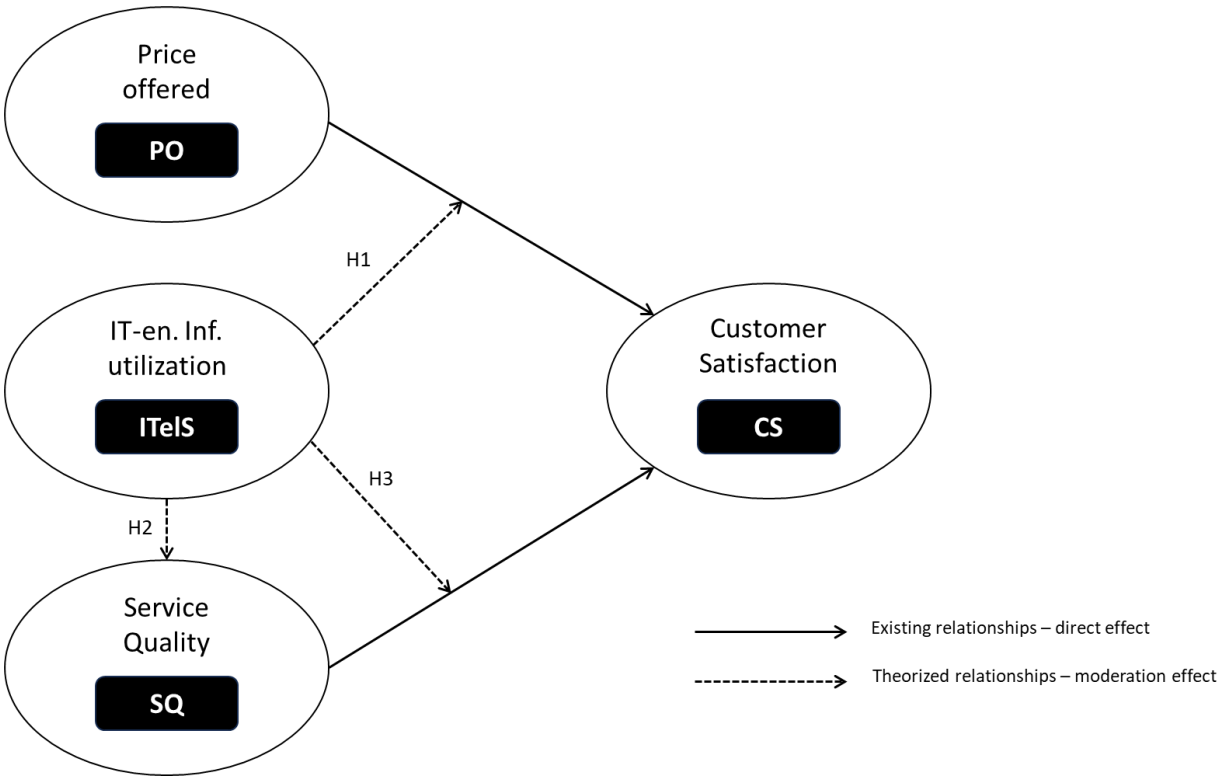
In parallel, studies in the B2B marketing field have examined the impact of IT-enabled information utilisation in supply chains from the customer's perspective (e.g. Lee et al., 2024; Kim et al., 2010; Mithas et al., 2005). Although there is still a dearth of studies examining how customers' perception of suppliers' IT-enabled information utilisation shapes customer satisfaction in B2B markets (Mithas et al., 2005), Lim and Kim (2015) have provided some valuable insights on how IT-enabled information utilisation can create value for customers. They noted that IT investments can facilitate the collection of different types of data. It also helps suppliers to identify what information to deliver to their customers, how to produce it, how to deliver it and how to organise who produces and delivers it. Utilising IT-enabled information can help customers enjoy better planning coordination. Additionally, it enables control of activities in the supply chain (Irfan et al., 2019; Sanders, 2005) and fosters long-term supply chain relationships (Zhao et al., 2001). The utilisation of Electronic Data Interchange (EDI) information in logistics, for example, has been found not only to bring about improved efficiency and lower costs but also to enhance perceptions of process and outcome quality (Dalaqmeh & Irsa, 2022; Zhu et al., 2022; Bienstock et al., 2008; Zhao et al., 2001). Moreover, when suppliers utilise IT-enabled information, they tend to be better at managing customer knowledge and responding to customer demands and, thus, more equipped to provide a better experience for their customers (Zhang et al., 2020; Sambamurthy et al., 2003; Sanchez-Rodrigues et al., 2010; Sanchez-Rodrigues et al., 2008). IT-enabled demand data can also enable dynamic pricing of B2B services (Li et al., 2009).

While previous research has provided some valuable insights on the business and customer value of IT-enabled information utilisation, very few studies have looked at the B2B customer's perspective, and in particular, how their perception of suppliers' IT-enabled information utilisation shapes customer satisfaction. The next section builds a research model and develops hypotheses to address this gap.

Research model and hypotheses

Figure 1 summarises the proposed research model. Hypotheses are discussed in detail in the sections that follow.

Figure 1
The influence of customers' perceptions of suppliers' IT-enabled information utilisation on B2B Customer satisfaction



Source: Author's illustration

Impact of perceived IT-enabled information utilisation on the price–customer satisfaction relationship in B2B markets

Previous research has repeatedly identified price perceptions as a key determinant of customer satisfaction in B2B markets (e.g., Williams et al., 2011). Scholars have suggested that a supplier's ability to offer competitive prices and guarantee prices can lead to greater customer satisfaction (Zhang et al., 2019). B2B customers also tend to track prices over time when making supplier decisions, so remaining competitively priced over time is also important (Elmaghraby & Keskinocak, 2003). This is a challenging task, considering that B2B services are often difficult to price.

However, equity theory suggests that transparent pricing can enhance perceptions of fairness when it comes to prices (Carter & Curry, 2010). Interestingly, Homburg et al. (2014) have found that although an increase in price generally leads to a decrease in customer satisfaction, when pricing is transparent, this is not always the case. Studies have also highlighted that customers tend to be more price-sensitive when there is a lack of information about prices (Gal-Or et al., 2008) and costs (Formentini et al., 2011).

B2B suppliers can leverage their information management capability (Docters, et al., 2004; Mithas et al., 2011) to improve transparency around pricing and, thus, enhance customers' perception of 'fair' suppliers' prices when making purchasing

decisions. IT can help suppliers establish prices and also enable them to utilise and share relevant information with customers about how prices are set (Docters et al., 2004; Habjan et al., 2014). Supply chain studies have long argued that the utilisation and sharing of quality information can enhance the supplier-customer relationship (Dawson et al., 2017). When customers obtain quality IT-enabled information, which can aid their understanding of how prices are formed, perceptions of transparency and fairness are enhanced and thus, customers are likely to be more willing – ceteris paribus – to accept the price charged (Carter & Curry, 2010; Gal-Or et al., 2008; Homburg et al., 2014). The above theorising collectively leads to the development of the following hypothesis:

- *H1: The more B2B customers perceive their supplier to utilise IT-enabled information in the service process, the more the importance of price offered in the formation of customer satisfaction decreases.*

Impact of perceived IT-enabled information utilisation on service quality and B2B customer satisfaction

Extant B2B literature has repeatedly confirmed that service quality is a key antecedent to customer satisfaction in B2B markets (e.g. Chenet et al., 2010; Molinari et al., 2008; Rauyruen & Miller, 2007; Vaidyanathan & Devaraj, 2008). Nevertheless, authors have noted that in supply chain relationships, both service quality and customer satisfaction rest on information, its use and its distribution (Widiyanto et al., 2021). Spreng, MacKenzie, and Olshavsky (1996) argued that when B2B customers evaluate their satisfaction with a supplier, they usually take into consideration information regarding the performance of the product/service offered. In a B2B context, all supply chain partners are, thus, believed to be better off when integrating quality information regarding products/services and making it available to other supply chain partners (Schau et al., 2005). Furthermore, authors reported that information utilisation and sharing within supply chains is linked to increased customer and supplier commitment to their relationship (Lee & Ha, 2018). B2B customers expect their suppliers to develop and utilise market information to meet (or even exceed) agreed service levels (Davis & Golicic, 2010). For example, a retailer will require its key suppliers to utilise transaction data and information on stock levels in order to adapt production to support unexpected demand or declines in sales. McIvor, O'Reilly, and Ponsonby (2003) also suggested that acquired, analysed, shared, and utilised IT-enabled information can improve the post-purchase customer experience. Drawing on the studies above, it is proposed that the more customers perceive a supplier to utilise IT-enabled information, the more their perceptions about service quality will be enhanced, and this will amplify the influence of service quality on customer satisfaction. From the B2B customer's perspective, the following hypotheses are, thus, proposed:

- *H2: Perceived utilisation of IT-enabled information by suppliers has a positive effect on service quality.*
- *H3: As suppliers perceive the utilisation of IT-enabled information as increasing, service quality becomes more important in determining customer satisfaction.*

Methodology

Data collection

A web-based survey was conducted in Slovenia. The target population for this study was all export firms that utilise transport services. This is a particularly fruitful setting for studying how customers' (in this case, export firms') perception of their suppliers' (in this case, transport service providers) IT-enabled information utilisation influences the

formation of customer satisfaction for two reasons. First, Slovenia has a long tradition in the road transport sector. Its transport industry adds about a tenth to the country's Gross Domestic Product (GDP) and is one of the few industries with considerable growth over recent years. Second, in terms of IT investments, Slovenian transport service providers widely utilise IT, predominantly in the form of Global Positioning Systems (GPS), to enhance the efficiency and effectiveness of their transport services. GPS allows transport firms to collect and share real-time transport information on collection location and time, delivery point and time, vehicle number, the position of the vehicle, mileage covered, travel speed, new requests by customers, periodic estimates of road travel times and the status of goods, loading units and vehicles (Ghiani et al., 2003; Giannopoulos, 2004; Repoussis et al., 2009; Wang et al., 2011). GPS helps customers to perform online transactions, share and exchange up-to-date information, receive real-time customer service, manage their logistics, and make inventory replenishment decisions (Eng, 2006).

To obtain a comprehensive list of survey respondents, namely export firms that showed contracted transport services costs in their profit and loss accounts, records from the official Slovenian Exporters register were merged with records of business entities from the database of the Agency of the Republic of Slovenia for Public Legal Records and Related Services. The final list provided 1,377 export firms eligible for inclusion in this study.

A survey website was created, and e-mail invitations were sent to staff responsible for organising transport services within these export firms. These targeted respondents usually worked in the purchasing department or customer service department of the export firms. They were able to evaluate the performance of transport service providers. They were responsible for selecting the transport firm, often making the first contact to place the order and specifying the date of loading/unloading, place of loading/unloading, and type of goods to be transported. From the initial call, 163 firms responded to the survey. To increase the response rate, follow-up reminders were sent out. These resulted in an additional 31 responses. The total number of valid observations was 194, with a final response rate of 14.1%.

To test for non-response bias, the Kolmogorov-Smirnov test was used to compare the distributions of early and late respondents in the sample (Ryans, 1974). The sample distributions of early and late respondents did not differ statistically (the p-value for all variables was above 0.10). The absence of non-response bias was thus confirmed (Ryans, 1974). Moreover, common method bias was tested using Harman's single-factor test (Podsakoff et al., 2003). The test showed that the most variance explained by a single factor was 23.5% and that none of the factors' variance exceeded 50% of the suggested threshold value. Accordingly, the absence of any significant common method bias in the data set was confirmed.

Questionnaire and measures

Relevant constructs were adapted from existing studies in marketing and information management. The construct items were translated from English to Slovenian through a collaborative and iterative translation procedure to ensure semantic equivalency (Douglas & Craig, 2007). A detailed list of the indicators used in the questionnaire is presented in Table 1.

Table 1
Indicators used in the questionnaire

Construct	ID	Indicator
Service Quality (SQ)	SQ1	When the company promises to do something by a certain time, it does so.
	SQ2	When you have problems, the company is sympathetic and reassuring.
	SQ3	The company is dependable.
	SQ4	The company provides its services at the time it promises to do so.
	SQ5	The company keeps its records accurately. *(*** removed in the final model)*
	SQ6	You can trust the employees of the company.
	SQ7	You feel safe in your transactions with the company's employees.
	SQ8	Employees of the company are polite.
	SQ9	Employees get adequate support from the company to do their jobs well.
Customer Satisfaction (CS)	CS1	Satisfaction with transport service
	CS2	Satisfaction with salespeople
	CS3	Satisfaction with transport services-related information
	CS4	Satisfaction with order handling
	CS5	Satisfaction with interaction with internal staff
	CS6	Satisfaction with complaint handling
Price Offered (PO)	PO1	The firm offers competitive prices for its service.
	PO2	The firm is able to offer prices as low as their competitors.
	PO3	The firm guarantees its prices.
IT-enabled Information Utilisation (ITeIS)	ITeIS1	The transport firm utilises GPS-enabled information to encourage employee involvement and improve work processes.
	ITeIS2	The transport firm utilises GPS-enabled information to improve communications between the transport company and you.
	ITeIS3	The transport firm utilises GPS-enabled information to improve ordering.
	ITeIS4	The transport firm utilises GPS-enabled information to enable staff to share task-related information.
	ITeIS5	The transport firm utilises GPS-enabled information to collect data about work/production processes.
	ITeIS6	The transport firm utilises GPS-enabled information to provide DSS, statistical tools, and diagrams.
	ITeIS7	The transport firm utilises GPS-enabled information to provide you with timely information for decision-making.
	ITeIS8	The transport firm utilises GPS-enabled information to provide you with relevant information that meets your needs.

Source: Author's illustration

The cover letter that accompanied the questionnaire asked respondents to focus their answers on the transport service provider with whom their firm had the strongest relationship. In particular, respondents were asked to think about the transport service provider that their firm used the most for transport (i.e., the transport service provider that they used for more than 50% of their transport business). Informal discussions with experts in the transport industry revealed that export firms may use more than one transport service provider due to the unavailability of trucks or for specific routes but that most export firms tend to have a stronger relationship with one supplier of transport services. It was then left to the respondents to assess who that transport service provider was for their firm and to keep that in mind when answering questions.

The questionnaire consisted of three parts. The first part included a set of questions regarding respondents' evaluations of their transport service providers' service quality (SQ), price offered (PO), and customer satisfaction (CS). In the second part of the questionnaire, respondents were then asked to answer questions regarding their perceptions of their transport providers' GPS-enabled information utilisation (ITeIS). As discussed previously, respondents were asked to focus specifically on GPS-enabled information utilisation, as GPS is the main form of IT that transport providers use to share information with their customers. In the third part, respondents were invited to answer demographic questions about their firm (e.g., industry, number of employees, sales volume) and themselves.

Following Cronin & Taylor's (1994) conceptualisation of service quality, the service performance (SERVPERF) instrument was adopted for measuring SQ, which has been extensively validated and is argued to produce better results than SERVQUAL (Asubonteng et al., 1996). Indicators of PO were adopted from the work of Tracey, Vonderembse, and Lim (1999) since they were specific to service industries and have been previously verified. The indicators of CS have been developed by Homburg and Rudolph (2001) for B2B markets and have been validated across several industries. The measurement scale of ITeIS was compiled drawing on similar prior studies by Sánchez-Rodríguez, Dewhurst, and Martínez-Lorente (2006). Following Cronin & Taylor's (1994) recommendation, all measures were adapted to the industry under study. All indicators were measured with a seven-point Likert scale, with 1 representing 'Strongly disagree' and 7 'Strongly agree'.

Sample characteristics

Tables 2, 3 and 4 showcase the profiles of the export firms in the sample by industry type, number of employees and sales volume, respectively. Most respondents worked in the export firms' purchasing or customer service departments.

Table 2
Profile of participating export firms by industry type

Export firms: by industry	% in the sample
Wholesaling/retailing	31.63%
Miscellaneous Manufacturing	25.00%
Transportation/equipment services	13.78%
Chemicals/rubber/mining	6.63%
Food and drug processing	3.06%
Electronics/telecommunications	2.04%
Marketing services	1.02%
Financial services	0.51%
Other	16.33%

Source: Author's illustration

Table 3
Profile of participating export firms by number of employees

Export firms: by number of employees	% in the sample
1 – 9	24.87%
10 – 49	26.42%
50 – 99	14.51%
100 – 199	11.92%
200 – 249	4.66%
250 – 499	9.84%
500 – 999	3.11%
1000 or more	4.67%

Source: Author's illustration

Table 4
Profile of participating export firms by sales

Export firms: by sales	% in the sample
< 500,000 €	7.26%
500,000 – 999,999 €	10.61%
One million to 1,999,999 million €	12.85%
Two million to 4,999,999 million €	21.23%
Five million to 9,999,999 million €	20.67%
Ten million to 19,999,999 million €	14.53%
Over 20 million €	12.85%

Source: Author's illustration

The study controlled for two variables, namely the size of the export firm (customer) and the industry to which it belonged. Existing studies in industrial marketing management suggest that firm size may have a significant impact on B2B relationships (Hallikainen et al., 2020). For example, larger transport service customers may have different requirements and hold different expectations regarding the transport service provider compared to smaller customers. Thus, it was deemed important to control for the impact of firm size on customer satisfaction. Furthermore, customers' expectations of transport firms' services may also differ across industries, and this may influence their satisfaction with the transport service provider (Giannopoulos, 2004). Hence, the impact of industry on customers' satisfaction with the transport service provider was also controlled.

Method

Descriptive statistics and structural equation modelling were used as means of statistical analysis. Partial Least Squares (PLS) path modelling was applied, as implemented in SmartPLS 2.0 (Ringle et al., 2005), to assess measurement reliability and validity, estimate the model, and test the hypotheses. PLS is a broadly accepted variance-based, descriptive, and prediction-oriented approach to structural equation modelling, which is distribution-free and can be utilised for exploratory and confirmatory research (Henseler et al., 2016). PLS has been the common estimation method for customer satisfaction assessment (Coelho & Henseler, 2012) and within studies assessing the IT value for organisations (e.g. Ghapanchi, 2013; Kamhawi, 2010). Moreover, PLS works well with small to medium sample sizes and complex models (Hair et al., 2012).

Results

Descriptive analysis

Descriptive analysis showed that most of the indicators' means were around one scale point to the right of the centre of the scale, thus suggesting a slightly negative skewed distribution. Standard deviations varied between .890 for CS4 and 2.149 for ITeIS6. ITeIS indicators showed the highest standard deviations, while CS indicators had the lowest variability. The means and standard deviations of indicators can be found in Table 5.

Before testing the structural model, the reflective part of the measurement model was first examined in order to assess the construct and indicator reliability, internal consistency, convergent validity, and discriminant validity. The quality of the formative construct in the measurement model was then determined through content validity (Straub et al., 2004), multicollinearity (Diamantopoulos & Siguaw, 2006), and weights (Chin, 1998). These are described in the following sections.

Table 5
Means, standard deviations and standardised loadings of indicators

Construct	Indicator	Mean	Std. deviation	Loading
Service Quality (SQ) (r)	SQ1	5.80	1.336	0.790*
	SQ2	5.52	1.264	0.764*
	SQ3	5.91	1.085	0.831*
	SQ4	5.90	1.082	0.806*
	SQ6	5.67	1.180	0.775*
	SQ7	5.66	1.183	0.801*
	SQ8	5.73	1.153	0.765*
	SQ9	5.63	1.144	0.732*
Price Offered (PO) (r)	PO1	5.66	1.231	0.836*
	PO2	5.46	1.581	0.794*
	PO3	5.97	1.220	0.786*
Customer Satisfaction (CS) (r)	CS1	5.85	0.952	0.873*
	CS2	5.87	1.092	0.877*
	CS3	5.59	1.098	0.856*
	CS4	5.84	0.890	0.868*
	CS5	5.89	1.049	0.854*
	CS6	5.47	1.390	0.791*
IT-enabled Information Utilisation (ITeIS) (f)	ITeIS1	4.90	1.923	0.861*
	ITeIS2	4.34	2.066	0.852*
	ITeIS3	4.64	1.981	0.905*
	ITeIS4	5.02	1.940	0.898*
	ITeIS5	5.04	2.032	0.924*
	ITeIS6	4.89	2.149	0.895*
	ITeIS7	4.76	2.092	0.906*
	ITeIS8	4.79	2.076	0.911*

*Note: (r) reflective measures; (f) formative measures; *Significant at 0.001 level (two-tailed test)*
Source: Author's illustration

Measurement model assessment

The reflective measures were assessed for reliability and validity by confirming that they described their corresponding constructs adequately (see Table 6). All Cronbach's Alphas reached and exceeded the 0.7 threshold (Nunnally, 1975). Without exception, latent variable composite reliabilities (Fornell & Larcker, 1981) were higher than 0.80 and, in general, above 0.90, showing a high internal consistency of indicators measuring each construct. The average variance extracted (AVE) (Fornell & Larcker, 1981) values were also consistently higher than 0.60, thus demonstrating one-dimensionality and a high convergent validity. Reliability and convergent validity of the measurement model were further confirmed by computing standardised loadings for reflective measures (see Table 5) and Bootstrap t-statistics for their significance. All standardised loadings exceeded the minimum suggested threshold of 0.7, thus confirming a high convergent validity of the measurement model.

To determine discriminant validity, the analysis also focused on whether each latent variable shared more variance with its measurement variables or with other constructs (Chin, 1998; Fornell & Larcker, 1981). Comparing each construct's square root of the AVE with its largest squared inter-construct correlations (Table 7) revealed that discriminant validity in the form of the Fornell–Larcker criterion was met. It was concluded that all the constructs showed evidence of adequate validity.

For the formative construct ITeIS, which was modelled using eight formative indicators, the test for multicollinearity denoted that analysis of the significance of

outer weights could be conducted as the next step since the variance inflation factor (VIF) values for all indicators were below 5. Thus, collinearity did not cause an issue (Hair et al., 2012). Outer weights of the ITeIS construct were significant for three indicators; for the other five indicators, the outer loading was greater than 0.5, and thus, no indicator was eliminated (Hair et al., 2012). Since the evaluations of construct reliability, indicator reliability, convergent validity, discriminant validity (reflective measures), content validity, multicollinearity, and weights (formative measures) were adequate, the constructs were confirmed as suitable for testing the conceptual model.

Table 6
Reliability and validity measures

Construct	Cronbach's Alpha	Composite reliability	Average variance extracted
Service Quality (SQ)	0.910	0.927	0.614
Price Offered (PO)	0.732	0.847	0.649
Customer Satisfaction (CS)	0.925	0.942	0.729
IT-enabled Information Utilisation (ITeIS)	N/A	N/A	N/A

Note: Composite reliability, Cronbach's alpha and average variance extracted are not applicable to the formative construct
Source: Author's illustration

Table 7
Correlations between latent variables and square roots of average variance extracted

	SQ	PO	CS	ITeIS
SQ	**0.784**	0.564	0.712	0.190
PO		**0.806**	0.556	0.173
CS			**0.854**	0.319
ITeIS				**N/A**

Note: Bold elements in the main diagonal of the latent variable correlations denote the square root of the average variance extracted
Source: Author's illustration

Structural model results

The structural model consisted of six latent variables, namely ITeIS, PO, SQ and CS, along with two latent variables that represented interactions between original latent variables (ITeIS x PO and ITeIS x SQ). Following Chin, Marcolin, and Newsted (2003), interaction terms were modelled through the creation of new constructs, using the products of the standardised indicators relative to the underlying constructs involved in the interaction as indicators.

Table 8 presents the explanatory power (through determination coefficient, R2) of the equations explaining the endogenous construct. The proposed model showed a high explanatory power for CS (0.6). Furthermore, Table 8 provides the estimates of path coefficients of the proposed model and corresponding significance levels, as well as the effect sizes for evaluating the predictive importance of each determinant (original constructs and interaction terms). Mirroring extant literature, PO and SQ showed significant positive impacts on CS, with the impact of SQ being considerably larger than the impact of PO (0.538 vs. 0.186). The ITeIS x PO-CS path was significant at 5 percent. It appeared that the more customers perceived that transport firms utilised GPS-enabled information, the less important the prices offered were in forming

their satisfaction with the transport firm (H1 was, therefore, supported). Moreover, the effect of ITeIS on SQ was positive, thus suggesting that the more customers perceived the transport firms to utilise GPS-enabled information, the more this enhanced the perceived service quality (H2 was, hence, supported). The path ITeIS-SQ was significant at 5%. Interestingly, the GPS x SQ-CS path was non-significant (H3 was not supported). Utilising IT-enabled information, thus, did not appear to increase the perceived importance of SQ in forming CS with transport service providers. Lastly, the results indicated that the control variables, i.e. firm size and industry type, did not have any significant effect on CS.

Table 8
Structural model results and effects sizes (f2)

Criterion	Predictors	R^2	Path coefficient	f^2
Customer Satisfaction (CS)	Price Offered (PO)	0.601	0.181**	
	Service Quality (SQ)		0.582***	
	IT-enabled Information Utilisation (ITeIS) x Price Offered (PO)		-0.184*	0.091
	IT-enabled Information Utilisation (ITeIS) x Service Quality (SQ)		0.018 (ns)	
	Firm size		0.063 (ns)	
	Industry		0.092 (ns)	
Service Quality (SQ)	IT-enabled Information Utilisations (ITeIS)	0.036	0.188*	

** significant at 0.05 level (two-tailed test); ** significant at 0.01 level (two-tailed test); *** significant at 0.001 level (two-tailed test), (ns) non-significant;*
Source: Author's illustration

Discussion and conclusion

Theoretical implications

Despite the recognised benefits of IT in extant B2B marketing literature, our understanding of how customers' perception of suppliers' IT-enabled information utilisation influences customer satisfaction remains scarce. While echoing the influence of price and service quality on B2B customer satisfaction, this study provides new insights into how perceived IT-enabled information utilisation affects customer satisfaction in B2B markets.

This study reveals two important contributions to B2B marketing theory in terms of the role that perceived IT-enabled information utilisation plays in customer satisfaction formation. First, the results suggest that the more B2B customers perceive suppliers to utilise IT-enabled information, the more this suppresses the relative impact of price on overall customer satisfaction formation. Equity theory explains that information utilisation in the transport process mobilises perceptions of fairness and transparency when it comes to suppliers' prices (Carter & Curry, 2010; Homburg et al., 2013). Increased IT-enabled information utilisation thus not only enables B2B suppliers to set up more precise prices, segment customers more accurately and adjust prices promptly (Li et al., 2009) but also encourages their customers to place less emphasis on prices when it comes to satisfaction formation (Guzovski et al., 2022).

Second, the results show that the perceived utilisation of IT-enabled information positively influences perceptions of service quality. IT-enabled information can enhance the quality of information available during the service process (Smith & Mentzer, 2010). In the e-service context, Xu, Benbasat, and Cenfetelli (2013) have

discussed the effect of information quality on service quality. Similarly, in the context of transportation and logistics, delivering timely and comprehensive information to customers has been found to be critical (Kahn et al., 2002). IT-enabled utilisation enhances on-time delivery as well as flexibility in the transport process, enabling the transport firm to reroute a vehicle while en route if customers' requirements change (Mintsis et al., 2004).

Although it was expected that as the perceived utilisation of GPS-enabled information in the service process increases, the importance of service quality in forming customer satisfaction would also increase, the results suggested that this was not the case. There are three possible explanations for this outcome. First, the literature suggests that positive enhancements in service quality may not be reflected immediately in an increase in customer satisfaction but rather in the long run (Hidayat et al., 2019). Second, increased perceived IT-enabled information utilisation by suppliers may increase customers' expectations and, in turn, increase expectations of service performance levels (Bebko, 2000; Chang & Chen, 2008). Third, an alternative possible explanation could be that the weakened relative importance of price in customer satisfaction formation shifts the emphasis on other customer satisfaction determinants (Homburg & Rudolph, 2001).

Managerial implications

This study also has several implications for B2B marketing practice. The utilisation of IT-enabled information makes price definition more transparent and, hence, possibly fairer in the eyes of customers by revealing, for instance, common market and transport costs (e.g. road tolls, taxes, fuel costs). While the definition of IT-supported pricing may lead to less variation in price between competitors, customers are likely to look for other factors that determine their satisfaction with the service provider and pay less attention to the price offered. B2B service providers sharing IT-enabled information on price setting should, therefore, sharpen their focus on developing other customer-oriented capabilities (e.g., order handling, complaint handling, flexibility, responsiveness, and reliable delivery) in order to differentiate themselves from the competition. In essence, B2B firms that share IT-enabled information with their customers should be shifting their emphasis from a price-oriented to a customer-oriented focus.

For B2B customers, perceived transparency on prices fostered by IT-enabled information utilisation can bring about two benefits. First, customers can save valuable resources, especially time, when searching for competitive offers from prospective suppliers. Second, customers can better focus on negotiating or tailoring other aspects of their customer-supplier agreement to meet their needs beyond direct economic interests. All of this collectively contributes to a more positive customer-service provider experience, which is key for repeat purchases (Kuksov & Xie, 2010).

Limitations and future research avenues

Despite its contributions to B2B marketing theory and practice, this study has limitations that open opportunities for future research. To begin with, the proposed model tested how Slovenian export firms' perception of their key transport service provider's GPS-enabled information utilisation shaped customer satisfaction. Future research can examine the generalizability of these findings to other B2B settings, countries and information technologies (e.g., enterprise-wide information systems). Future studies can also unpack the antecedents of perceived IT-enabled information utilisation. Last but not least, this study focused on the dyadic relationship between B2B customers and their main suppliers. Researchers can extend this study to broader supply chains

and consider their level of integration. Moreover, studies can delve deeper into the role that the nature and length of the customer-supplier relationship may play in shaping customer satisfaction in B2B markets.

Concluding remarks

Customer satisfaction plays a major role in endorsing long-term supply chain relationships and enhancing firm performance in B2B contexts. This study explored how customers' perception of suppliers' IT-enabled information utilisation affects the formation of customer satisfaction in B2B markets. Blending customer satisfaction and information utilisation literature facilitated the development of research hypotheses that explicate these relationships. The results revealed that perceived IT-enabled information utilisation suppresses the relative importance of price offered in forming customer satisfaction in B2B contexts. Moreover, perceived IT-enabled information utilisation positively affects perceptions of service quality. However, this does not impact the relative importance of service quality on customer satisfaction formation. This study aims to trigger future research that sheds further light on the role that IT plays in shaping B2B customer satisfaction.

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About the author

Andreja Habjan is a recognised expert in the fields of transport, logistics, and business administration, with a solid background in both academia and the professional world. Her educational journey began at GEA College, where she earned a Master's degree in Business Administration and Management from 2002 to 2006, laying the groundwork for her future career. Her pursuit of further education led her to Brunel University London, where she focused on business, management, and logistics as a research student from 2006 to 2010. Her academic journey reached a peak at Cardiff University, where she earned a Doctor of Philosophy (PhD) in Ground Transportation in 2015, further deepening her knowledge and research skills. Alongside her academic pursuits, Andreja has built a notable professional career. Since July 2007, she has been a pivotal figure at Habjan Transport, d.o.o., starting as the Head of Finance and Administration before taking on the role of CEO in September 2013. Her tenure as CEO has been marked by steady leadership and strategic development. In addition to her role at Habjan Transport, Andreja has contributed to academia as a Lecturer at GEA College from January 2003 to July 2017, sharing her insights and experience with students. In April 2021, she took on the position of Assistant Professor at NOA, Slovenia, further demonstrating her commitment to education in the field of transport and logistics. The author can be contacted at **andreja.habjan@mynoa.com**.

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Economic and Environmental Sustainability through Trade Openness and Energy Production

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Abstract

Background: Energy production plays a major role in the Saudi Arabian economy, but energy production can lead to an increase in environmental pollution. **Objectives**: This study investigated the impact of energy production and trade openness on Saudi Arabia's economic growth and environmental pollution using annual data from 1970 to 2020. **Methods/Approach**: The fully modified ordinary least squares (FMOLS) and the dynamic ordinary least squares (DOLS) methods were employed to develop two models, including an economic growth model and an environmental Sustainability or pollution model. **Results**: The results of the two tests ensured that both expanding trade openness and increasing energy production led to faster economic growth. Nevertheless, the expansion of trade openness and energy production also led to environmental pollution; hence, the increase in energy production did not support sustainable development. **Conclusions**: Thus, policymakers should develop a green economy strategy to reduce the use of fossil fuels and increase renewable energy in energy production to reduce environmental pollution. Moreover, the Saudi Arabian government should highly promote investment in renewable energy production through trade openness.

Keywords: pollution; growth; Saudi Arabia; FMOLS; DOLS

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Introduction

Trade openness refers to the degree to which one country deals with another country in trade, including exports, imports, foreign direct investments (FDIs), lending, borrowing, and repatriation of funds from abroad (Amna Intisar et al., 2020). Trade openness also enhances economic growth in several ways, including an increase in capital formation and the expansion of markets, as well as the development of new production methods, the creation of more job opportunities, and the reduction of poverty. Previous studies have shown that trade openness has led to technological transformation in the Asian economy and helped enhance human capital (Amna Intisar et al., 2020). Furthermore, financial openness is another route through which economic growth can be supported. In this way, the level of foreign direct investment and capital flows into the country can be determined (Aremo & Arambada, 2021).

The results of literature reviews regarding the impact of trade openness on economic growth differ widely. Several literature reviews have indicated that the impact of trade openness is positive for economic growth, as demonstrated by Amna Intisar et al. (2020). Al-Shayeb and Hatemi (2016) and Alam and Sumon (2020) showed that trade openness improved new technology for transfers and facilitated technological progress and productivity. These advantages are proportional to the degree of trade openness, reducing resource misallocation in the short term while facilitating technological development transfers in the long term (Mallick & Behera, 2020). However, Gries, Kraft, and Meierrieks (2009), Hye and Lau (2014), Zahonogo (2016), and Belloumi and Alshehry (2020) found a negative impact. Moreover, Kim (2011) and Vlastou (2010) discovered that trade openness boosted economic growth in developed countries while harming developing countries. Other previous studies have shown no significant relationship between trade openness and economic growth (Eris & Ulasan, 2013); Menyah et al., 2014; Ulaşan, 2015; Yanikkaya, 2003).

The increasing concern about the environmental impact of fossil fuels has grown over the last four decades. Considering that oil production consumes oil to generate thermal energy to process oil and convert it into its related products, the industry should be more energy efficient and consider renewable energy resources as well (Halabi et al., 2015). Increases in greenhouse gas emissions represent a significant hazard to the environment. The rapid economic growth and expansion of industrialisation processes in newly industrialised countries necessitate the intensive use of energy and other natural resources. This energy use leads to the release of more residues and wastes into the environment, which can result in environmental pollution. Carbon dioxide is widely regarded as the primary cause of the greenhouse effect, and it has received considerable attention in recent years. The majority of carbon dioxide emissions (CO2 emissions) are caused by the use of fossil fuels such as coal, oil, and gas (Hossain, 2011). The global oil companies have implemented strategies and taken a series of steps towards developing technologies that lower greenhouse gas emissions, especially that concerns focus on the relationship between greenhouse gas emissions and global warming, which is expected to increase by approximately 40% over the coming two decades. This increase in greenhouse gas emissions should be addressed by adopting environmental regulations on various levels, especially for industrial and oil-producing businesses (Halabi et al., 2015).

Regarding the impact of trade openness on environmental pollution, Mahmood, Maalel, and Zarrad (2019) noted that an increase in trade openness would increase energy consumption and pollution as a country's income level rose. However, a decline in trade openness does not always correlate with a decline in energy consumption. Some researchers have studied the relationship between trade openness and carbon dioxide. However, the findings of previous studies have differed

regarding the impact of trade openness on carbon dioxide emissions. Chen, Jiang, and Kitila (2021), Rahman, Zaman, and Górecki (2020), and Zamil, Furqan, M., and Mahmood (2019) found that an increase in trade openness leads to an increase in CO2 emissions. Thus, environmental pollution is increasing. Conversely, Hossain (2011) found that trade openness leads to a decrease in environmental pollution.

Oil production represents a large proportion of the national GDP in oil-producing countries, and an increase in oil prices can strengthen the value of the country's currency by increasing export earnings and real national income. Previous studies have concentrated on the impacts of energy consumption on economic growth and environmental pollution but have ignored the impact of energy production on economic growth and environmental pollution. Although energy production leads to economic growth, it also leads to environmental pollution. Kingdom Saudi Arabia (K.S.A.) is the world's largest oil producer and one of the most severely polluted countries (Algarini, 2019).

KSA is the second largest holder of oil reserves in the world, and oil exports significantly contribute to its GDP. Despite this, it is predicted that if KSA continues to consume its reserves at the current rate, it will have to import oil by 2038. Moreover, its power consumption is three times higher than the world average; the housing sector consumes about 70% of the total electricity consumption in the country. Hence, the future demand for electricity in KSA is expected to continue to grow, accompanied by population growth, a fast industrialisation pace, and urbanisation. The matter that harms the environment (Ali & Khan, 2018). According to the World Bank (2023) data, renewable energy consumption accounted for only 0.06 % of total final energy consumption in 2020, and fuel exports accounted for 77% of merchandise exports in 2021. Accordingly, the data show that KSA is still heavily reliant on non-renewable energy sources, with almost no use of renewable energy.

In 2014, CO2 emissions totalled 19.52 metric tons per capita in Saudi Arabia, compared to 16.49 metric tons per capita in the United States (WDI, 2019). The environmental challenges facing the Kingdom of Saudi Arabia (KSA) are represented by environmental damage due to the oil and gas industry. Air pollution is caused by the mining industry, the large expansion of the transportation sector, and increases in the per capita production of waste. According to Vision 2030, Saudi Arabia aims to achieve environmental sustainability using renewable energy, green cities, and waste recycling (Saudi-Vision, 2030, n.d.).

To cite further knowledge, a few studies (Algarini, 2019; Danlami et al., 2019; Hdom Fuinhas, 2020) have discussed the relationship between energy production and carbon dioxide emissions and concluded that increased energy production leads to an increase in carbon dioxide emissions. Only Algarini's study (2019) focused on Saudi Arabia, while two other studies (Chen et al., 2019; Hdom & Fuinhas, 2020) focused on the impacts of trade openness and energy production on economic growth and carbon dioxide emissions. However, neither of these studies analysed Saudi Arabia.
This study aims to clarify the impact of energy production and trade openness on economic growth and environmental pollution at the same time in Saudi Arabia. Because there is no clear consensus about these relations. Although Algarini (2019) and Belloumi and Alshehry (2020) carried out the two studies focusing on Saudi Arabia, these studies did not combine energy production with economic openness. Therefore, this study attempts to bridge the gap between the impact of energy production and trade openness on economic growth and environmental pollution and enrich Saudi Arabian studies. The following questions were raised:

- Does energy production have a significant positive impact on economic growth?

- Does trade openness have a significant positive impact on economic growth?
- Does increased energy production lead to increased environmental pollution?
- Does trade openness have a significant impact on increasing environmental pollution?

The study covered the period 1970–2020 only due to data availability. The data were collected from the World Bank and the BP Statistical Review of World Energy. The fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS) models were employed to determine the impact of energy production and trade openness on economic growth and environmental pollution. The FMOLS and DOLS methods were employed according to Le et al. (2023) and Ngong et al. (2022). The FMOLS represents a nonparametric method of testing serial correlation by using the disturbance parameters' Kernal estimators on the OLS asymptotic distribution by modifying OLS, correcting the impact of serial correlation, and ensuring regressors' endogeneity. It is superior to both OLS and Engle–Granger methods for its ability to correct inference problems. Accordingly, it ensures the long-term validity of estimates. The DOLS is a parametric method that uses leads and lags to solve correlation problems among variables of investigation. Moreover, it is dynamic and can solve the problems of endogeneity, ensuring co-integration and unbiased coefficients. Both FMOLS and DOLS ensure robustness (Ngong et al., 2023; Kalim & Shahbaz, 2009).

The following sections comprise the remainder of the paper: Section 2 reviews the relevant literature, and Section 3 presents the research design. Section 4 contains the empirical results, and Section 5 contains the conclusions, recommendations for policy and limitations.

Literature Review

The literature review was classified into four categories. The first category focused on studying the link between trade openness and economic growth; the second category focused on the link between trade openness and environmental pollution. The third category focused on the links between energy production, economic growth, and environmental pollution. Moreover, the fourth category focused on the links between economics and sustainability.

Trade Openness and Economic Growth

Trade openness serves as a conduit for the flow of FDI, capital, goods, and services to host countries or areas. These are the engines of economic growth in developing countries. In recent years, scholars and researchers have argued over and sought to verify the relationship between trade openness and economic growth. This section presents a literature review of the relationship above.

Aremo and Arambada (2021) examined the relationship between trade, financial openness, and economic growth in Sub-Saharan Africa (SSA) in the period 1980–2017. The authors applied a dynamic analysis using the techniques of the general method of moments (GMM) and the general method of moments system (GMM system). They found a positive impact of trade openness on economic growth in low-income countries. However, financial openness and joint trade did not have a significant positive effect on economic growth. Generally, there was no evidence to support the hypothesis of simultaneous openness in sub-Saharan African economies. Hdom and Fuinhas (2020) used the co-integration regression methods FMOLS and DOLS. They found that the Brazilian economy was affected by electricity generation, gross domestic product (GDP), and international trade in both positive and negative ways. A bidirectional correlation was observed between trade openness and all energy production in Brazil. Saleem et al. (2020) used the autoregressive distributed lag (ARDL)

approach on annual data (1975–2016) for Bangladesh, India, Nepal, Pakistan, and Sri Lanka. The authors found that trade openness was significantly related to economic growth, especially in Bangladesh, India, and Sri Lanka. The study concluded that foreign direct investments and trade openness contributed to the economic growth of these countries. Belloumi and Alshehry (2020) employed the ARDL approach in Saudi Arabia for the years 1971–2016. The results indicated that trade openness did not affect economic growth in the short term. In the long term, the effect of openness on economic growth was negative when the indicators of the ratio of exports to GDP and total exports and imports divided by GDP were applied. However, a positive impact was noted when the authors used the ratio of imports to GDP. Anam Intisar et al. (2020) used the FMOLS and DOLS models to examine the impact of trade openness and human capital on economic growth. The findings showed that trade openness had a significant and positive relationship with economic growth. Al-Shayeb and Hatemi (2016) employed asymmetric generalised impulse response functions and asymmetric causality tests. The results indicated that a positive perpetual shock of trade openness leads to a significant positive response in GDP per capita. No such response was noted to yield significant negative shocks in trade openness.

Kim (2011) revealed that increased trade openness would benefit high-income countries in terms of real development. Conversely, other studies, such as Vlastou (2010), used dynamic OLS and found that trade openness had a significant negative impact on real income in low-income countries. The study revealed a significant negative impact of trade openness on economic growth.

In conclusion, results from previous studies differed regarding the impact of trade openness on economic growth. This can be attributed to the different economies and policies followed, the multiplicity of ways to measure foreign trade, and the different methodologies used in each study.

The Trade Openness and Environmental Pollution

Recently, studies have discussed the impact of trade openness on the quality of the environment, considering environmental quality as one of the indicators for evaluating economic development. An excessive increase in trade openness leads to the growth of production, the creation of infrastructure, and the increase of industrialisation and industrial entities, which results in negative consequences in terms of environmental quality and the emission of carbon dioxide. Nevertheless, some academics, based on empirical evidence and the application of the Kuznets theory, disagree with the results indicating that trade has a negative impact on environmental quality. Instead, they hold that good economic performance, including trade, is positively correlated with good environmental performance (Antweiler et al., 2001; Atici, 2009; Chen et al., 2019; Kalmaz & Kirikkaleli, 2019; Pham et al., 2022). The second category of literature that focused on the link between trade openness and carbon dioxide emissions was led by the work of Zamil et al. (2019). The authors employed the ARDL approach to examine Oman's economy from 1972 to 2014. The results showed that GDP and increased trade openness had exacerbated carbon dioxide emissions problems. Hossain (2011) applied the Granger Causality Test in newly industrialised countries over the years 1971–2007. The findings indicated that, in the long run, environmental quality was generally good in terms of economic growth and trade openness. Rahman et al. (2020) used the ARDL-bound test to study Lithuania during the period 1989–2018. The study concluded that trade and energy consumption were key determinants of carbon dioxide emissions. Kalmaz and Kirikkaleli (2019) used ARDL, FMOLS, DOLS, and the wavelet coherence technique to measure the impact of energy consumption, economic growth, and urbanisation as the main causes of carbon dioxide emissions

in the long term. The study covered the Turkish economy from 1960–2015. In Turkey, it was also found that trade openness had no significant impact on CO2 emissions in the long term. Chen et al. (2021) used the quintile regression approach for the years 2001–2019 and concluded that an improvement in trade openness had reduced carbon dioxide emissions. Atici (2009) examined the effects of GDP, energy consumption, and trade openness on CO2 emissions in Central and Eastern European nations using panel data from 1980 to 2002 and the extended environmental Kuznets curve. The results offer some proof that an environmental Kuznets curve exists. CO2 emissions gradually decrease as GDP rises. Alkhateeb et al. (2017) used the bound ARDL model in Saudi Arabia from 1970-2016. The findings showed that trade had a negative impact on carbon dioxide emissions. As a result, expanding trade openness is beneficial in reducing pollution levels in Saudi Arabia. Pham et al. (2022) used the Bayesian model averaging approach to sample 64 developing countries from 2003 to 2017. The findings showed that increased trade openness in developing countries did not cause environmental deterioration.

Previous studies showed different points of view on the relationship between trade openness and carbon dioxide. The difference in the results may be due to the different measures of trade openness, the methodology of data analysis, the period, and the country categories.

The Energy Production, Economic Growth, and Environmental Pollution

The world's countries are highly dependent on oil to generate energy. Therefore, it is important to investigate the impact of oil production on economic growth. Oil is a strategic source of energy, which is also non-renewable and is going to be depleted in the future (Tamba, 2017). According to Ike, Usman, and Sarkodie (2020), many researchers have investigated the relationship between economic growth and environmental impact and found it to be positive. Based on the assumptions provided, we chose oil production in a large country with a large oil producer, expecting it to have a strong negative impact on the environment.

The relationship between economic growth and carbon dioxide emissions does not remain constant along the development path of countries. Because it fluctuates between positive and negative. The increase in national income influences people to demand cleaner production to ensure environmental sustainability, which is referred to by the inverted U-shaped relationship between environmental degradation and per capita income, or the 'environmental Kuznets Curve'. Countries' early levels of development witnessed a limited environmental impact accompanied by a limited economic impact and a low level of resource consumption. The growth in development accelerated with resource extraction and agricultural and industrial activities, the matter that put pressure on the quality of the environment. The higher levels of development are usually accompanied using more energy-efficient technologies and a higher demand for lower carbon emissions, which causes a decrease in environmental degradation (Panayotou, 2016).

In the last category of literature that focused on the links between energy production, economic growth, and carbon dioxide emissions, Danlami et al. (2019) used ARDL and FMOLS models to examine LMI Middle Eastern and North African countries over the years 1980–2011. In low- and middle-income countries, the results showed that increasing energy production leads to more CO2 emissions in the long term. Danish, Danish, Zhang, Wang, and Wang (2018) applied the ARDL approach to Pakistan's economy during the period 1970–2011. They discovered that the production of energy from fossil fuels caused increased carbon dioxide emissions.

Chen et al. (2019) used ARDL, VECM, and Granger causality approaches to study the effect of trade openness on carbon dioxide emissions. The study focused on China from 1980 to 2014. The results showed an increase in non-renewable energy over the long term. The GDP effect revealed an increase in carbon dioxide emissions, whereas renewable energy and foreign trade reduced carbon dioxide emissions. In a study of Iran's economy, Ahmad, and Du (2017) employed DOLS, FMOLS, and ARDL approaches to study the period from 1971 to 2011. The results showed that increasing economic growth leads to more carbon dioxide emissions. Further environmental pollution with increased energy production.

Algarini (2019) used the vector auto-regressive (VAR) model, Granger causality, and the Wald test for the period 1990–2017. The results indicated that there were bidirectional relationships between economic growth and carbon dioxide emissions, gas electricity production, and carbon dioxide emissions. The increased growth in the number of pollutant factors around the world has highly driven scientists, governments, and civil society agents to fight vigorously against high greenhouse gas emissions. The climate change agents argue for sustainable development through the green economy, which is based on the use of clean technology, green energy, green industry, and green business (Bogdan et al., 2014).

Green energy depends on using clean sources of energy, like solar, wind, and water energy, and it acts as a competitor to the traditional resources of fossil fuels. Recently, and due to increased awareness of the negative impact of the use of greenhouse gas, green energy has been used in the extraction and production of fossil fuels, a matter that made both sources of energy compatible rather than competitors. The electricity supply for the oil and gas industry currently uses green technology to supply the thermal energy needed to enhance oil recovery (Choi et al., 2017). According to Pickl (2019), renewable energy sources will grow enormously over the next two decades and become major sources of energy. In addition, he expects that renewable energy will account for approximately two-thirds of power plant investments globally. Accordingly, it is a problematic issue to compromise green energy sources with oil and gas, and it is difficult to predict the capital allocation between them. Further, Pickl (2019) adds that global oil companies are actively changing their strategies to use renewable energy sources in the energy sector. This matter influences them to create new strategies that enable them to catch up with the highly growing market of renewable energy against oil and gas and prepare for the capital allocation between them to reduce greenhouse gas and limit the environmental impact.

Not only have global oil companies responded to the environmental impact of the use of traditional non-rentable sources of energy, but governments across the world have begun to adopt policy support schemes for renewable energy sources (Guliyev, 2023). The downstream processes in the petroleum industry are different from the upstream processes because of their high dependence on energy at high temperatures. The downstream processes include hydrogen production, distillation, and the generation of high-pressure steam (Halabi et al., 2015). Moreover, the use of renewable energy in upstream processes can reduce both fuel consumption and operation costs. Different sources of renewable energy can be used in the stages of production. In addition, it can reduce noise and increase safety (Ericson et al., 2019). Balamurugan, Seenivasan, Rai, and Agrawal (2022) argue that oil, coal, diesel fuel, and gasoline are responsible for about 80% of air pollution. These energy resources are used in producing electricity, industrial manufacturing, transportation, and heating. They further argue that biodiesel, which is made from fatty acids, represents renewable sources, including vegetable oils, recycled cooking oil, or animal fats, and

can be used as a kind of green fuel for internet consumption, power generation, and household energy needs.

Economics and Sustainability

Pejić Bach et al. (2023) aimed to examine stakeholders' perceptions of development. They found four groups: three with high economic growth and high and medium sustainability and one group with low economic growth and low sustainability. Al-Tit et al. (2020) studied a model for investigating the key driving factors based on two external variables and one variable. It showed that social support had a significant relationship with trust and social commerce intention. Prelipcean & Boscoianu (2020) studied a case of emerging markets represented by Romania. The problem of the study was very complex. The criteria of sustainable investment and global market drivers should be examined. The investment in social responsibility would be possible if it were implemented effectively.

Several studies have empirically examined trade openness and energy production and their impacts on economic growth and environmental pollution. Indeed, these studies were carried out in one country or a group of countries. Notably, however, no study focused on Saudi Arabia has yet combined trade openness and energy production to study the effects on economic growth and environmental pollution. Therefore, the present study provides a unique contribution to the literature.

Methodology

Data and Sources

The data were collected from the World Bank and BP Statistical Review of World Energy to study the impact of energy production and trade openness on economic growth and environmental pollution. The study covered the years 1970–2020. The study variables were as follows: Economic growth (GDP) was measured by the real gross domestic product per capita; trade openness (TO) was measured by the equivalent import + export / GPD; energy consumption (EN) was measured by the per capita oil equivalent (kg); and energy production (EP) was measured by oil production. Environmental pollution (CO) was measured by the emissions of millions of metric tons of carbon dioxide.

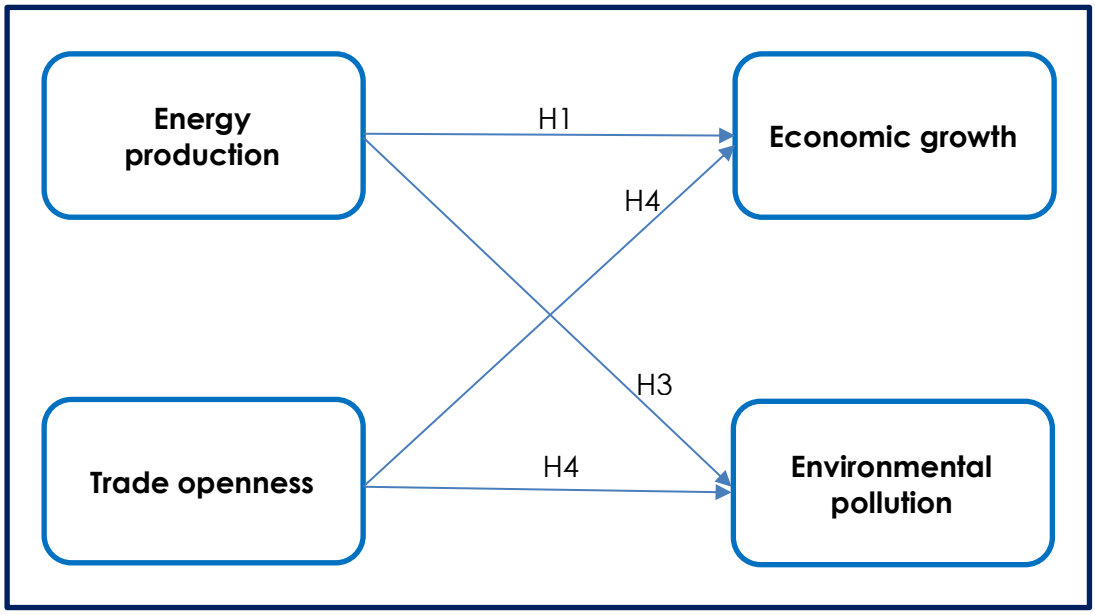
Model Specification

Based on the research question, the study's proposed hypotheses are as follows:

- H1: It is the likelihood that Increased Energy production will increase economic growth,
- H2: There will be a positive relationship between Trade openness and economic growth,
- H3: It is the likelihood that Increased Energy production will increase environmental pollution, and
- H4. There will be a positive relationship between Trade openness and environmental pollution

Figure (1) shows the expected relationships between variables. Two models were used to investigate the impact of energy production and trade openness on economic growth and environmental pollution. The first model studied the effect of trade openness and energy production on economic growth, as illustrated by Equation (1). The second model studied the relationship between the effects of trade openness and energy production on environmental pollution, as explained by Equation (2).

Figure 1
The Research Model



Source: Author's work

The variables of the investigation were selected for theoretical considerations, including selection consistency that identifies the best method for statistical inference, scientific knowledge, and interpretation of the relationships between variables based on the discussed literature (Ding et al., 2018). Accordingly, the variables of the models of this study were chosen based on the models of previous studies (Aremo & Arambada, 2021; Hdom & Fuinhas, 2020; Saleem et al., 2020; Belloumi & Alshehry, 2020; Danish et al, 2018; Chen et al., 2021; Rahman et al., 2020; Algarini, 2019; Danlami et al., 2019; Ahmad & Du, 2017). Moreover, variables are selected for practical considerations, considering data availability from credible sources (Ding et al., 2018). According to data available for the Saudi Arabian economy, before estimating the models, the Relevance of variables and their Measurability, the solution of the multicollinearity problem, and the Sufficiency of the variables to explain the phenomena under study, all variables are transformed into natural logarithms to reduce non-normality and heteroscedasticity (Hdom & Fuinhas, 2020). The functional form of the models is as follows:

$$LnGDP_t = \alpha_0 + \alpha_1 LnTO + \alpha_2 LnEN + \alpha_3 LnEP + \alpha_4 LnCO + \varepsilon_{1t} .....(1)$$

Where LnGDP is the natural logarithm of economic growth, LnTO is the natural logarithm of trade openness by the equivalent (import + export)/GPD, and the expected sign is positive. LnEN is the natural logarithm of energy consumption. The expected sign is positive, LnEP the natural logarithm of energy production by oil production (Including crude oil, shale oil, oil sands, condensates, and natural gas liquids), and the expected sign is positive. LnCO is the natural logarithm of Environmental pollution by the carbon dioxide emissions per capita in metric tons, and the expected sign is positive. Denote the intercept, and ε_{1t} this is the stochastic disturbance term.

$$LnCO = b_0 + b_1 LnTO + b_2 LnEN + b_3 LnEP + b_4 LnGDP + \varepsilon_{2t} ....(2)$$

Where LnCO is the natural logarithm of Environmental pollution by the carbon dioxide emissions per capita in metric tons, LnTO is the natural logarithm of trade openness by the equivalent (import + export)/GPD, and the expected sign is positive. LnEN is the natural logarithm of energy consumption, and the expected sign is positive. LnEP is the natural logarithm of energy production by oil production, and the expected sign is positive. LnGDP is the natural logarithm of economic growth b_0 denotes the intercept, and ε_{2t} is the stochastic disturbance term. In addition, variables are selected for their relevance to the outcomes of interest and their sufficiency in interpreting the phenomenon of investigation, as we assume a lack of studies on the relationship between energy production and economic openness (Ding et al., 2018).

Stationary Tests

The Unit root tests are used to ensure the stationarity of the variables. If the variables are non-stationary, this leads to spurious regression. This study uses the augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests to perform the unit root test.

Co-Integration Test

The presence of cointegration demonstrates that the model variables are balanced in the long run. Furthermore, using the ordinary least squares method to estimate the coefficients ensures consistent results (Hdom & Fuinhas, 2020). The Johansen co-integration method was used for the Co-Integration Test. The Johansen test is highly sensitive to the lag length in the VECM; several statistics are used to determine the best lag length (Bashier & Siam, 2014).

FMOLS and DOLS Methods

FMOLS and DOLS methods are used because they have co-integration relationships between variables, and to overcome the problem of serial correlation and homogeneity, Phillips, and Hansen (1990) developed the FMOLS. To test long-term relationships between variables. FMOLS has the advantage of providing reliable estimates for small sample sizes and a robustness test on the results. Its application is also beneficial in dealing with non-stationary issues in the selected series (Adom & Bekoe, 2013). The FMOLS method produces unbiased results that are also fully efficient and consistent. More specifically, FMOLS is a non-parametric approach, whereas DOLS is a parametric approach developed by Stock and Watson (1993). That can control the endogenous effect, correcting heteroskedasticity problems, and providing unbiased co-integrating coefficient estimates (Anam Intisar et al., 2020; Ngong et al., 2021)

Diagnostic Tests

The diagnostic tests are used to check whether the model is well specified, which means that the regression assumptions are not compromised (Hdom & Fuinhas, 2020).

Empirical Results and Discussion

Stationary Tests

Two tests were used to check the stationarity of the variables: the augmented Dickey–Fuller test (Dickey & Fuller, 1979) and Phillips–Perron (Phillips & Peron, 1988) tests, as shown in Table 1.

Table 1
Stationary Tests

Variable	Augmented Dickey-Fuller (ADF)				Phillips–Perron (PP)			
	Level	p-Value	1st diff.	p-Value	Level	p-Value	1st diff.	p-Value
LnGDP	−2.3398	0.1641	−6.0791	<0.0001	−2.3492	0.1612	−6.1051	<0.0001
LnTO	−1.4856	0.5325	−9.0897	<0.0001	−2.0590	0.2617	−9.1178	<0.0001
LnCO	−1.9562	0.3047	−5.2300	<0.0001	−1.8288	0.3626	−5.2343	<0.0001
LnEP	−2.4559	0.1325	−3.8030	0.0054	−2.7643	0.0707	−6.3125	<0.0001
LnEN	−1.3975	0.5761	−7.9764	<0.0001	−1.4810	0.5350	−7.97347	<0.0001

Source: Author's analysis using EViews 12, 2022

Table 1 shows that the null hypothesis H0 was rejected for all the variables at the 1% and 5% significance levels, which means that all the variables are stationary at the first difference.

The Appropriate Lag Length

Several tests were used to determine the optimal lag length appropriate for the tested model, as shown in Table 2.

Table 2
VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	157.982	NA	6.26e-11	−6.467	−6.231	−6.378
1	585.618	727.890	3.67e-18	−23.132	−21.479	−22.510
2	691.036	152.519	2.06e-19	−26.086	−23.016 *	−24.931
3	752.450	73.174	8.58e-20	−27.168	−22.680	−25.479
4	807.470	51.508 *	5.92e-20 *	−27.977 *	−22.072	−25.755 *

*denotes the lag order chosen by the criterion; LR - sequentially modified LR test statistic (each test at 5% level); FPE - Final prediction error; AIC – Akaike information criterion; HQ – Hannan-Quinn information criterion; SC - Schwarz information criterion. NA – not available, Source: author's analysis using EViews 12, 2022

The lag length appropriate for the tested model was also examined. According to the test results, the appropriate lag length is four, so if the model estimates a lag length other than four, the results become biased. As presented in Table 2, most of the tests (LR, FPE, and HQ) had the smallest lag length from them by the fourth year.

Co-Integration Test

To confirm the long-term relationship between variables, Johansen and Juselius (1990) used a co-integration test. The researcher also applied this test, and the results are shown in Table 3.

Table 3
Johansen Tests for Co-Integration

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Results
None *	0.9549	361.22	95.753	<0.0001	Reject H0
At most 1 *	0.8856	218.60	69.818	<0.0001	Reject H0
At most 2 *	0.6992	118.84	47.856	<0.0001	Reject H0
At most 3 *	0.5707	63.580	29.797	<0.0001	Reject H0
At most 4 *	0.3211	24.681	15.494	<0.0016	Reject H0

(*) indicates that the hypothesis was rejected at the 0.05 level, (**) Significant at 1%. Source: author's analysis using EViews 12, 2022.

The results of the Johansson test, shown in Table 3, indicate that the co-integration null hypothesis (none) and hypotheses 1, 2, 3, and 4 were all rejected. In contrast, the 5 co-integration equations did not reject the null hypothesis. The results show that model variables had co-integration relationships between variables, enabling the use of the FOMLS and DOLS methods.

Economic Growth Model

Table 4 outlines the results of the impact of energy production and trade openness on economic growth based on the FMOLS and DOLS methods. The elasticity coefficient of LnEN had statistical significance at a 5% level. According to the FMOLS findings, on average, a 1% increase in LnEN would decrease economic growth by 0.73%. Moreover, the DOLS findings demonstrate that, on average, a 1% increase in LnEN would decrease economic growth by 0.75%. This result indicates that energy consumption has a negative impact on economic growth, which conflicts with the results of Belloumi and Alshehry (2020).

Table 4
Results of FMOLS and DOLS (Equation (1) Economic Growth)

FOMLS MODEL					DOLS Model				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**	**Variable**	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LnEN	−0.7325	0.1221	−5.997	<0.0001	**LnEN**	−0.7545	0.1519	−4.9652	<0.0001
LnTO	0.3279	0.1512	2.1679	0.0355	**LnTO**	0.6001	0.1639	3.6607	0.0009
LnCO	0.6198	0.1742	3.5563	0.0009	**LnCO**	0.6145	0.2305	2.6660	0.0121
LnEP	0.2948	0.1179	2.5000	0.0161	**LnEP**	0.3324	0.1412	2.3546	0.0251
C	7.1988	0.6844	10.517	<0.0001	**C**	7.2001	0.6800	10.588	<0.0001
R-squared			0.795947		**R-squared**			0.956280	
Adjusted R-squared			0.777809		**AdjustedR-squared**			0.933714	
S.E. of regression			0.126088		**S.E. of regression**			0.070276	
Diagnostic test			**Statistical test**		**p-value**				
LM (4)			22.87273		0.5960				
Heteroskedasticity			620.9332		0.2688				
Jarque–Bera			0.412197		0.813753				
Skewness			4.756904		0.4463				
Kurtosis			6.420678		0.2674				

Source: author's analysis using EViews 12, 2022.

The elasticity coefficient of LnTO was found to be statistically significant at a 5% level. According to the FMOLS findings, on average, a 1% increase in LnTO would increase economic growth by 0.32%. Furthermore, DOLS findings show that, on average, a 1% increase in LnTO would increase economic growth by 0.60%. The

findings show that trade openness had a positive impact on economic growth, which agrees with the previous findings by Ho, Pham, and Nguyen (2021), Malefane (2020), Amna Intisar et al. (2020), and Hdom and Fuinhas (2020). However, these previous results conflict with those of Belloumi and Alshehry (2020) and Saleem et al. (2020).

The elasticity coefficient of LnCO had statistical significance at a 5% level, and, according to the FMOLS findings, on average, a 1% increase in LnCO would increase economic growth by 0.62%. Moreover, the DOLS findings reveal that, on average, a 1% increase in LnCo would increase economic growth by 0.61%. These findings indicate that environmental pollution would lead to an increase in economic growth. The previous findings revealed by Hdom and Fuinhas (2020), however, did not support sustainable development.

The elasticity coefficient of LnEP had statistical significance at a 5% level, and, according to the FMOLS findings, on average, a 1% increase in LnEP would increase economic growth by 0.29%. Additionally, the DOLS findings demonstrate that, on average, a 1% increase in LnEP would increase economic growth by 0.33%. These findings indicate that energy production would lead to an increase in economic growth, which conflicts with the previous findings provided by Hdom and Fuinhas (2020) but supports the findings of Ahmad and Du (2017). This contrast confirmed the different results of the different studies.

Diagnostic Test for Economic Growth Model

Table 4 illustrates that the Breusch-Godfrey Serial Correlation LM Test had no serial correlation since the p-value (0.5960) was greater than 0.05. The heteroskedasticity test findings showed no problems because the p-value (0.2688) was greater than 0.05. The Jarque–Bera, skewness, and kurtosis test results demonstrate that the residuals were normally distributed since the p-values (0.8137, 0.4463, and 0.2674) were higher than 0.05.

Environmental Pollution Model

Table 5 presents the results for the impact of energy production and trade openness on environmental pollution after applying the FMOLS and DOLS methods. According to the FMOLS findings, the elasticity coefficient of LnTO did not significantly affect environmental pollution. However, the DOLS findings indicate that the elasticity coefficient of LnTO did not significantly affect Environmental pollution. The results confirm that the expansion of trade openness is not a creation of more environmental pollution. These results support the previous findings by Pham et al. (2022)and Kalmaz and Kirikkaleli (2019). but conflicts with previous findings by Zamil et al. (2019), Rahman et al. (2020), Chen et al. (2021), Alkhateeb et al.(2017), and Belloumi and Alshehry (2020). Moreover, according to Choi et al. (2017), the adoption of low-priced oil for decades will not be available in the future and could rebound. The matter requires considering the efficient use of green energy technologies (Choi et al., 2017).

Table 5
Results of FMOLS and DOLS (Equation (2) Environmental pollution)

	FOMLS Model:				DOLS Model				
Variable	**Coeff.**	**Std. Error**	**t-Statistic**	**Prob.**	**Variable**	**Coeff.**	**Std. Error**	**t-Statistic**	**Prob.**
LnTO	−0.0635	0.1339	−0.4746	0.6373	**LnTO**	0.1850	0.1069	1.7309	0.0934
LnEN	0.7966	0.0514	15.485	<0.0001	**LnEN**	0.6872	0.0425	16.169	<0.0001
LnGDP	0.5152	0.1356	3.7993	0.0004	**LnGDP**	0.2536	0.1146	2.2121	0.0345
LnEP	0.2134	0.1049	2.0328	0.0480	**LnEP**	0.5844	0.0919	6.3586	<0.0001
C	−2.6875	1.2785	−2.1020	0.0412	**C**	−1.7673	0.9608	−1.8392	0.0755
	R-squared		0.964028		**R-squared**		0.991649		
	Adjusted R-squared		0.960831		**Adjusted R-squared**		0.987339		
	S.E. of regression		0.117740		**S.E. of regression**		0.063397		
	Diagnostic test		**Test statistic**		**p-value**				
	LM (4)		22.87273		0.5960				
	Heteroskedasticity		620.9332		0.2688				
	Jarque–Bera		0.247449		0.883623				
	Skewness		2.916336		0.7129				
	Kurtosis		1.061784		0.9574				

Source: author's estimates using EViews 12, 2022.

The elasticity coefficient of LnEN was found to be statistically significant. According to the FMOLS findings, on average, a 1% increase in LnEN would increase environmental pollution by 0.79%. Furthermore, the DOLS findings show that, on average, a 1% increase in LnEN would increase environmental pollution by 0.68%. As a result, energy consumption was found to be the primary source of environmental pollution in Saudi Arabia. These results suggest that as energy consumption increases in Saudi Arabia, CO2 emissions will also increase, and the environment will become more polluted. These results support the previous findings by Hossain (2011), Rahman et al. (2020), Kalmaz and Kirikkaleli (2019), Rahman et al. (2021), and Belloumi and Alshehry (2020).

KSA is in high need of utilising renewable energy sources in the coming years, especially solar energy. KSA can act as a solar hub for its neighbouring countries because of its large land areas. Therefore, an initiative towards exporting green power will benefit both KSA and the Gulf countries and contribute to a sustainable environment and climate (Ali & Khan, 2018).

The elasticity coefficient of LnGDP had statistical significance at a 5% level. According to the FMOLS findings, on average, a 1% increase in LnGDP would increase pollution emissions by 0.52%. Moreover, the DOLS findings reveal that, on average, a 1% increase in LnGDP would increase pollution emissions by 0.25%. These findings indicate that an increase in economic growth would lead to an increase in environmental pollution. This result supports the supported by Environmental Kuznets curve theory and the previous findings by Zamil et al. (2019), Kalmaz and Kirikkaleli (2019), Chen et al. (2019), and Ahmad and Du (2017) but conflicts with previous findings by Hdom and Fuinhas (2020), Hossain (2011) and Belloumi and Alshehry (2020).

Access to green energy requires providing it at a wide range to ensure the reduction of greenhouse gas emissions and, hence, the environmental impact. This requires the Saudi government to collaborate with the global business sector and society to achieve integration that comes with a secure supply (Comakli et al., 2008). Russia and KSA have announced green energy transition plans (McKillop, 2012).

The elasticity coefficient of LnEP had statistical significance at a 5% level. According to the FMOLS findings, on average, a 1% increase in LnEP would increase

environmental pollution by 0.21%. Furthermore, the DOLS findings show that, on average, a 1% increase in LnEP would increase environmental pollution by 0.58%. As a result, energy production was found to be the primary source of pollution in Saudi Arabia. This result indicates that as Saudi Arabia's energy production increased, CO2 emissions also increased, making the environment more polluted. These findings conflict with previous findings by Hdom and Fuinhas (2020) but are consistent with those of Danlami et al. (2019), Danish et al. (2018), and Chen et al. (2019). Despite that, national oil companies should generate returns for their governments, and private oil companies should generate returns for shareholders. Accordingly, all of the involved parties should ensure cost-effectiveness. Subsidies provided to renewable energies, accompanied by a reduction in the use of renewable technologies, can increase the value of using green energies (Ericson et al., 2019).

Diagnostic Test of Equation Environmental pollution

Table 5 shows that the LM test had no problems with serial correlation because the p-value (0.596) was greater than 0.05. The heteroskedasticity test results show no problems because the p-value (0.2688) was greater than 0.05. The Jarque–Bera, skewness, and kurtosis test results demonstrate that the residuals were normally distributed since the p-values (0.8836, 0.2791, and 0.9574) were higher than 0.05.
Granger causality Wald tests

Table 6
Granger Causality Wald Tests of Economic Growth Model

Direction of Causality	Chi-sq	Prob.
LnGDP → LnCO	8.121039 *	(0.0872)
LnCO → LnGDP	6.580123	(0.1598)
LnGDP → LnEN	5.055096	(0.2817)
LnEN → LnGDP	20.74741 ***	(0.0004)
LnGDP → LnEP	387.9472 ***	(0.0000)
LnEP → LnGDP	8.183075 *	(0.0851)
LnGDP → LnTO	5.052581	(0.2819)
LnTO → LnGDP	6.580123	(0.1598)
LnTO → LnEN	3.525245	(0.4741)
LnEN → LnTO	29.40909 ***	(<0.0001)
LnTO → LnEP	6.721914	(0.1513)
LnEP → LnTO	4.891183	(0.2986)

(***) Significant at 1%, (**) Significant at 5%, and (*) Significant at 10%. Source: Author's analysis using EViews 12, 2022.

The results of the Granger causality and Wald tests are shown in Table 6. If the p-value is significant at 1%, 5%, or 10%, H0 is rejected, which suggests that X did not homogeneously cause Y (Ali, Khan, & 2018). (LnDGP, LnTO) is not significant at any level, so the null hypothesis is accepted. This result indicates that trade openness does not lead to economic growth and thus does not support the results of the study. The result of the causality test shows that there is a bidirectional relationship between economic growth and energy production, indicating that both economic growth and energy production can predict each other in Saudi Arabia. This finding is consistent with FMOLS and DOLS models that support long-run relationships between variables. While there is a unidirectional causality running from economic growth to environmental pollution, this result indicates that economic growth increases environmental pollution and from energy consumption to economic growth.

Table 7
Granger Causality Wald Tests of Equation Environmental Pollution

Direction of Causality	Chi-sq	Prob.
LnGDP → LnCO	8.121039 *	(0.0872)
LnCO → LnGDP	6.580123	(0.1598)
LnTO → LnCO	4.505072	(0.3419)
LnCO → LnTO	12.33504 **	(0.0150)
LnCO → LnEN	7.682901	(0.1039)
LnEN → LnCO	22.44043 ***	(0.0002)
LnCO → LnEP	7.532495	(0.1103)
LnEP → LnCO	23.16543 ***	(<0.0001)
LnEN → LnEP	21.16212 ***	(0.0003)
LnEP → LnEN	14.65739 ***	(0.0055)

(***) Significant at 1%, (**) Significant at 5%, and (*) Significant at 10%. Source: Author's analysis using EViews 12, 2022.

The result of the causality test is shown in Table 7. A unidirectional causality runs from environmental pollution to trade openness. This result indicates that trade openness does not lead to environmental pollution and thus supports the results of the FMOLS and DOLS models. There is a unidirectional causality running from energy consumption to environmental pollution and from energy production to environmental pollution. These results are consistent with the estimates for FMOLS and DOLS, as increased energy production and consumption lead to more environmental pollution.

Conclusions

The main goal of this study is to identify the impact of energy production and trade openness on economic growth and environmental pollution. Due to the lack of studies on environmental pollution in Saudi Arabia, no study has combined energy production with economic openness. Therefore, this study attempted to bridge the gap between the impact of energy production and trade openness on economic growth and environmental pollution while enriching Saudi Arabian studies. The results of this study would represent a real addition to Saudi Arabia's knowledge. This study employs FMOLS and DOLS and co-integration regression methods; the data spanned the period 1970–2020. Based on the results of FMOLS and DOLS, it was found that trade openness had a statistically significant impact on economic growth. In the context of expansion, trade openness would lead to an increase in economic growth. According to this result, the null hypothesis of no positive relationship between Trade openness and economic growth is rejected, and the alternative hypothesis is accepted, meaning that a positive relationship between Trade openness and economic growth. It was also found that energy production had a statistically significant impact on economic growth, confirming that an increase in energy production would lead to an increase in economic growth. According to this result, the null hypothesis that Increased Energy production will not increase economic growth is rejected, and the alternative hypothesis is accepted, meaning that Increased Energy production will increase economic growth.

According to the results of FMOLS and DOLS, energy production had a statistically significant impact on environmental pollution, indicating that an increase in energy production would lead to an increase in environmental pollution. This result indicates that energy production represents the primary source of environmental pollution in Saudi Arabia. According to this result, the null hypothesis that Increased Energy

production will not increase environmental pollution is rejected, and the alternative hypothesis is accepted, meaning that Increased Energy production will increase environmental pollution. According to the FMOLS estimates, trade openness did not significantly affect environmental pollution. The results of the Granger causality and Wald tests confirmed this finding. The DOLS estimates show no statistically significant impact on environmental pollution. According to this result, the null hypothesis of no positive relationship between Trade openness and environmental pollution is accepted. In this regard, an increase in trade openness would not lead to greater environmental pollution.

The result of the causality test of the economic growth model is consistent with the FMOLS and DOLS models, as increased energy production leads to increased economic growth. While the results of the causality test for the relationship of trade openness to economic growth do not support the results of the estimates for the FMOLS and DOLS models, the results of the environmental pollution model's causality test are consistent with the estimates for FMOLS and DOLS, as increased energy production leads to increased environmental pollution. Furthermore, trade openness does not cause environmental pollution.

This study recommends that decision-makers in Saudi Arabia and all MENA countries should pursue two policies to reduce environmental pollution in Saudi Arabia. Firstly, green technology and green transportation should be used to reduce the use of fossil fuels. Secondly, carbon pricing is a sustainable policy instrument that is effectively used to restrict dirty production by imposing high taxes on polluted industries.

This study was limited to studying the impact of non-renewable energy production on economic growth and environmental pollution. It excluded renewable energy production due to a lack of data covering the study period. Among the proposed future studies, a study that includes the impact of renewable and non-renewable energy on economic growth and environmental pollution in Saudi Arabia will complete this study.

Future studies should focus on the impact of energy consumption and energy production on environmental pollution. Addressing the concept of a 'circular economy of carbon', which includes reducing, reusing, recycling, and removing carbon, is also required for future research. Moreover, the effects of carbon pricing on environmental sustainability or pollution.

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Adolescent Well-being and Life Satisfaction: Impact of Digital Technology Usage

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Abstract

Background: Digital technologies have significantly changed the way adolescents perceive the world around them. The perception of the social environment is crucial for their well-being and health. **Objectives:** This paper aims to evaluate the relationship between the perceived life circumstances of adolescents, such as dietary habits, physical activity, obesity, subjective health, the use of digital technology devices, and the level of occupancy with school obligations. **Methods/Approach:** The survey research was conducted on a sample of adolescents between the ages of 11 and 15. Data was analysed using regression analysis and association rules. **Results:** The results present a moderate positive correlation between the level of school obligations and life satisfaction or subjective health, while for the independent variable, time spent in front of screens, the strength of the relationship is moderate and negative. **Conclusions:** The model represents a useful starting point for the recommendations for creating patterns to influence life satisfaction and well-being in adolescence. It provides insight into the potential optimisation of school obligations of adolescents according to the level of life satisfaction, subjective perception of health, and time spent in front of the screen.

Keywords: adolescence, subjective health, life satisfaction, school obligations, physical activity, digital technologies, regression, association rules

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Introduction

The share of adolescents in the world's population is 16%, which is 1.2 billion adolescents between the ages of 10 – 19 (Patton et al., 2016). According to the results of the Institute for Health Metrics and Evaluation (IHME), in middle-income and low-income countries (LMIC), 13%–15% of adolescents are coping with a mental disorder of some kind (*Global Burden of Disease,* 2023; James et al., 2018).

The importance of the topics covered in this paper is demonstrated by the information about the adolescent's degree of life satisfaction, which is determined by the amount of stress they consider for school-related commitments. In this article, we are using data from the Croatian Institute for Public Health in 2018, which was collected based on a sample survey of a population of 2112 adolescents and limited only to the territory of the Republic of Croatia. Respondents were the elementary unit of the survey.

The special importance of this analysis is to find out the impact of social and health by drawing special attention to the importance of school obligations, physical activity, eating habits, and obesity conditions in adolescent years by acceptance of life commitments. The qualitative aspect of the description in the paper is further supported by wealthy research findings of theorists who are dealing with the mental health of children by finding interactivity among key factors and links between social issues in the context of personal perception of health that more or less positively affect the level of life satisfaction in adolescence about the amount of school obligations, all of which this paper proves.

The article is further assisted by many research findings of theorists who are dealing with the mental health of children. The level of life satisfaction in adolescence is influenced by key impacts of interconnection and correlation between social issues in the context of personal perception of health with different intensities.

All the already existing research of theorists pays particular attention to concerns that have shown up due to cognitive development and mental adolescent health (Crisanti et al., 2017; Shankar et al., 2017). The authors emphasise the importance of adolescent relationships in the family and with peers, which influence the fulfilment of school obligations. (Haslam et al., 2016, p. 4; Jegannathan et al., 2014). For years, other authors argued that in a case of missing key factors, such as unstable food supply and inadequate nutrition, psychological distress might occur, depression, anxiety or problems with mental health and the already stated ones have proven to be the principal causes of disability in the global capacity in the younger population (children and adolescents)(Hallfors et al., 2011; Whitsett et al., 2019).

This research aims to determine the relationship between the preoccupation with school duties and certain determinants that are related to the life circumstances faced by young people in adolescence. Moreover, an attempt is made to explain the correlation between variables related to general life situations and the level of school obligations of adolescents. This research tries to answer the following questions: 1) How do the determinants of life circumstances, such as life satisfaction and physical activity in young people, influence the preoccupation with school obligations in adolescence? 2) Do the problems of today, such as excessive time spent in front of the screen and bad eating habits among adolescents, affect the level of school obligations?

Based on the obtained results, a model will be set up to recommend the optimal determination of the level of school obligations according to other life circumstances in adolescents. The results suggest which variables in the model should be selected to optimise the level of school obligations. The technique of associative rules will be used

to examine the observed variables in the model better to explain the relational relationships in the data set.

This paper begins with a literature review of the life circumstances that young people in adolescence encounter to describe the possible influence that different determinants, such as life satisfaction, physical activity, or eating habits, would have on the level of school obligations. Furthermore, the methods that were applied in the paper are defined together with the sample and the research instrument that was chosen for this research. The results of the research are presented, which should answer the research questions, that is, give certain findings about the influence of the situations and habits of adolescents regarding the presence of school obligations. Finally, the paper ends with a discussion of today's problems in adolescence and a conclusion with relevant implications and suggestions for future research.

Literature review

Adolescence is a phase of maturation and a sensitive period of rapid emotional, cognitive, social, and neurological development. During this turbulent period, adolescents learn how to build relationships outside of the home, cope with challenging life events and learn healthy behaviours and habits that are more likely to continue into adulthood. Also, it was found that adolescents' health, well-being, and attitudes are greatly influenced by their social and physical environment. The period in adolescence is a phase of identity development, i.e., understanding one's self (Freeman & Block, 2021).

In their research, Murphy et al. (2020) focused on both challenges and advantages faced by adolescents living in urban areas (this topic is especially important during this sensitive period of social and neural development). Research by a group of authors has shown that creating a healthy home environment and ensuring parental presence and supervision at home can prevent misbehaviour even in the most challenging situations (Leung & Zhang, 2000; Nickerson & Nagle, 2004). Special attention is paid to the period of adolescent development: "Investing in adolescent's well-being and health [including mental health] attains a threefold dividend of advantages now, in the lives of adults in the future, and the lives of future generations of children (Hancox et al., 2005)."

School obligations issues

School achievement during adolescence, as one of the indicators of success later in life, is one of the key factors that influences adolescents' life satisfaction.

Many researchers deal with the influence of the media on students' school achievement. While media use doubtlessly plays an important role in students' lives, its influence, however, can have both non-negative and positive impacts on students' school achievements (Adelantado-Renau et al., 2019; Mao et al., 2022). Some studies have shown a distorted association between the following variables, i.e., moderate media use contributes to students' school achievements, while excessive use can have a negative impact on it. This finding was also consistent with the one in a large meta-analysis that revealed a negative association between media use and school achievements (Guzikova, 2020; Huang, 2018; Mehmetaj & Zulfiu Alili, 2020). Additionally, other researchers emphasised a consistent relationship between media use and sleeping or learning, as well as students' passivity (Kostyrka-Allchorne et al., 2017; Sharma et al., 2017).

Some anxiety triggers among adolescents are excessive media use, lack of routine, and eating issues (that could lead to eating disorders) (Schwartz & Costello, 2021).

Life satisfaction issues

According to the World Happiness Report, in 2022, the majority of adults reported being satisfied with their lives. The most children and adolescents report positive levels of life satisfaction (Aknin & Wang, 2022). It is essential to remember the universal desire for happiness and the capacity of individuals to rally to each other's support in times of great need (Helliwell et al., 2022). The findings by these results reflect those of a group of authors who also found that most children and adolescents reported a generally higher level of life satisfaction (McCullough & Huebner, 2003; Park & Huebner, 2005; Siyez & Kaya, 2008).

International survey results from the following countries, namely America, Israel, South Korea, and China, showed a universal decline in life satisfaction at the beginning and during adolescence. Job loss has a negative effect on employees' well-being and self-esteem (Chang et al., 2003; Creed et al., 2003; Suldo & Huebner, 2004). A longitudinal study by Kwon (2020) showed that adolescents who dropped out of school reported a lower level of life satisfaction and higher rates of depression.

The results of the longitudinal study revealed that job abandonment was associated with life circumstances, which indicates that full-time employees reported higher levels of life satisfaction and lower financial stress in comparison to full/part-time students and former students who are currently in the labour market (Creed et al., 2003; Patton & Noller, 1984).

The study conducted by Tomić-Koludrović (1999) revealed that adolescents in Croatia were aware of music, fashion, and Western trends. However, the existing differences in consumption among adolescents were most likely related to peer group identification. Both Kwon (2020) and Valois et al. (2004) found similar results among American students; in a study conducted by Kwon (2020), there was a positive correlation between life satisfaction and meaningful involvement in an instrumental activity, while Valois et al. (2004) confirmed that diverse physical activity is related to higher life satisfaction.

Health issues

Adolescence is a period of maturation and development characterised by changes in eating habits, sedentary behaviour, physical activity, and psychological health. Several studies have investigated the relationship between adolescents' life satisfaction and high-risk behaviours, such as violence and aggression, which can lead to premature mortality (Valois et al., 2006). There is a connection between adolescents' life satisfaction and risky behaviour, such as physical fighting. Based on the authors' findings, there was a connection between life happiness and feelings of insecurity at school, threats of injury, school trips, and property theft (Valois et al., 2001).

When it comes to participation in sports and physical activities among adolescents, the results show a decrease in girls' physical activity levels. On the other hand, there is an increase in adolescent depression, physical problems, and sedentary behaviour (Ortega et al., 2008). Magson et al. (2021) argue that exposure to the news is related to anxiety among adolescents. The pandemic caused an increase in anxiety and other mental conditions. Many adolescents had to cope with uncertainty and stress during the pandemic, and the pandemic impacted their lives in a way no one could predict (Smirni et al., 2020). According to Stephenson (2021), the pandemic impacted teenagers' mental health in a way that only one in three teenagers was able to cope with the ongoing stress created by the pandemic.

The adolescents' quality of attachment to parents is higher than attachment to friends, which is positively associated with life satisfaction. On the other hand, these

findings do not match those of American and Chinese youth (Huang, 2018; Stephenson, 2021).

Obesity issues

Obesity is defined as an eating disorder caused by excessive food consumption that leads to long-term health problems and usually begins in childhood or during adolescence. In 2016, overweight and obesity affected an estimated 340 million children and adolescents aged 5-19 (*World Health Organization*, 2023). In addition to these findings, Valois et al. (2003) pointed out that several variables, namely weight loss diets, poor weight perception, weight loss attempts, vomiting, and taking weight loss medications or laxatives among adolescents, were negatively associated with life satisfaction.

Moreover, a negative correlation has been found between the body composition of school-age children and physical fitness (Abu Hanifah et al., 2013; Botelho et al., 2013; Brunet et al., 2007). Childhood obesity and overweight are associated with an increased risk of cardiometabolic diseases (Brouwer et al., 2013). Many studies have shown that physical exercise can lessen the risk of childhood obesity, prevent or reduce the symptoms of depression, and boost self-esteem (Nassis et al., 2005; Ortega et al., 2008).

Eating habits issues

According to the Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders, the American Psychiatric Association distinguishes two types of eating disorders: Anorexia nervosa (AN) and bulimia nervosa (BN). Some psychological, behavioural, and interpersonal factors that may contribute to eating disorders among young people are perfectionism, low self-esteem, neuroticism, and sadness (Halvorsen & Heyerdahl, 2006; Proctor et al., 2017). Furthermore, the following factors, such as low self-esteem, depression, poor self-esteem, neuroticism, and maladaptive perfectionism, are also linked to life satisfaction among adolescents (Gilman et al., 2005).

Digital devices usage

Many researchers deal with the influence of the media on the behaviour of adolescents. While some research supports little or no impact of television use on academic performance, many argue that the impact of media use on adolescent mental health is negative, especially taking into account that it negatively impacts the time devoted to school obligations (Shastri & Mohite, 1997; Tarekegn & Endris, 2019).

Among the positive effects of using the media, the connection with peers through digital platforms, which showed their meaning during the pandemic, stands out (Grah & Penger, 2022; Nguyen Ngoc et al., 2022). Many authors discuss the positive aspects of the influence of television use on the academic success of adolescents, and some believe that some media messages can teach adolescents various life lessons (Nathanson, 2001; Shastri & Mohite, 1997). Their attitude towards media content most often determines the role of parents and their concern about the effect of content on the mental health of adolescents (Nathanson, 2001).

On the other hand, many authors emphasise the negative effects of the use of electronic media on the mental health of adolescents. Research by a group of authors has shown that children have poorer executive functions if they are exposed for too long to programs that are not intended for their age (Barr et al., 2010). Henke (1999) finds that excessive media use negatively affects school performance.

According to Nathanson (2001), parents are obliged to assume the role of controller of the content and amount of use of electronic media.

To gain a better insight into this issue, additional research on this topic is needed, which would include research in the long term as well as research in special conditions such as a pandemic.

Methodology

Data

The methodology of the paper is based on secondary data, where the Croatian Institute of Public Health researched a sample of 2112 respondents. The target population is adolescents between the ages of 11 and 15 in the Republic of Croatia in 2018. The research was conducted using an internationally agreed methodology in such a way that students fill in the questionnaire anonymously and voluntarily. This standardised methodology enables comparative analysis, assessment of trends, and focus on specific challenges in improving the health and quality of life of adolescents.

Research instrument

The Croatian Institute of Public Health tries to point out numerous factors that affect the health and well-being of young people within its activities. In its research, the institute focuses on understanding the life habits, circumstances, and attitudes of boys and girls aged 11, 13, and 15 in their living environment and social context - in the family, school, or their relationship with peers following health behaviour in school-aged children (HBSC) research standards. HBSC is a WHO collaborative cross-national study of adolescent health and well-being (Ravens-Sieberer et al., 2009). HBSC has conducted surveys every four years since 2002, and each survey does not examine the same adolescents in the sample. In addition, the intention is to point out certain risky behaviours and habits acquired during adolescence that can continue into adulthood and consequently significantly affect the health and social condition of individuals and the entire community.

The application of the mentioned international standard questionnaire enables the collection of common data in all participating countries, the quantification of key health indicators and contextual variables, and the comparison of data at the national and international levels. The collected data on the health behaviour of school-aged children is extremely valuable, and it can serve countries in the development of their national strategies and programs in the field of health promotion and health education and eliminate inequality and the consequences of inequality in later life.

For this research, data were selected for 2018 and presented in 5-point scale measures for 2,112 examined adolescents between the ages of 11 and 15. The data related to those variables that could best show the influence of life circumstances in the adolescent age on preoccupation with school responsibilities were processed, which, after all, represents a dependent variable in the research. The research instrument is a survey conducted by HBSC 2018, which contains a representative sample of children in the fifth and seventh grades of elementary and first grades of high school in the Republic of Croatia. The structure of secondary education has been preserved (gymnasiums, four-year and three-year schools). It participated in the research 634 students (30%) aged 11 years (average age 11.6 years), 612 students (29%) aged 13 (average age 13.6), and 866 students (41%) aged 15 years (average age 15.6 years). Out of a total of 2,112 students, 1,077 were male (50.99%) and 1,035 (49.01%) female. The survey lasted for 18 months, in which 2,112 students were

successfully surveyed out of a total of 5,169 assigned questionnaires, which represents a survey percentage of 40.86% at the national level.

Table 1
Research variables

Variable Name	Variable abbreviation	Variable measurement
The level of school obligations	SOO	Assessing the occupancy of school obligations for students on 5- point ratio scale (1-not at all; 5-extremely much)
Life satisfaction	LiS	Measuring the degree of satisfaction with the life situation on 5- point ratio scale (1-very dissatisfied; 5-very satisfied)
The perception of subjective health	SH	Measuring the subjective attitude of students about health on 5- point ratio scale (1-very bad; 5-excellent)
Physical activity	PA	Measuring the frequency of physical activity among students in the past 7 days on 5- point ratio scale (1-never; 5-very often)
Diet quality of eating habits	DQ	Measuring the attitude of students about diet quality on 5- point ratio scale (1-very bad; 5-excellent)
Time in front of a screen	ST	Measuring the frequency of being in front of screens on leisure on 5- point ratio scale (1-never; 5-very often)

Source: Authors' work

According to the methodology of Schnettler et al. (2015), determinants such as eating habits, perceptions of life satisfaction, and subjective health are key to helping adolescents manage their school obligations. Also, a study by Loprinzi et al. (2012) postulates that physical health is the most important prerequisite in the fight against obesity and a long stay in front of mobile devices to strengthen the ability to master school duties. Based on these findings, the independent variables selected for this research focus on the life habits of adolescents during their school duties, such as the possible physical activity they engage in, eating habits, and perceptions of satisfaction with life and their health.

Analysis

In this research, a regression analysis of the acceptance of school obligations in the dynamic life circumstances of adolescents was carried out. The dependent variable in the research is the level of preoccupation with schoolwork. In contrast, the independent variables are life satisfaction, subjective health, level of physical activity, eating habits, and time spent in front of the screen. Based on the mentioned variables, a multiple regression model is applied in the research, which tries to assess the connection between preoccupation with school duties in adolescents and the mentioned independent variables that imply the life circumstances they face. The multiple regression model with the dependent variable - the occupancy of school obligations will be estimated:

$$SOO_i = \alpha + \beta_1 LiS_i + \beta_2 SH_i + \beta_3 PA_i + \beta_4 DQ_i + \beta_5 ST_i + \sum u_i \quad (1)$$

The parameters in the equation of the multiple regression model will be evaluated for the dependent variable of the level of school obligations and for the observed independent variables in the model, namely perception of life satisfaction, subjective health, level of physical activity, eating habits and time spent in front of the screen. In addition, Pearson's correlation coefficient will be used to determine the direction and strength of the relationship between the dependent variable of the level of preoccupation with school obligations and the observed independent variables. For variables on an interval or ratio scale (numerical data), Pearson's coefficient of correlation is applied. A scatterplot's relationship between variables may be read, and it implies that the points follow and disperse around the line (Udovičić et al., 2007).

In this research, a sample of 2112 adolescents was examined, which is a prerequisite for potential data mining. Therefore, an associative rule data mining technique is performed that produces a list of rules that outline underlying patterns in the data set (Kumar & Toshniwal, 2016). The next few sentences will explain the items in the technical associative rules. If it is understood that there are two rules, A and B, while N is the total of observations, then rule A has the support of rule B. Hence, it can be said that the rule is supported. Support (*Sp*) is often referred to as a free frequency limit. If it is satisfied by a sufficient number of cases, then rules are generated based on other support measures (Agrawal & Srikant, 1994).

$$S_p = \frac{P(A \cap B)}{N} \quad (2)$$

On the other hand, a very important element of the technique of associative rules is Confidence (C_f) because it implies the reliability of rule A, defined as the ratio of occurrences of A and B (Kumar & Toshniwal, 2016). The equation calculates confidence:

$$C_f = \frac{P(A \cap B)}{P(A)} \quad (3)$$

Lift (L_t) presents the ratio of the confidence and the expected confidence for the rule. Expected confidence can be defined as the occurrence of A and B together with the occurrence of B. Lift measures co-occurrence only and is also symmetric concerning A and B. The value ranges from 0 to ∞, and if it is over 1, then the rule is useful for forecasting future data sets (Agrawal & Srikant, 1994).

$$L_t = \frac{P(A \cap B)}{P(A) \times P(B)} \quad (4)$$

According to Kumar and Toshniwal (2016), leverage (Lv) for rule A measures the difference between A and B, which appear together in the data set and are statistically dependent. The values range between -0.25 and + 0.25. If the value is 0, the rules or variables are independent, while when they are mutually dependent, the value is closer to +0.25. When one variable is only dependent and the other is not, the value of L_v goes to -0.25.

$$L_v = P(A \cap B) - P(A) \times P(B) \quad (5)$$

Conviction (C_v) is a measure of confidence and lifts weakness. Assuming that there is no symmetry between rules A and B, conviction helps to calculate the degree of implication of any rule, and the values range between 0.5 and ∞ (Kumar & Toshniwal, 2016). For values over 1, they represent interesting points in the possible rules.

$$C_v = \frac{P(A) \times P(B)}{P(A \cap B)} \quad (6)$$

Results

Descriptive analysis

For the research, a descriptive statistics analysis was performed for the observed variables. MEAN values, standard deviations, and p-values are given in Table 2. The variable life satisfaction (LiS) has the highest mean value (3.802) among the other observed variables, which proves that adolescents, on average, gave higher ratings when evaluating their perception of satisfaction with their life situation. Also, according to the mean value (2.182) of the PA variable, the surveyed adolescents very rarely engage in some physical activity, on average. The smallest average deviation from the arithmetic mean is achieved for the variables DQ and ST, while the variable SH has the largest standard deviation. Considering the p values according to which we determine significance, the variables SOO, LiS and SH are statistically significant in a multiple regression model at the 5% level of significance. In comparison, the variable ST is significant at the 1% level of significance. An explanation of the significance and reliability of the observed multiple regression model is given below in Table 4.

Table 2
Descriptive statistics of observed variables

Variable	Mean	Std. Dev.	*t Stat*	*p-value*
SOO	3.356	0.027	-0.243	0.031
LiS	3.802	0.021	-0.907	0.046
SH	2.395	0.039	1.032	0.041
PA	2.182	0.006	-0.471	0.669
DQ	2.524	0.001	-3.462	0.101
ST	3.682	0.001	-8.572	0.003

Source: Authors' work

Table 3 presents the Pearson correlation coefficients for the observed variables. The relationship between the dependent variable SOO and the independent variable LiS is positive and strong. This means that life satisfaction increases the level of school obligations, and the student who has a high level of satisfaction implicates a high level of school obligations. An upper level of life satisfaction may affect better on school obligations. The analysed reflection in the literature review postulated that there is a link between a low level of life satisfaction and leaving school (school obligation – low level of meeting school obligations) where one needs to take into consideration research conducted by theorists according to which continuing the education (high education) is tied to a low level of scholastic success due to the psychological-emotional state caused by lowered financial abilities (Creed et al., 2003; Feather & O'Brien, 1986).

The connection between SOO and SH, through Pearson's correlation coefficient, leads to the knowledge of the direction and strength of the connection between the level of subjective health and the burden of school obligations. The obtained result determines a moderately strong positive correlation between the variables – SH and SOO. This means that subjective health increases the level of school obligations. Hence, adolescents with high subjective health have a moderately high level of school obligations. Subjective health is dependent on elements of encouragement and congruent conditions. According to research, physical inactivity increases the risk of depression (Valois et al., 2001). Elements of encouragement are evident in sedentary behaviour, media exposure, and the pandemic, affecting physical inactivity and even their health, with numerous consequences on self-esteem (Ortega

et al., 2008). It is worth noting that a high level of subjective health and life satisfaction of students makes them feel freer and more willing to take on more responsibilities and thus be more burdened with them (Magson et al., 2021; Ortega et al., 2008).

One should also consider that countries with a lower HDI (human development index) with medium and low income also report mental disorders in 13 to 15% of adolescents and that adolescents account for 16% of the world population. Almost 23% of the total number of inhabitants in its structure refers to adolescents in African countries, which demonstrates a progressive increase in the number of inhabitants, which would mean that almost every fourth inhabitant should be in his/her education stages, the possibility of which is dubious because of poverty (G. C. Patton et al., 2016).

Table 3
Correlation matrix

	SOO	LiS	SH	PA	DQ	ST
SOO	1					
LiS	0.883**	1				
SH	0.512**	0.679**	1			
PA	-0.263	-0.537*	-0.899*	1		
DQ	-0.894	-0.953	-0.806*	0.661	1	
ST	-0.980***	-0.954***	-0.636**	0.414*	0.956	1

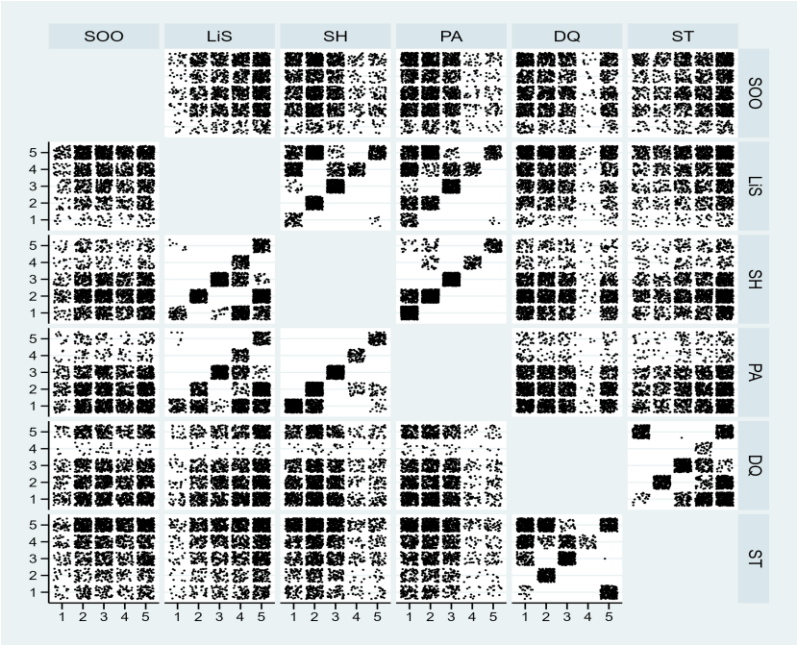
Note: *statistically significant at 10%; ** 5%; *** 1%; *Source:* Authors' work

By connecting the independent variable, PA, with the dependent variable, SOO, we tried to explain the direction and strength of the relationship between the level of physical activity and school workload. The Pearson correlation coefficient appears to have a weak negative correlation between the variables – physical activity and school obligation on adolescents. This means that physical activity decreases the level of school obligations, and the physically active student implicates the low level of school obligations. This refutes certain knowledge about this relationship. Even though there is no reliably strong connection between physical activity and school obligations, numerous surveys indicate the existence of a strong connection between physical activity and life satisfaction (life quality), which share a positive correlation (Valois et al., 2004). Numerous surveys have shown a positive correlation between life satisfaction and intense physical activity in adolescents and a negative correlation to depression and anxiety (Vilhjalmsson & Thorlindsson, 1992). The positive correlation confirmed by research on physical intensity and life satisfaction points to a strong consequent link between life satisfaction, quality of life, and school obligations, which was shown (Maton, 1990). In the case of our research, with this negative correlation between the mentioned variables, it is obvious that the greater amount of school obligations in the adolescent age occupies too much of the free time of the adolescents themselves, which leads to a tendency for a lower volume of physical activity.

The correlation between variables SOO and DQ presents a strong negative correlation between eating habits and school obligation levels in adolescents. Generally, it means that students' eating habits significantly decrease the level of school obligations, and regular diet quality is implicated in the high level of school obligations. This confirms findings that proper nutrition and taking care of eating habits contribute to health, which later affects the reduction of the feeling of being overwhelmed by school obligations. Also, the relationship has a high psychophysical significance; hence, deciding on a controlled and quality diet in adolescence helps manage school obligations (Schnettler et al., 2015).

When explaining the connection between physical activity and eating habits with the school obligation level, we need to emphasise that a higher level of awareness of physical activity and diet quality leads to a reduction in workload and satiety in school obligations. Students fill their free time with more school obligations, which adds value to free time (Phinney & Ong, 2002). More free time also brings the possibility that young people spend more time in front of the screens of mobile or computer devices. The Pearson correlation coefficient shows a strong negative correlation between the variables – time spent in front of screen (ST) and school obligation level (SOO) on adolescents. The time spent in front of the screen decreases significantly and implicates the level of school obligations. This confirms the finding that in adolescence, it is precisely among the factors that reduce work habits and the desire for commitment. In addition, excessive staring at screens interferes with concentration for other things that adolescents need to do, especially at school (Kalenkoski & Pabilonia, 2012; Phinney & Ong, 2002).

Figure 1
Scatter Plot Matrix



Source: Author's illustration

Figure 1 displays the dispersion between the observed variables, with 25 different positions in each diagram. The strength of the black colour on the diagram implies the strength of the relationship, while the position of the colour within the diagram represents the direction (positive or negative sign) of that relationship between the observed variables. On the scatter plot matrix (Figure 1), there is a positive and strong relation between the level of physical activity and subjective health, and the values are close to the regression line without much dispersion, which proves a strong connection in the relationship. In contrast, the positive slope of the direction implies a positive relation. Moreover, scatter presents positive and moderately strong relations between variable life satisfaction and physical activity, as well as subjective health. Also, there is a moderate negative relation between eating habits and time in front of a screen. These two variables' values are close to each other, which reduces the degree of data dispersion. The relationship between the time spent in front of screens

and eating habits is moderate, and the negative slope of the direction evidences the negative correlation.

Regression Analysis

The method of ordinary least squares (OLS) was used to estimate the regression parameters of the variables. The results are given in Table 4, which contains the estimated values of the regression parameters and p-values.

Considering the presented results of the values of the regression parameters (β) of the independent variables in Table 4, it can be determined that the variables LiS and SH have a positive relationship with the dependent variable SOO, indicating that if life satisfaction or the perception of subjective health increases, then the level of school obligations would increase on average. In the case of the values of the regression parameters for the PA, DQ and ST variables, they have a negative relationship with SOO, i.e. with an increase in the level of physical activity, eating habits, or the time spent in front of screens, then preoccupation with school duties would decrease. The dependent variable, the occupancy of school obligations, is affected by three variables: life satisfaction (LiS), subjective health (SH) at the 5% level of significance for time in front of the screen (ST) at the significant level of 1%, according to the results of p-value in Table 2.

Table 4
OLS Result

	Dependent variable (SOO)	
β	**C**	1.211
	LiS	0.616**
	SH	0.327**
	PA	-0.246
	DQ	-0.454
	ST	-0.532***
S.E. reg.	0.002	
R^2	0.999	
Adj R^2	0.997	
AIC	-9.867	
DW	2.451	
Prob(F)	0.029	

Source: Authors' work

Regarding the significance, the model includes variables that are statistically significant at the 5% and 1% levels, namely life satisfaction (LiS), subjective health (SH) and time in front of the screen (TS). The statistical significance of the variables LiS, SH and ST in the multiple regression model at the level of 5% and 1% significance presents the relevance of the observation of the variables for the given model, which indicates that the model has certain statistical reliability and significance with which it could be applied. The multiple regression model of the dependent variable - the occupancy of school obligations is given:

$$SOO_i = 1.211 + 0.616LiS_i + 0.327SH_i - 0.246PA_i - 0.454DQ_i - 0.532ST_i + \sum u_i \quad (7)$$

where SOOi is the dependent variable for adolescent i, while LiS, SH, PA, DQ, and ST are independent variables, and u_i displays the standard error. Table 4 shows the results of the observed multiple regression model.

Based on the results of the observed multiple regression model, it can be determined that the standard error of the regression is small (*S.E. reg.* = 0.002), the coefficient of determination – R-squared (R^2) is almost equal to 1, so almost all deviations are interpreted by the given model. Between the value of R^2 and the corrected coefficient of determination Adjusted R-squared (*Adj* R^2), there is a small difference of 0.002. The value of the Durbin-Watson test is 2.451 (<2.50). Hence, there is no first-order autocorrelation; Prob *(F)* = 0.029 explains the existence of a statistical connection between the variables in the observed model. According to the results of multiple regression, the model is relevant for researching the relationship between school obligations and the life situations faced by adolescents.

Furthermore, this answers the question of how the level of school obligations should be optimised regarding life satisfaction, subjective health and time spent in front of the screen. The model in which the level of school obligations in adolescents can be influenced through satisfaction with the life situation, perception of subjective health and time spent in front of the screen represents the most appropriate set of activities and should be observed in practice for optimising school obligations regarding the life circumstances. It should be emphasised that in this research, the model serves as a recommendation for the optimal determination of the level of school obligations according to other life circumstances of adolescents.

Association Rules

After the explanation of the elements in the measurement of associative rules (in section *Analysis*), an example of the technique for the observed variables as attributes in this research is given. To carry out this technique, they are categorised in the manner indicated in Table 5. Given that the observed variables were measured ordinally, on a scale from 1 to 5, they are categorised; hence, 1 represents very low, while 5 means very high.

Table 5
Attributes for Association Rule Analysis

Attribute name	Type	Categorised Values
School_obligations	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Life_satisfaction	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Subjective_health	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Physical_activity	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Diet_quality	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"
Screen_time	Ratio	1-"very low"; 2-"low"; 3-"moderate"; 4-"high"; 5-"very high"

Source: Authors' work

The technique of associative rules in this research is used to analyse and predict the behaviour of adolescents in cases where certain life circumstances affect each other. Practically, if an individual is satisfied with life situations, will he then have a higher level of subjective health and physical activity? A method of data mining strives to get a better insight into the chain of the behaviour of adolescents in different situations that they encounter in their life circumstances. This operation was performed in the Weka 3.8.6 system for the sake of simpler execution and use of data on the observed variables based on the examined adolescents. By processing attributes according to associative rules, 10 rules were obtained, which are shown in Table 6.

Table 6
Association Rules Result

Rule no.	Rule body	C_f	L_t	L_v	C_v
1.	physical_activity = moderate → subjective_health = moderate	0.99	4.17	0.18	385.29
2.	physical_activity = very low → subjective_health = very low	0.99	4.17	0.18	385.29
3.	life_satisfaction = high → physical_activity = very high → subjective_health = moderate	0.95	3.95	0.15	216.03
4.	life_satisfaction = very high → physical_activity = low → subjective_health = moderate	0.95	3.95	0.13	282.07
5.	life_satisfaction = moderate → physical_activity = moderate → subjective_health = moderate	0.95	3.95	0.13	14.19
6.	life_satisfaction = high → physical_activity = high → diet_quality = moderate	0.72	2.34	0.13	13.12
7.	life_satisfaction = low → physical_activity = high → school_obligations = high	0.68	2.12	0.13	10.33
8.	life_satisfaction = low → physical_activity = high → diet_quality = low	0.55	2.01	0.13	10.21
9.	life_satisfaction = low → physical_activity = high → screen_time = low	0.49	2.01	0.14	8.37
10.	subjective_health = high → diet_quality = moderate	0.69	3.04	0.13	7.45

Source: Authors' work

The association rules represent that moderate or very low levels of physical activity lead to moderate or very low subjective health. Most of the rules are associated with the satisfaction of life. Therefore, a high and very high level of life satisfaction is achieved when physical activity is very high or, on the other hand, low with a moderate perception of subjective health. Also, a low level of satisfaction with the life situation is presented in the case of high physical activity followed by high preoccupation with school obligations. Furthermore, a low level of life satisfaction occurs in situations of high physical activity, bad eating habits, or less time spent in front of the screen. In addition, the perception of a high level of subjective health is achieved by moderate eating habits. Concerning the obtained rules, a lower concentration of connection and confidence with attributes such as school obligations and screening can be seen, which would certainly further strengthen the results of this research.

Discussion

This paper showed the correlation of the level and amount of school obligations to certain independent variables that marked the daily lives of adolescents. These describe how certain life habits, namely nutrition, physical activity, time of usage of electronic devices, subjectively perceived health, and life satisfaction, can have an impact on requests defined by the school system. This period is very important for the lives of adolescents, defined by their role as students.

There is a link between low level of life satisfaction and leaving school (school obligation – low level of meeting school obligations)(Kwon, 2020). For many theorists, continuing education (high education) is tied to a low level of scholastic success due to the psychological-emotional state caused by lowered financial abilities (Creed et al., 2003).

Subjective health is dependent on elements of encouragement and congruent conditions, and according to research, physical inactivity increases the risk of depression (Valois et al., 2001). Elements of encouragement are evident in sedentary behaviour, media exposure, the pandemic, physical activity, and even health, with numerous consequences on self-esteem (Magson et al., 2021; Ortega et al., 2008; Stephenson, 2021). One should also take into account that countries with a lower HDI (human development index) with medium and low income also report mental disorders in 13 to 15% of adolescents and that adolescents account for 16% of the world population (Patton et al., 2016).

Numerous surveys indicate a strong connection between physical activity and life satisfaction (life quality), which share a positive correlation. Studies have also shown a positive correlation between life satisfaction and intense physical activity in adolescents and a negative correlation to depression and anxiety (Vilhjalmsson & Thorlindsson, 1992). The positive correlation confirmed by research on physical intensity and life satisfaction points to a strong consequent link between life satisfaction, quality of life, and school obligations (Maton, 1990).

To the younger population, it may seem that they represent a public ranking system and may have a negative connotation on the level of peer acceptance. They can fuel feelings of alienation or exclusion. Building healthy social media habits is essential to avoiding potential mental health risks. Use should be moderate and balanced, with a focus on communication and socialising with family and friends. This confirms the phrase "high tech to high touch". The decision on the duration of use depends on the individual's age, and it is also defined by character traits and the culture in which individuals live. However, the impact of the content that adolescents encounter and the activities they engage in on the Internet is perceived as more important than the actual time spent online. Instead of just using social media for posting content and passive browsing that might lead them to compare, it might be more useful to use it to strengthen close relationships with friends through comments and messages.

An important problem that society is facing nowadays is the growing number of overweight and obese children, increasing every day. The number of obese children and adolescents in Western countries has more than tripled in just twenty years. Among the young population, there is a growing epidemic of metabolic disorders linked to obesity, which are normally characteristic of old age. An increased body mass index in childhood and adolescence is very often associated with an increased risk of developing cardiovascular disease later in life. In addition to many factors, including the sedentary lifestyle of the modern "virtual" society, the root cause of this problem is the excessive intake of and easy access to energy-rich meals followed by very little physical activity, together, reduced physical activity and poor eating habits contribute to overweight and obesity.

According to the analysis of results obtained by the regression and correlation, high levels of subjective health and life satisfaction in adolescents create the opportunity for more experiences, more sense of freedom, and being more relaxed in specific life situations, thus demonstrating a greater willingness to assume more responsibility prompted by their inexperience and naiveté. Being more burdened and fed up with the tasks are the final consequences of that condition. On the other hand, the analysis of the Pearson coefficient correlation indicates that a higher awareness level concerning physical activity and eating breakfast in terms of creating more adequate eating habits can result in reducing the sense of being burdened and fed up with school responsibilities. In this manner, scheduling their free time for specific extracurricular activities, sports, and recreation, as well as taking greater care of their

health, led to a reduced sense of feeling burdened by the responsibilities that the school system imposes on adolescents.

This analysis opens the discussion on the importance of the impact of experiences such as feeling burdened with school responsibilities and feeling occupied by obligations due to the school schedule of students of adolescent age. The emphasis is on the effect this has on their life habits and everyday situations - which they might find themselves in.

Based on all of the above, the following recommendations can be made: First, further in-depth research should be conducted to examine variables such as television program content and student academic performance, as well as parent guide television programs and student academic performance. Moreover, parents should adequately mediate and control their children's behaviour when watching television (Kwon, 2020; Magson et al., 2021; Valois et al., 2003).

Conclusion

Research results confirmed that overdosing on screens negatively affects school performance (Henke, 1999; Nathanson, 2001). There is a moderately positive relationship between school obligations and life satisfaction or subjective health. Therefore, it can be postulated that satisfaction with life situations and a favourable perception of health among adolescents have a positive effect on managing school obligations. This builds on the authors' findings that confirm the positive effect of satisfaction with the life situation and health on school obligations (Adelantado-Renau et al., 2019; Stephenson, 2021). Although no statistical significance was shown in the model for the independent variables DQ and PA, they are negatively related to SOO.

In the analysis of observed variables with the technique of associative rules, most of them are associated with the life satisfaction (LiS) attribute, especially with the assumed rules that a certain level of physical activity and subjective health can influence satisfaction with the life situation.

The multiple regression model, which was implemented in the research, serves as a guideline for future forms and programs for managing school obligations and life situations in adolescence. The results of the analysis of associative rules did not concentrate enough on attributes related to school obligations and time spent in front of the screen. Considering the conducted multiple regression analysis and obtained associative rules, the observed model represents a useful recommendation for developing patterns to influence satisfaction with the life situation with a certain level of school obligations in adolescence. Moreover, the model provides insight into the potential optimisation of school obligations of adolescents according to the level of life satisfaction, subjective perception of health and time spent in front of the screen.

A certain shortcoming of this research existed due to the subjective opinion of adolescents and their inexperience when it comes to being overburdened with responsibilities, creating their perception and attitude, which cannot be reliable indicators of the real situation. A limitation of this study is the use of data every four years as values for the regression and correlation methods. For more relevant insights, research should address data obtained from population surveys. Future research should come to grips with the issues and get clearer views of this topic, which could provide useful guidelines for determining what problem burdens adolescents the most and diverts focus from issues that are more important for their character development.

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Virtue Ethics, Managerial Profession and Personality Traits: The Extension of Mintzberg's Managerial Traits

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Abstract

Background: In the dynamic realm of business, ethics serves as a critical compass, guiding the delineation between right and wrong actions. Gaining momentum as a focal point within organisational discourse, the concept of ethics has burgeoned into a cornerstone element of corporate identity and operations. **Objectives:** This study aims to dissect the theoretical underpinnings of moral virtues—specifically wisdom, justice, courage, and restraint—and their intersection with the managerial profession and associated personality traits. We propose the extension of the Mintzberg model of managerial traits from the perspective of virtue ethics. **Methods/Approach:** Employing a theoretical review methodology, this investigation traverses through each identified moral virtue, engaging with contemporary research and scholarly publications within the domain of virtue ethics. **Results:** The analysis affirms that virtue ethics, with its emphasis on character and morality, is instrumental in shaping the framework for managerial conduct and decision-making. The exploration identifies a symbiotic relationship between managerial virtues within the Mintzberg model of managerial traits, highlighting how these elements collectively contribute to the effectiveness and ethical grounding of managerial practices. **Conclusions:** The findings underscore the indispensability of moral virtues and specific personality traits in the cultivation of proficient and ethically oriented managerial professionals. The extended Mintzberg model can be a relevant starting point for a more detailed discussion regarding virtue ethics in a globalised economy.

Keywords: economy, ethics, managerial profession, personality, managerial traits, Mintzberg, managerial roles

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Introduction

Ethics, an essential cornerstone in the framework of societal and professional behaviour, serves as the guiding concept that distinguishes between right and wrong in the process of making decisions (Contreras et al., 2021). Within the intricate and diverse domain of business management, the recognition and implementation of distinct ethical virtues are not solely a theoretical endeavour but rather a practical imperative to guarantee the recruitment of individuals capable of effectively navigating the complexities of managerial duties with honesty and sagacity (DeTienne et al., 2021). The management occupation, known for its requirement of strong decision-making skills and leadership talents, provides a distinct platform where the principles of ethics offer a clear representation of exemplary professional behaviour, especially considering the quest for sustainability in the contemporary world (Waheed & Zhang, 2022).

This research aims to provide a connection between the theoretical frameworks of ethical theories and the practical realities of the managerial profession within the given setting. This paper delves into the examination of ethics, encompassing not only its philosophical foundations but also its practical ramifications within the realm of business. In this study, we focus on the ethical aspects of virtues, with particular emphasis on four fundamental virtues—wisdom, justice, courage, and restraint—which are considered crucial for shaping the ethical behaviour of individuals in the field of management.

Moreover, this study aims to analyse the notion of the managerial profession, elucidating the essential qualities and skills that delineate effective managerial approaches. This research sheds light on the intersection of moral virtues and personality factors in shaping efficient management by analysing the fundamental principles of ethics and their application to managerial practices, proposing the extension of the Mintzberg model of managerial traits (Mintzberg, 1973; Weick & Mintzberg, 1974; Snyder & Wheelen, 1981; White, 2020). By combining the philosophical domain of virtue ethics (Carr et al., 2017) with the pragmatic sphere of management, our objective is to create a thorough comprehension of how ethical concerns support and improve the managerial profession.

The article is organised to create a coherent narrative, starting with an explanation of the concept of ethics and its essential aspects. Subsequently, we commence an examination of business administration as a profession, outlining its distinguishing features and the indispensable qualities necessary for achieving proficiency in this domain. The central focus of our investigation centres on virtue ethics and its relevance to the managerial field, examining the ways in which the development of virtues and personality traits enhances the ethical and efficient performance of managerial duties, within the Mintzberg model (1973).

This investigation aims to make a scholarly contribution to the field of ethics and management while also providing practical insights for fostering ethical leadership within the corporate realm.

The notion of ethics

In its definition, ethics is the science of morality which represents models of behaviour and research into what is right and what is wrong in our behaviour. Ethics is the search of each person for the difference between good and evil. Moral judgment is part of our everyday life. There are three great ethical traditions: the aretaic, deontological and teleological traditions. Aretaic focuses on the arete, i.e., the virtues of each

person, and it is a virtue in disposal for action (Buzar and Krkač, 2013). The deontological tradition believes that there are unique moral laws as a guideline for the behaviour of the individual, and the teleological tradition emphasises the consequences of the committed moral act (Buzar and Krkač, 2013). The field of ethics deals with human action and human character (Mladić, 2007). Other sciences, such as psychology, also deal with humans in action and character, but the primary task of ethics is to see things through good or evil, right or wrong (Mladić, 2007). This paper combines ethical and psychological perspectives and applies them to the potential improvement of the selection process for managerial positions.

Ethics is about the way we should live, but it is often hard to apply this knowledge to ourselves and our own decisions about how to live and act. Aristotle (1988) attempted to do that in the first systematic treatment of ethics in human history. Aristotle's moral philosophy (1988) was and still is the most important version of virtue ethics. Virtue ethics focuses on good lives (Zagzebski, 2023). Virtue ethics comes from the Greek term arete (Ἀρετή), which means virtue. The concept of virtue ethics has been universal in contemporary ethics for the past few years and is becoming an increasingly popular topic. Virtue ethics focuses on the evaluation of people's character traits and believes that people should act with the aim of promoting virtues and base their actions on them. It is interesting to note that the first virtue ethics and discussion was in 1995 in the book by author Julia Annas (1995), who wrote on the mortality of happiness, preceded by articles by Geach (1977), Foot (1978) and Wallace (1978). Louden (1986), and more recently, the work of Driver (2001), but with a focus on deontology (Berčić, 2008). Virtue ethics does not only show us where the limits of what is acceptable are but also suggests to us what we should be like within the space of what is permissible, and this is the sense in which virtue ethics focuses on humans (Berčić, 2008). When we mention the words virtue and vice, we clearly know that these words refer to character traits that define our behaviour (Berčić, 2008). In virtue ethics, both characteristics are fundamental. If the manager lied, it is appalling, not because it led to adverse consequences, but because the untruth made that manager a liar. Virtues should be the primary source of all values, and we will mention some of them in this lesson.

In Nicomachean ethics, emphasis is placed on the virtues of friendship and justice. Aristotle (1988) indicates that it is important to consider the middle of an individual virtue; for example, the formula for courage is a combination of cowardice and reckless rashness (Senković, 2006). Interestingly, Aristotle (1988) believes that virtues are rational and moral, and that moral virtue arises through habituation. Accordingly, Aristotle (1988) believes that ethical virtues are obtained through practice and habituation. Since ancient times, there have been two divisions of virtues: rational and moral. Reasonable virtue has its origin and growth based on lessons, so she needs practice and time. However, moral virtue arises through habituation; none of the moral virtues arise in us by nature because none of the things that are by nature can be changed by habituation (Berčić, 2008). Reasonable virtue originates and grows based on teaching, so we can conclude that it needs experience and time. However, moral virtue arises through training. This part is applicable in the managerial profession as well; often, managers need both experience and time in combination with practice. Therefore, none of the moral virtues arise in us by nature because none of the things that are by nature can be improved by habituation. division into four basic virtues: prudence, justice, courage, and moderation. These are also the virtues that we will analyse in more detail in the next part of the seminar paper and point out the importance of having them in the managerial profession. Prudence is a virtue that is counted as one of the basic virtues, and it refers to the ability of practical mental

action. Its characteristics are freedom of choice, measured procedures, and application in a specific situation. Often, managers do not focus on the importance of practical applications in specific situations. However, by creating a certain ethical scale, they might be able to follow their ethical virtue progress. Justice means the ideal state of social interaction in which there is a fair and impartial balance of interests and the distribution of goods and opportunities between people or groups. It represents the value principle of distribution that determines how many goods and how many burdens (rights and obligations) should be given to subjects of social relations, and it is apparent that there is an inseparable connection between justice and law. Justice is also the concept of fair and moral treatment of all persons (natural persons and legal persons), especially in the law profession. Justice is frequently seen as a constant effort to do what is right. However, some writers, such as Kelsen (2017), do not attach any greater importance to justice because, in modern society, there are only concerns of different social groups and their conflicts. This conflict can be resolved by order in two ways - either the interests of one group will be satisfied at the expense of the other, or a compromise will be found where neither side will gain, but neither will lose much. It is impossible to determine which of these two solutions is "just" at a given moment because justice is not a rational category, and there is no way to determine or measure it precisely. Righteousness is an ideal, morally correct situation or personality. Plato gives the following definition for justice: 'Justice is the possession and action of what belongs to whom (Berčić, 2008). This means that everyone should get as much for their work as that work is worth and that they ought to do what they are most capable of. Therefore, a fair manager stands in the right place, does what he can do best, and gives back in full and equal measure for what he gets. Courage, fearlessness, or heroism is one of the four basic virtues. The basis is a strong and stable desire to fulfil one's obligation despite great obstacles, dangers, and difficulties (Berčić, 2008). A brave man or brave manager feels capable and has enough self-confidence to risk something. Courage gives us strength and perseverance to overcome difficulties and strive to find solutions, as well as strength to overcome fear. Courage can also be the willingness to sacrifice one's life. Courage is not the denial of fear nor the absence of fear. On the contrary - free choice decides to do what is necessary despite the feeling of fear. It is also important to mention moderation, which enables man to use the created goods equally and justly; moderation, like any other virtue, is positive. Moderation is power over oneself (Berčić, 2008). It helps a person to have power over himself and puts his passions, desires, and aspirations in the right place. This point is often crucial for managerial professionals in situations when they are making big business decisions; that would allow managers to consider all parameters. Next to that, self-control tends towards a balanced use of material goods and strives for a higher good. This virtue is often stated as the source of emotional and spiritual life.

Considering that these four virtues have noticeably clear descriptions, but the other virtues are also truly clear in their description, virtue ethics places special emphasis on terms that are more precise and informative. In addition to this, representatives of the subject theory believe that it is important to define why someone did something clearly, and they believe that phrases like 'he did something bad' are very general. To be able to correct behaviour, it is important to locate what a certain person is doing wrong (Berčić, 2008).

Analysis of business management as an occupation

In every profession, there are certain virtues that every manager must possess to deal with business. Researchers who deal with the field of career behaviour believe that

personality is related to the types of careers that individuals choose and how they function in them. Thus, individuals with certain personality traits will choose certain professions in which they will function better than others (Tonković Grabovac, 2013). Business management is only a special case of management as a more general human condition (Sahoo, 2017). Management is everywhere, ranging from people's self-management to social network management and from household management to planetary management in the context of global warming. This raises the question of what is meant by the concept of business management. Often, management is self-evidently understood as managerial power and a mechanism to control, inspired by the scientific management theory that is still taught in business schools today. To develop a better understanding of the contemporary meaning of the concept, one would expect to find deeper insights into the sub-discipline of the philosophy of management. An explanation of why many non-philosophers defines business management self-evidently in terms of managerial power and mechanism of control, while philosophers of management seem to omit the question 'what is management', maybe that the concept of management is 'highjacked' by political philosophers like Michel Foucault. Foucault outlined management as a governmental practice that directs the modern governmentality of the world. Alan Bray, a famous British historian, raised the provocative question, "Why is it that management seems to have no history?" demonstrating that the practice of management as a corpus of knowledge and skills received only slight attention in the literature (Bray, 2001).

Researchers often try to identify the skills and personality traits that managers must have to be successful in their occupations. Success in formal management education does not guarantee that someone will be a strong manager, and learning from experience, including mistakes, is necessary to improve existing skills and acquire new skills. Philosophers themselves often did not develop an explicit philosophy of management themselves, and we looked through different philosophical descriptions of managerial occupation and found Xenophon's philosophy of management, which identifies nine dimensions of business management, as well as the competencies which include knowledge, skills, and virtues) that good management requires (Blok, 2019). Management has numerous roles; it points to the establishment and maintenance of an effective business with the main goal of making a profit, suggests public appreciation, and it also highlights the importance of having a sense that both private and public interests are served in a joined way. Philosopher Xenophon argues that business management is concerned with a branch of knowledge by which business managers can increase their business, according to Mintzberg (1973), a professor who is the author of management books, which put focus on crucial management roles and divided them into certain categories, which we also found as an appropriate baseline for comparison between virtues and managerial traits. Mintzberg (1973) carves up ten crucial management roles into 3 categories: interpersonal (those include figurehead, leader, liaison, and monitor), informational (disseminator, spokesperson, and entrepreneur) and decisional (disturbance handler, resource allocator and negotiator). We will focus on interpersonal and decisional roles in comparison with ethical traits for managerial positions (Gutterman, 2023).

Mintzberg's efforts (1973) to identify some of the distinguishing characteristics of managerial work, which ultimately led to the creation of his model of "managerial roles", were accompanied by his assessment that effective managers must recognise and master a number of important "managerial skills", including development and nurturing of peer relationships (i.e., liaison contacts), negotiation and conflict resolution skills, the ability to motivate and inspire subordinates, establishment and maintenance of information networks, the ability to communicate effectively when

disseminating information, and the ability to make decisions in conditions of extreme ambiguity and allocate resources. He argued that the entire process of identifying the various managerial roles and related skills, while not guaranteeing that a manager will be effective and successful, provided a framework for setting priorities and establishing a managerial training regimen (Gutterman, 2023). Traits and characteristics have been a popular method of evaluating the potential for effective and successful leadership in management. Various researchers identified numerous other traits, many of which were difficult to define with specificity and sometimes incapable of being acquired, such as "personality" and "charisma/personality. Miner and Smith (1977) tried to explain that managerial effectiveness could be described by the following categories: authority acceptance (i.e., desire and willingness to accept the authority of superiors), competitive games and situations, both of which were based on a desire to engage in competition with peers; assertiveness; imposing wishes (i.e., desire to tell others what to do and to influence through sanctions); distinctiveness (i.e., a desire to stand out from the group); and a desire to carry out the routine functions associated with managerial responsibilities (Gutterman, 2023). The empirical section should provide appropriate citations to the methodology used. The paper's argument should be built on an appropriate base of theory, concepts, or other ideas. The research or equivalent intellectual work on which the paper is based should be well-designed. Methods employed should be appropriate.

Henry Mintzberg's framework of managerial roles (Mintzberg, 1973; White, 2020) offers a nuanced understanding of the complex nature of managerial work, identifying ten distinct roles that managers must embody to navigate the multifaceted landscape of organisational life effectively. These roles are categorised into three main groups: interpersonal, informational, and decisional. The interpersonal category, comprising the figurehead, leader, and liaison roles, highlights the importance of social, motivational, and networking skills in management. The informational roles—monitor, disseminator, and spokesperson—underscore the manager's duty to gather, process, and share information both within and outside the organisation. Lastly, the decisional category, which includes entrepreneur, disturbance handler, resource allocator, and negotiator roles, emphasises the critical decision-making responsibilities managers hold in problem-solving, resource distribution, and negotiation processes.

Mintzberg's managerial traits (1973) are presented in Figure 1 and are defined as follows:

- Figurehead: As a manager, you have social, ceremonial, and legal responsibilities. Managers should be a source of inspiration. People look up to you as a person with authority and as a figurehead.
- Leader: In this role, you provide leadership for your team, your department, or your entire organisation and manage the performance and responsibilities of everyone in the group.
- Loyalty: Loyalty is a virtue that is extremely important in a managerial career because it means that the manager's value system aligns with the attitudes of his superiors or the community in which he operates. Loyalty is visible in situations where the manager must agree or act with values that will best reflect his employer.
- Liaison: Managers must communicate with internal and external contacts. You need to be able to network effectively on behalf of your organisation.
- Monitor: Acts as the information-gathering hub of the organisation, constantly scanning the environment for important data, trends, and developments that could impact the organisation. They stay informed about what is happening internally and externally to make accurate decisions.

- Disseminator: A manager is responsible for effectively distributing important information within the organisation. They ensure that employees have the data and insights they need to perform their jobs effectively and stay aligned with organisational goals.
- Spokesperson: The manager represents the organisation to the outside world. They communicate the company's plans, policies, actions, and results to stakeholders, building the organisation's reputation and facilitating external relationships.
- Entrepreneur: As a manager, you create and control change within the organisation. This means solving problems, generating new ideas, and implementing them.
- Disturbance Handler: When an organisation or team encounters an unexpected roadblock, the manager must take charge. You also need to help mediate disputes within the organisation.
- Resource Allocator: The manager should also determine where organisational resources can best be applied. This involves allocating funding and assigning staff and other organisational resources.
- Negotiator: Managers are required to participate in and direct important negotiations within their team, department, or organisation. They plan negotiations by understanding everyone's needs, foreseeing potential issues, and developing fair strategies that match the company's values.

Figure 1
Model of Mintzberg managerial traits

Figure Head	social, ceremonial, and legal responsibilities
	source of inspiration
Leader	leadership for your team, your department, or your entire organisation
	manage the performance and responsibilities of everyone in the group
Loyalty	having value system aligned with the attitudes of superiors and/or the community
	being able to agree or act with values that will best reflect his employer
Liason	communicate with internal and external contacts
	network effectively on behalf of your organisation
Entreprenur	create and control change within the organisation
	solving problems, generating new ideas, and implementing them
Monitor	Acts as the information-gathering hub of the organisation
	scanning the environment for important data, trends, and developments
Disseminator	responsible for effectively distributing important information
	ensure that employees have the data and insights
Spokeperson	communicate the company's plans, policies, actions, and results to stakeholders
	build the organisation's reputation and facilitating external relationships
Disturbance Handler	to take charge when an organisation or team encounters an unexpected roadblock
	to help mediate disputes within the organisation
Resource Allocator	to determine where organisational resources can best be applied.
	allocate funding and assigning staff and other organisational resources.
Negotiator	to participate in negotiations within their team, department, or organisation
	understanding everyone's needs, foreseeing potential issues, and developing fair strategies

Source: Authors' work based on Mintzberg (1973) and Muma et al. (2006)

Virtue ethics and managerial profession

Studying the theoretical part of virtue ethics and the managerial profession, the author noticed a connection between virtue ethics and the managerial profession. Studying the characteristics of managers and the skills required to perform managerial functions, we noticed that the moral responsibility of the managerial profession is not clearly indicated. Virtue ethics believes that if someone has a virtue, then they will act in accordance with it. The managerial profession is extremely complex in terms of following certain norms and procedures, and for this, a person must have certain virtues to perform it. In the following, we will list some of the desirable managerial virtues and compare them with Aristotle's (1988) and Nicholson's traits (1964). Aristotle's trait (1988) of righteousness in the managerial profession should emphasise the virtue of fairness; the business manager does his job to the best of his ability and gives back in equal measure for what he gets. The following trait is prudence, which is counted as one of the basic virtues, and we believe that it is a virtue that a diplomat must inherit. He would have to have measured procedures and their application in a concrete situation, for example, maintaining interpersonal relations in the representative's office. Members of the representative's office are regularly exposed to special working conditions and feel lonely in a foreign country. Next to that is bravery; courage in the managerial profession can refer to a powerful desire to fulfil a personal obligation despite great obstacles, dangers, and difficulties. A brave manager feels capable and has enough confidence to risk something. Courage gives the manager strength and perseverance to overcome difficulties and strive to find solutions, as well as strength to overcome fear. Courage can also be the willingness to sacrifice one's life, but this can only be the case in high-risk diplomatic missions. Managers should have the virtue of making decisions out of free choice and doing what is necessary despite the feeling of fear. For example, a new company structure or digital transformation in the new age is a great example of when making a decision is crucial. Moderate managers should have a virtue which will allow the managerial profession/diplomat to use the created goods equally and fairly. Responsibility refers to conscientiously performing managerial duties. Managers should be ready to state their opinions and arguments with their communication skills, and that will have firm argumentation.

Nicholson (1964) gives an example of the diplomatic profession, and he states that honesty is the basis of the profession, that if a diplomat is not honest in his actions and thoughts, it can reflect on his bad reputation and loss of credibility. He also highlights that precision in diplomacy emphasises moral correctness/precision rather than intellectual precision. This is a virtue that, according to Nicholson (1964), a diplomat must respect from the very moment of appointment. As Nicholson states (1964), do not allow yourself to become upset about your work. In diplomatic negotiation situations, a diplomat must avoid personal animosities, prejudices, exaggerations, and dramatisations. Furthermore, the virtues of calmness and patience are great. He also highlights. The virtue of benevolence and modesty refers to the fact that a diplomat will negotiate and act in good faith without inciting conflict. Modesty as a virtue implies moderation and simplicity, both in behaviour and materially. Humble people do not aspire to godliness and luxury.

The inclusion of virtue ethics within Henry Mintzberg's managerial roles model (1973) presents a persuasive extension that serves to reconcile the disparity between managerial efficacy and ethical leadership. The rationale behind this development stems from the growing acknowledgement of the significance of ethical issues in business operations and the consequences of managerial choices on various stakeholders. Managers are urged to exemplify virtues such as integrity, justice, and

compassion while adopting virtue ethics. This ensures that their actions and decisions not only accomplish organisational goals but also contribute to the overall welfare. This methodology enhances Mintzberg's framework (1973) by incorporating ethical considerations into the fundamental aspects of managerial practices, emphasising that genuine leadership extends beyond mere operational achievements and includes the development of a morally upright organisational culture.

Therefore, based on the Mintzberg model (1973) and the literature on virtue ethics, we propose the following description of the managerial traits considering virtue ethics (Figure 2):

- Figurehead: Demonstrating virtue ethics means embodying the principles of integrity and respect in every action, serving as a moral compass for the organisation and inspiring those around you through exemplary conduct.
- Leader: In leadership, applying virtue ethics involves guiding your team with fairness, fostering a culture of trust and empowerment, and leading by example in your professional and ethical behaviours.
- Loyalty: Displaying loyalty requires aligning your actions with the organisation's values and goals and demonstrating commitment to your role, team, and the broader community, even when faced with challenges.
- Liaison: Being a liaison with a foundation in virtue ethics requires the cultivation of relationships based on sincerity and mutual respect, ensuring that the organisation's ethical principles guide networking efforts and aim to foster long-term, positive connections.
- Monitor: Being diligent and honest in gathering and analysing information, ensuring decisions are made based on accurate, unbiased data that benefits the organisation holistically.
- Disseminator: Virtue ethics calls for transparency, ensuring that all communication is clear, accurate, and intended to support the collective success of the team and organisation.
- Spokesperson: In this context, virtue ethics mandates truthfulness and responsibility in all external communications, accurately representing the organisation's values and achievements to build trust and credibility.
- Liaison: Acting involves fostering genuine, respectful relationships with internal and external stakeholders, prioritising open communication and mutual benefit in all interactions.
- Entrepreneur: Applying virtue ethics means embracing innovation and change ethically, ensuring that new ideas and solutions are pursued with consideration for their impact on all stakeholders.
- Disturbance Handler: Virtue ethics require approaching conflicts and challenges with a focus on fairness and seeking resolutions that uphold the dignity and well-being of all involved.
- Resource Allocator: Making equitable decisions and ensuring resources are distributed fairly and in a manner that supports the organisation's mission and values.
- Negotiator: Virtue ethics entails striving for outcomes that are both successful and just and reflective of the organisation's ethical standards, ensuring negotiations are conducted with honesty and integrity.

Figure 2
The extension of Mintzberg's managerial traits from a virtue ethics perspective

Figure Head	embodying the principles of integrity and respect in every action
	inspiring those around you through exemplary conduct.
Leader	guiding team with fairness, fostering a culture of trust and empowerment
	leading by example
Loyalty	aligning ctions with the organisation's values and goals
	demonstrating commitment to the broader community, even when faced with challenges
Liason	cultivation of relationships based on sincerity and mutual respect
	ensuring that networking efforts are ethical
Entrepreneur	embracing innovation and change ethically
	ensuring that new ideas and solutions are pursued with consideration for stakeholders
Monitor	Being diligent and honest in gathering and analysing information
	ensuring decisions are made based on accurate, unbiased data
Disseminator	ensuring that all communication is clear, accurate
	intend communication to support the collective success of the team and organisation
Spokeperson	truthfulness and responsibility in all external communications
	accurately representing the organisation's values and achievements
Disturbance Handler	approaching conflicts and challenges with a focus on fairness
	seeking resolutions that uphold the dignity and well-being of all involved
Resource Allocator	Making equitable decisions
	ensuring resources are distributed fairly
Negotiator	striving for outcomes that are both successful and just
	ensuring negotiations are conducted with honesty and integrity

Source: Authors' work based on Mintzberg (1973) and Muma et al. (2006)

The expansion of Mintzberg's managerial roles from a virtue ethics perspective provides a comprehensive and profound understanding of managerial obligations. This perspective highlights not only the skills and duties associated with each role but also the moral and ethical aspects that form the foundation of successful and accountable management. This method emphasises the significance of ethical conduct in several parts of management, including decision-making, leadership, communication, and negotiation, by integrating the practical elements of managing functions with the concepts of virtue ethics.

The incorporation of virtue ethics alters the understanding of managerial jobs, shifting them from straightforward positions of power and accountability to occasions for moral guidance and ethical guardianship. Managers are perceived as individuals who not only work towards accomplishing organisational objectives but also serve as guardians of ethical principles. They are responsible for both attaining operational excellence and cultivating an ethical organisational culture. This viewpoint emphasises the crucial significance of virtue ethics in improving the honesty, responsibility, and resilience of managerial practices.

Furthermore, this enhanced comprehension of Mintzberg's managing responsibilities, informed by virtue ethics, provides practical insights for managers aiming to negotiate the intricacies of contemporary organisational existence. The proposition posits that achieving success in managing roles is not exclusively dependent on technical expertise and strategic intelligence but also the

development of values such as integrity, equity, esteem, and empathy. In essence, this approach promotes a management paradigm that is both efficient and morally upright, cultivating cultures where trust, honesty, and moral excellence are of utmost importance.

Authors believe that if we have moral role models, then we try to behave just like them. Through different business contexts, we have so far convinced ourselves that we learn best by imitating role models. Even psychology uses the term model learning. When we imitate role models, we do a kind of projective identification, and in that way, we acquire and develop the virtues that serve us as role models (Berčić, 2008). We believe that moral roles, natural authority, and models are of immense importance in management.

Conclusion

In this paper, we shed light on the theoretical concept and the link between virtue ethics and virtues in the managerial profession. Business management is understood as the establishment of a functioning order in which all natural resources have their proper place, all human resources have their proper task and role, and the business manager regulates and governs the proper use of these natural and human resources in order to make a profit. This involves the structuring of the business and the assignment of an appropriate place to each part of the business.

Virtue ethics tells us what we should be, and in this paper, we have analysed specific virtues that we consider necessary in the managerial profession. Virtue ethics should be clear and simple and explain the nature of moral motivation. In the management profession, every manager should take care of what he is like, so if all managers saw themselves like that, the world of business would improve. This paper aims to compare and define specific virtues essential for performing the managerial profession.

We took the existing virtues and made a comparison within the context of the Mintzberg model of managerial traits. The integration of virtue ethics into Mintzberg's managerial framework not only enhances the model's relevance in today's ethically conscious business environment but also serves as a guiding beacon for managers aspiring to lead with moral authority. This synthesis of managerial acumen and ethical integrity paves the way for a new era of leadership, where success is measured not just by financial performance but also by the positive impact on society and adherence to ethical values.

In one of the future research projects, we suggest creating survey research on managerial virtues, allowing the examination of which virtues are desired in the managerial profession empirically. We also suggest a longitudinal study because, in this way, it could be monitored whether the respondents' opinions change according to the times and the context in which we live. Finally, by adding ethical aspects to how we study behaviour, we can set the stage for future studies that mix virtue ethics with managerial qualities, making the process of choosing managers better.

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Generation Z Purchase Intentions: Does Sponsorship Disclosure Matter?

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Abstract

Background: Digital advertising and the amount of money spent on influencer marketing increases every year. Nowadays, it has become one of the most profitable ways to promote products and services and increase a company's profit through an endorsement on social media networks. **Objectives:** This paper explores the parallel mediating effect of brand awareness and influencer credibility between sponsorship disclosure and purchase intention among the Generation Z. **Methods/Approach:** We used a convenience sample method and used regression analysis to test the parallel mediator effect. **Results:** Findings of the research indicate that the direct influence of sponsorship disclosure on purchase intention is non-significant. However, this relation is significant when mediated by brand awareness and influencer credibility. **Conclusions:** The contribution of the research adds to the new knowledge in the field of influencer marketing and gives practical implications for brand managers who want to influence customers to buy.

Keywords: influencer marketing; sponsorship disclosure; influencer credibility; brand awareness; purchase intention
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Introduction

Digitalisation and the rise of social media usage have changed the way people learn, communicate, and make buying decisions. Influencer marketing includes opinion leaders to influence consumers' process of deciding (Vrontis et al., 2021; Sesar et al., 2022) to buy or not to buy a certain product or service, and the field of influencer marketing is highly connected to influencers activities on social networks since they are sponsored by the brand (De Veirman et al., 2019). The influencer marketing market size in the USA is valued at 10.3 billion dollars and will expand at a compound annual growth rate (CAGR) of 33.4% from 2022 to 2030, while the global influencer market size in 2021 was 10.4 billion dollars (Grandviewresearch, 2023). In this context, the Generation Z is the cohort that significantly values reviews and ratings while shopping online and digital technologies present a sort of passion (Agrawal, 2022) and not a purpose to an end like in earlier generation cohorts.

This paper analyses purchase intention among the Generation Z cohort, which is the first generation born with digitalisation and what triggers them to buy (Bittner et al., 2022; Głodowska et al., 2022). This generation has different attitudes and behaviour regarding various issues, such as job expectations and seeking (Nguyen Ngoc et al., 2022). is encouraged daily by different types of influencers they follow on social media networks through their posts. Therefore, in today's digital world, influencer marketing represents a good company strategy to adapt to increase sales and reach a targeted audience with fewer costs that need to be spent, for example, in traditional advertising. In recent years, sponsorship disclosure research has shown an increase in the number of articles on the part of business management, marketing, psychology and information systems (Jhawar et al., 2023).

This research aims to provide a deeper understanding of how sponsorship disclosure affects purchase intention through brand awareness and influencer credibility among the student population belonging to Generation Z in Croatia.

The paper has been divided into six major sections. After the introduction, the conceptual model and hypothesis section was introduced, which provides a literature review supporting the developed hypothesis. Further, the methodology of the research has been explained. In part four, research results were presented, then discussed in section five. Finally, a conclusion with research limitations has been presented in the final section.

Conceptual model and hypothesis

Relationship between sponsorship disclosure and brand awareness

The rise of influencer marketing has become one of the rising fields in digital marketing, and its adaptation in marketing campaigns seems to be an effective way to target customers (Jílková, 2018). Influencer marketing represents electronic word of mouth in the digital era, and most companies that engage influencers want to place their products in a large audience. It was found that electronic word of mouth (e-WOM) has a strong impact on online purchase intention (Erkan and Evans, 2018). When influencers include in their everyday branded content (in terms of pictures, videos, posts, etc.), their followers can find it difficult to distinguish regular posts from ads (Lou et al., 2021). So, the question is whether displayed or not displayed sponsorship disclosure affects brand awareness and how this affects influencer credibility. It has been stated that presenting a sponsorship disclosure in an ad enables advertising awareness (Lou et al., 2021). Memory and recognition of a displayed brand determines brand awareness (Aaker,2014; Febriyantoro, 2020). Brand awareness can

be graded from not recognising the brand at all to fully recalling a brand (Ilyas et al., 2020).

Sponsorship disclosure is a clear disclosure that influencers show in their posts to build trust relationships with their followers and be clear about what they represent (Wang et al. 2022). In the persuasion knowledge model, sponsorship disclosure represents an antecedent (Jhawar et al. 2023) that can convince a follower to buy a disclosed product or service or even reassure them not to buy or use the same product or service. On the other hand, general posts with sponsorship status compared to those without disclosure have a negative influence on brand attitude. This happens due to increased ad scepticism, which negatively influences source credibility (De Veirman and Hudders, 2020). In a developing country (Philippines), influencer marketing creates value for SMEs. Findings show that influencer marketing affects brand awareness by enhancing brand reputation and impacting consumer purchases (Escolano,2023).

Based on those mentioned above, analysing sponsorship disclosure and brand awareness among the Generation Z of students is significant for theory and practice since analysing their behaviour gives practical and scientific value to the field of influencer marketing. Therefore, we pose our first hypothesis:

- *H1: There is a statistically significant relationship between sponsorship disclosure and brand awareness among Generation Z students in Croatia.*

Relationship between sponsorship disclosure and influencer credibility

Earlier studies investigated whether sponsorship disclosure status posted on influencers' walls on social media platforms affects followers' responses to this post. Some studies show that sponsorship disclosure status negatively affects the credibility of an influencer. When influencers show sponsored content, they enhance the reputation of a brand of SMEs and create long-term customer value through ambassadorships of products and services (Escolano, 2023). However, if this is perceived negatively due to a persuasion knowledge activation, it may have a negative effect on source credibility (Jhawar et al., 2023) and may create a negative attitude toward disclosed advertisements (Boerman et al., 2014; Jhawar et al., 2023). Schorn et al. (2022) found a decrease in influencers' credibility when a post for a sustainable accommodation was labelled, but when posting their advantages rather than sustainable benefits, influencer credibility increased. In the case of Vogel et al. (2020), when there were clear disclosure hashtags, the ad recognition increased, but influencer credibility decreased as well, and intentions to engage with posts decreased in the case of young adult e-cigarette users aged 18-29. Ad trust was lower with greater hashtag recognition regardless of disclosures. De Veirman and Hudders (2020) found that sponsorship disclosure type (brand post and influencer post) affects influencer credibility since influencer posts are more admired than brand posts. They added to the new knowledge by including source evaluation variables to explain the influence of sponsored brand versus influencer posts. Findings suggest that disclosures can foster ad recognition. Naderer et al. (2021) found that disclosures increase influencer trustworthiness when there is high follower-influencer similarity, which leads to positive purchase intention.

Based on the analysis, the second hypothesis is posed:

- *H2: There is a statistically significant relationship between sponsorship disclosure and influencer credibility among Generation Z students in Croatia.*

Relationship between a sponsorship disclosure and purchase intention

Previous research found that the presence of sponsorship disclosure and explicit disclosure activated consumers' conceptual persuasion knowledge, which led to diminished message credibility, engagement, product attitude, and purchase intention (Chung et al., 2023). The significant indirect effect of advertising disclosure on purchase intention mediated by influencer source attractiveness was found in the research of Weismueller et al. (2020). Kay et al. (2020) found that when micro-influencers disclose, consumers have higher levels of purchase intentions than when exposed to macro-influencers who do not disclose. Based on the said, a third hypothesis has been defined:

- *H3: There is a statistically significant relationship between sponsorship disclosure and purchase intention among Generation Z students in Croatia.*

Relationship between brand awareness and purchase intention

Purchase intention refers to the combination of consumers' interest (cognitive behaviour) in a brand or a product and the likelihood of purchasing these items (Shah et al., 2012). It depends strongly on the attitude or preference for a particular brand or product (Lloyd and Luk, 2010). The actual buying behaviour is based on the follower's information he collects (Nunes et al., 2018) about the product or service through different social media platforms. Purchase intention is closely related to consumer attitudes, and advertising can influence attitudes towards the advertised brand and, therefore, influence consumers purchase intentions (Hoyer et al., 2013). Many prior studies show that brand awareness is a significant precedent of customers' purchase intention (Tan et al., 2021; Bilgin, 2020; Dabbous et al., 2020; Febriyantoro, 2020; Ling et al., 2023). Since continuous advertising and distribution to broad groups of customers influence high brand awareness (Foroudi, 2019), its close connectedness to influencer advertising and placing sponsorship status on social networks should be analysed since influencers' positive posts represent a good way to create customers desire for brand purchase (Martín-Consuegra et al., 2018). Kosakarika (2020) found that brand awareness (that is, brand recall, top-of-mind brand, dominant brand, and word of mouth) influences purchase intention, while brand recall was found insignificant. Dwidienawati et al. (2020) analysed customers' and influencers' reviews on purchase intention, where influencers' reviews showed a positive influence on purchase intention while customers' reviews did not have a positive influence on purchase intention. Johansen and Guldvik (2017) found a significant relationship between influencer marketing and respondents' behaviour toward purchase in a sample of 180 respondents. Further, the research of Gautam and Sharma (2017) on 243 respondents showed a positive significant effect of social media marketing and customer relationships on consumers' purchase intention.

Therefore, the fourth hypothesis:

- *H4 states: There is a statistically significant relationship between brand awareness and purchase intention among Generation Z students in Croatia.*

Relationship between influencer credibility and purchase intention

Previous studies found that influencer credibility (measured by expertise, trustworthiness, and attractiveness) had a positive effect on purchase intention in the context of the Amman Stock Exchange in Jordan (Hanandeh et al., 2023). Xie et al. (2023) analysed the influence of the visual presentation of influencers' aesthetic labour on consumers' brand purchase intention. They found that consumers who are

promotion-focused vs. prevention-focused consumers have a higher intention to purchase brands endorsed by influencers who have high visual presentation of aesthetic labour through para-social relationships. Other research done by Brüns and Meißner (2023) shows how ad recognition diminishes positive brand attitudes, word-of-mouth intentions, and purchase intentions by reducing the perceived integrity of an influencer, which magnifies doubt in an advertised brand. Further, they found that these effects are reconciled when a brand picture appears and is notable in terms of colour or brightness. Also, the impact of digital influencers on the purchase intention of vegan products in the cosmetic industry is seen in influencers' credibility and social media usage (dos Santos et al., 2023). Prasad et al. (2022) aimed to examine the effect of credibility on consumers' purchase intentions, and the results indicate that expertise, integrity, and credibility play a vital role in conveying trustworthiness and genuineness about the product and its usage. Further, Almahameed and Obidat (2023) found that trust in sellers, sociability, electronic Word-Of-Mouth (eWOM), perceived economic benefit, and informational fit-to-task positively influence the intention to purchase in developed countries. Chiu and Ho (2023) found a significant influence of influencer credibility on the purchase intention of Chinese Generation Z through the mediating influence of emotional attachment. On the other hand, Lee and Kim (2020) found no relationship between influencer credibility and purchase intention, and there were no significant effects of the sponsorship disclosure of Instagram promotional posts on purchase intention.

Therefore, influencer credibility plays a significant role in customers' purchase intention, and the fifth hypothesis is defined as:

- *H5: There is a statistically significant relationship between influencer credibility and purchase intention among Generation Z students in Croatia.*

Mediation effect

The role of mediation variables in the model, brand awareness and influencer credibility have been analysed. For example, Febriyantoro (2020) analysed the double mediation model to see whether brand image and brand awareness are mediators between YouTube ads and purchase intention. They found that brand awareness and brand image do not mediate the relationship between YouTube ads and purchase intention. However, they found a positive and significant effect of YouTube ads on brand image and brand awareness. Research shows that brand awareness plays a significant and positive mediator role in the relationship between social networking site advertisements and consumer purchase decisions (Nofal et al., 2020). Research results on the sample of 306 German Instagram users between 18 and 34 years reveal that influencer credibility characteristics (source attractiveness, source trustworthiness and source expertise) affect consumer purchase intention. It was also found that influencer attractiveness played a mediator role between advertising disclosure and purchase intention (Weismueller et al., 2020). Among 432 Dutch Instagram users, there was also a significant mediation effect of perceived credibility and identification in the relation between product influencer, number of followers, advertising outcomes and influencer likeability (Janssen et al. 2022). Further, partial mediation of credibility was found between influencer trustworthiness and purchase intention (Saima and Khan, 2021). Based on the previous research regarding the mediation role of brand awareness and influencer credibility, two hypotheses, H6 and A7, have been posed:

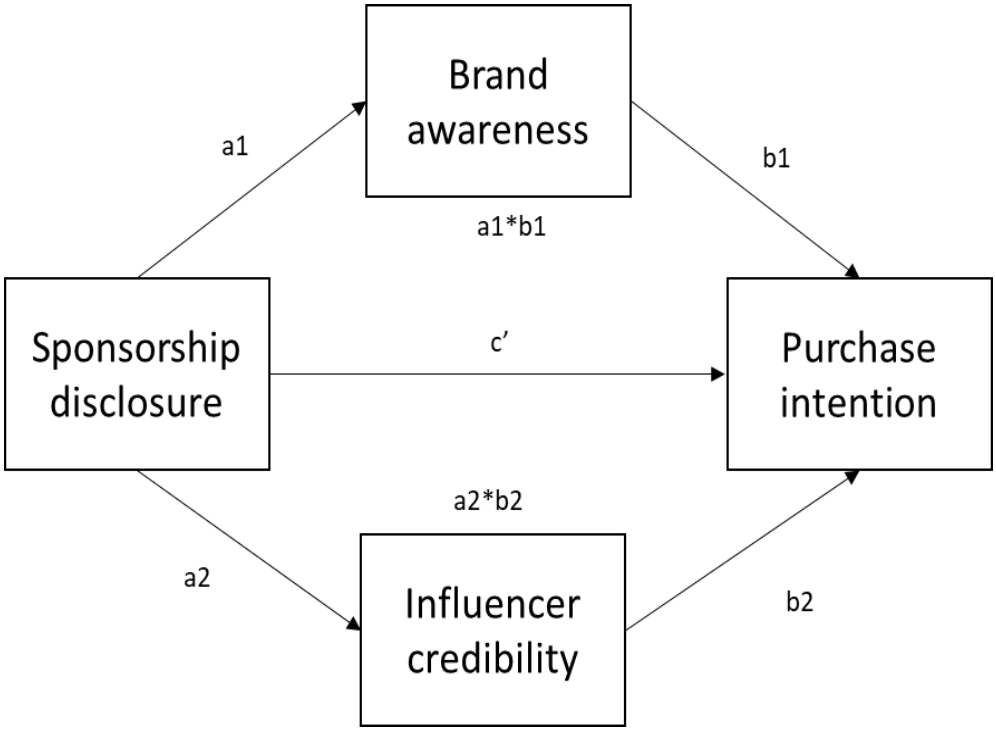
- *H6. Brand awareness mediates the relationship between sponsorship disclosure and purchase intention.*
- *H7: Influencer credibility mediates the relation between sponsorship disclosure and purchase intention.*

Methodology

Research design

Figure 1 represents a conceptual framework developed based on the previous literature research. Figure 1 represents direct (path c') and indirect effects (path a1,a2,b1,b2) and is used to test the set hypothesis.

Figure 1
Research model



Source: Author's work based on Weismueller et al. (2020), Febriyantoro (2020), Lee & Kim (2020)

To confirm the importance of disclosing a sponsorship and its impact on purchase intention, the research model uses the parallel double mediation model.

For testing the mediation model, variable sponsorship disclosure (SPONS) represents a dichotomous independent variable. Further, there are two mediator variables in the model where M1 represents brand awareness (BRAND), and M2 represents influencer credibility (INF). The dependent variable is purchasing intention (PUR). Mediator variables and dependent variables were measured on a five-point Likert scale. Through this model, the direct and indirect effects of sponsorship disclosure on purchase intention were addressed. In this model, an antecedent variable X (SPONS) influences the consequent Y variable (PUR) directly as well as indirectly through two mediators (BRAND and INF), with no causal influence between those two mediators (Hayes, 2018).

Data collection

Primary and secondary data were collected. Secondary data was used to determine questions for constructing and creating a conceptual framework. Primary data was collected using an online questionnaire that was sent by mail to students of all departments at University North. The research was conducted from December 2021

till the end of January 2022 during a Croatian lockdown period. We used a convenience sample method. Finally, data from 371 respondents were collected. Seven questionnaires were excluded from further analysis due to missing data and the fact that they do not use social media networks. Therefore, out of the total 364 respondents, 268 (73.6%) were respondents belonging to Generation Z (born in 1997 or later), 89 respondents (24.5%) were millennials (born from 1981 till 1996), and 7 respondents (1.9%) born from 1965 till 1980. The gender, level of the study and the use of social networks are shown in Table 1.

Table 1
Sample characteristics: gender, study and the use of social network

Demographic variables	Frequency (N=268)	Percentage
Gender		
Male	113	42.2%
Female	155	57.8%
Study		
Undergraduate study	203	78.7%
Graduate study	64	23.9%
Postgraduate	113	42.2%
The use of social network		
Instagram	155	57.8%
Facebook	39	14.6%
You tube	51	19.0%
Twitter	4	1.5%
Snapchat	5	1.9%
Tik Tok	7	2.6%
Other	7	2.6%

Source: Author's work

The measurement scales

The measurement for the defined constructs in the research model was derived from the existing literature. Because of the research context, some measures were adjusted. The construct items and questions are represented in Table 2. We used a 5-point Likert scale to construct influencer credibility, brand awareness, and purchase intention, while sponsorship disclosure is a dichotomous variable construct (displayed vs. no display).

Data analysis

Table 3 represents the reliability of constructs, influencer credibility, brand awareness, and purchase intention since they are all above 0.8.

The sponsorship disclosure variable is a dichotomous variable with a mean value of 1.32 and a standard deviation of 0.465. Respondents had to answer yes or no if the influencer advertised clearly in their posts. Also, the mean and standard deviation scores were presented.

The highest mean value is the variable INF5=3.66, which represents high influencer attractiveness. Further, among brand awareness variables, the highest mean is BRAND4, where respondents recognise the advertised product among other competing brands. Respondents rated high (PUR1= 3.13)" The influencer posts on social media encourage them to buy and try a recommended product/service".

Table 2
Summary of particle measurement

Construct	Particle	Source
Sponsorship disclosure	SPONS: Did the influencer (through whom you learned information about a product or service) show in the status of his post that this content is sponsored by the company that owns product/service X? (yes/no)	Wang and Lee (2021)
Influencer credibility	INF1: As for the influencer I follow on social media, I think that his/her posts on social media are honest.	Munnukka et al. (2019) Weismueller et al. (2020)
	INF2: As for the influencer I follow on social media, I think I can trust his/her social media posts.	Munnukka et al. (2019) Weismueller et al. (2020)
	INF3: As for the influencer I follow on social media, I think that the influencer is competent to make claims about the product/service X.	Munnukka et al. (2019) Weismueller et al. (2020)
	INF4: As for the influencer I follow on social media, I can easily identify with him/her.	Munnukka et al. (2019) Weismueller et al. (2020)
	INF5: As for the influencer I follow on social media, I think the influencer is attractive.	Munnukka et al. (2019) Weismueller et al. (2020)
Brand awareness	BRAND1: 1 Which of the following statements best describes your memory of the appearance of the advertised "X product" or the content of the advertised "X service"?	Yoo et al. (2000)
	BRAND2: I can quickly remember some characteristics of that advertised "product (service) X".	Yoo et al. (2000)
	BRAND3: I can quickly remember the symbol or logo of the advertised product/service X.	Yoo et al. (2000)
	BRAND4: I can recognise advertised product/service X, among other competing brands.	Yoo et al. (2000)
Purchase intention	PUR1: Do influencer posts on social media encourage you to buy and try a recommended product/service?	Chung et al. (2023) Dabbous et al. (2020)
	PUR2: Do you actually buy products/services used and recommended by influencers?	Chung et al. (2023) Dabbous et al. (2020)
	PUR3: Do you intend to buy a product/service recommended by an influencer in the future?	Chung et al. (2023) Dabbous et al. (2020)
	PUR4: Do you recommend products (or services) to others, used and recommended by influencers?	Chung et al. (2023) Dabbous et al. (2020)
	PUR5: When you choose between the products (or services) and the competition, do you base your decision on the influencer's recommendation?	Chung et al. (2023) Dabbous et al. (2020)

Source: Author's work

Table 3
Reliability, mean and standard deviation scores of influencer credibility, brand awareness and purchase intention variables.

Construct	Particle	M	SD	a
Influencer credibility	INF1	3.37	1.158	3.37
	INF2	3.33	1.160	3.33
	INF3	3.22	1.126	3.22
	INF4	3.18	1.038	3.18
	INF5	3.66	1.054	3.66
Brand awareness	BRAND1	3.60	1.266	3.60
	BRAND2	3.57	1.167	3.57
	BRAND3	3.53	1.260	3.53
	BRAND4	3.76	1.150	3.76
Purchase intention	PUR1	3.13	1.257	3.13
	PUR2	2.21	1.119	2.21
	PUR3	2.88	1.186	2.88
	PUR4	2.54	1.203	2.54
	PUR5	2.31	1.172	2.31

Source: Author's work

Results

A regression analysis was performed to test the set hypothesis and analyse direct and indirect effects. All hypotheses were tested using SPSS and PROCESS program, model 4 for parallel mediation. All indirect effects were subjected to bootstrap analysis with 5000 bootstrap samples and a 95% confidence interval. PROCESS is convenient for testing the hypothesis because it provides bootstrap confidence intervals and estimation of mediation analysis computing conditional direct, indirect and total effects (Hayes, 2018). Table 4 presents the model coefficients of the parallel multiple mediator model.

Table 4
Model coefficients of the parallel multiple mediator model

		M1 (BRAND)		
Antecedent	path	β	SE	**p**
SPONS	a1	0.447	0.127	**< .001***
M1 (BRAND)	-	-	-	-
M2 (INF)	-	-	-	-
Constant	iM1	3.306	0.105	**< .001***
R2= 0.044; F (1, 266)= 12. 4213; p < .001*				
		M2 (INF)		
Antecedent	β	SE	p	**β**
SPONS	0.227	0.111	< .0429	**0.227**
M1 (BRAND)	-	-	-	-
M2 (INF)	-	-	-	-
Constant	3.195	0.092	< .001*	**3.195**
R2= 0.015; F (1, 266)= 4.1406; p < .0429*				
		Dependent (PUR)		
path	β	SE	p	**path**
c'	0.003	0 .108	.975	**c'**
b1	0.152	0 .054	.005*	**b1**
b2	0.501	0 .062	< .001*	**b2**
iy	0.382	0.235	0.106	**iy**
R2= 0.2798; F (3, 264)= 34.1940; p < .001*				

Source: Author's work
*Note: *Statistically significant at 1%*

As can be seen in Table 4, the direct path (a1) represents the significant relationship between sponsorship disclosure and brand awareness (β= 0.447; p < 0.001). Therefore, sponsorship disclosure represents a positive and significant predictor of brand awareness among student Generation Z in Croatia, and hypothesis H1 is supported. The second direct path (a2) represents a statistically significant and positive relationship between advertising disclosure and influencer credibility (β= 0.227, p < 0.05). Therefore, hypothesis H2 is also supported. Further, brand awareness (path b1) has a positive and significant direct effect on purchase intention among the student Z population in Croatia (β= 0.152; p < 0.01); therefore, hypothesis H3 is supported. Path b2 represents the direct effect of influencer credibility on purchase intention, where hypothesis H4 is also supported since there is a positive and significant effect (β= 0.501; p < 0.01).

The direct effect of sponsorship disclosure on purchase intention was found to be non-significant (β = 0.0034, p = 0.9752). However, the mediation analysis revealed significant indirect effects through the mediators' brand awareness and influencer credibility, presented in Table 5. Brand awareness (β = 0.0680, BootLLCI = 0.0118, BootULCI = 0.1483) was statistically significant. This indicates that sponsorship disclosure had an indirect effect on purchase intention through the mediator's brand awareness. Further, influencer credibility (β = 0.1135, BootLLCI = 0.0122, BootULCI = 0.2242) was also statistically significant, indicating that sponsorship disclosure had an indirect effect on purchase intention through influencer credibility. Since zero does not fall between the BootLLCI and BootULCI for brand awareness (β =0.0680) and influencer credibility (β=0.1135), they represent mediators, and this mediation is significant, thus supporting hypotheses H6 and H7. Research data show that very little of the variance in influencer credibility (R^2= 0.015) or brand awareness (R^2= 0.044) is explained by sponsorship disclosure. However, 28% of the variance in purchase intention is accounted for by both proposed mediators and sponsorship disclosure.

Table 5
Path coefficients

Path	β	SE	p	Hypothesis
(a1) Sponsorship disclosure →Brand awareness	0.4475	1.270	< 0.001	Supported (H1)
(a2) Sponsorship disclosure →Influencer credibility	0.2265	0.1113	< 0.05	Supported (H2)
(b1) Brand awareness→Purchase intention	0.1520	0.0541	<0.01	Supported (H3)
(b2) Influencer credibility→ Purchase intention	0.5012	0.0618	<0.001	Supported (H4)
(c') Sponsorship disclosure → Purchase intention	0.0034	0.1085	0.9752	Not supported (H5)
Indirect Effect(s) (X on Y)	Effect	BootSE	BootLLCI-BootULCI	
(a1*b1 x c') Brand awareness mediates Sponsorship disclosure → Purchase intention	0.1816	0.0700	0.0529-0.3244	Supported (H6)
(a2*b2 x c') Influence credibility mediates Sponsorship disclosure → Purchase intention	0.1135	0.0550	0.0122-0.2242	Supported (H7)

Source: Author's work

Table 5 summarises the research results, indicating that H1, H2, H3, and H4 are supported, while H5 is not supported, indicating that the direct effect between sponsorship disclosure and purchase intention is not statistically significant. However, the indirect effect of brand awareness mediates the relationship between sponsorship disclosure and purchase intention, confirming hypothesis H6. In the same manner, hypothesis H7 is confirmed.

Discussion

Understanding consumer purchase intention and consumer behaviour is a difficult task to analyse since different variables and different contexts influence consumer behaviour differently. Our study investigated the antecedent variable of sponsorship disclosure with mediating roles of brand awareness and influencer credibility and their impact on consumer purchase intention.

The results demonstrate that sponsorship disclosure has a significant and positive direct effect on brand awareness, confirming the research of Escolano (2023). Further, the direct effect of sponsorship disclosure on influencer credibility is also found to be positive and significant, following Naderer et al. (2021) but opposite to the research of De Veirman and Hudders (2020), who found that sponsorship disclosure (compared to no disclosure) negatively affects brand attitude through enhanced ad recognition, which activates ad scepticism and negatively affected the influencer's credibility but.

The direct effect of brand awareness on purchase intention was found to be positive and significant, as in line with researchers Kosakarika (2020) and Dwidienawati et al. (2020), however, only for influencers' reviews, as opposite to customer reviews. Furthermore, results indicate a positive and significant effect of influencer credibility on purchase intention (b2), which results corroborate the research of Prasad et al. (2022), dos Santos et al. (2023), Chiu and Ho (2023) and Hanandeh et al. (2023).

On the other hand, the research findings do not show the significant direct impact of sponsorship disclosure on purchase intention, which is opposite to the research of Chung et al. (2023) and Kay et al. (2020).

Findings demonstrated the mediation role of brand awareness and influencer credibility in the relationship between sponsorship disclosure and purchase intention. The results are aligned with previous studies of Weismueller et al. (2020) and the opposite of Febriyantoro (2020), who did not find the mediation role of brand awareness and brand image between YouTube ads and purchase intention.

Research results indicate that sponsorship disclosure is a significant predictor of purchase intention when controlling for brand awareness and influencer credibility. This relation is not significant without the mediators. Therefore, purchase intention among Generation Z, who did not experience life without technology, is triggered by disclosing commercials on influencers' posts, which then positively increases influencers' credibility and brand awareness. Showing advertising can have a positive or negative impact (Febriyantoro,2020). This research shows that the indirect effect is positive and significant. Since the contrast coefficient was found to be non-significant, this indicates that brand awareness and influencer credibility have similar effects as mediators. From the perspective of managers, this is a good indication to invest in advertising through Instagram and Facebook since those are the social networks most often used by respondents. Also, they should be smart in choosing a credible influencer who represents their product or service.

Conclusion

The research results indicate that sponsorship disclosure alone does not directly impact purchase intention; however, its impact through the mediation effect of brand awareness and influencer credibility is present among Generation Z students in Croatia. Therefore, they are equally important mediators in the relationship between sponsorship disclosure and purchase intention and are relevant variables for brand managers to analyse.

This research has several limitations that needs to be considered when evaluating its results. First, the research sample includes students from the Generation Z from only one university in Croatia; hence, future research should include other generation cohorts to see differences among generations. The second limitation relates to constructs of brand awareness and influencer credibility, which were used as a general construct. Future research should analyse their dimensions to see the effect of each dimension on the dependent variable, that is, the strength of each of the influencer credibility characteristics (trust, expertise, and attractiveness) and brand awareness (recall of a brand and recognition) on purchase intention. Third, other mediator variables should be considered and analysed in the model, such as consumer trust, brand image/awareness and influencer-brand fit. It would be also interesting to investigate the role of the overall attitude towards the advertising, since various research indicated that Generation Z has a non-traditional relationship to marketing (Fromm and Read, 2018), and their relationship with influencers is not straightforward.

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Developing Luxury Jewellery Consumption Scale: Integrating Dual Process Theory and Theory of Consumption

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Abstract

Objectives: Driven by the Dual Process Theory and the Theory of Consumption, the purpose of this paper is to provide a refined scale for luxury consumption motives in addition to categorising the motives into emotional and rational concepts. **Methods/Approach:** A non-probability convenience sampling technique was used to collect the data from 350 participants. Exploratory and confirmatory factor analyses were used to refine a luxury consumption motive scale. **Results:** The findings showed price, quality, and investment as rational motivators, and conspicuousness, hedonism, self-identify, and uniqueness, as emotional motivators are extracted as dimensions of the luxury consumption scale, specially fitted for jewellery. **Conclusions:** The present study makes a significant contribution with regards to creating a unanimous refined scale for luxury consumption motives of jewellery and categorising them into emotional and rational.

Keywords: scale refinement; jewellery; luxury consumption; luxury motives; emotional; rational

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Introduction

Luxury is viewed as all items that are seen as valuable and desirable and that are highly needed to achieve a certain status or to be perceived as belonging to a particular class (Ko et al., 2019). Additionally, Dall'Olmo Riley Riley and Lacroix (2003) and Wang (2022) argue that luxury is seen as a very subjective aspect relying on consumers' perceptions. Luxury is seen in many sectors, such as clothing, accessories, but also life style, such as tourism (Rodek et al., 2020; Avasiloaei, 2022). Luxury brands strive to create an identity and promote the concept of exclusivity to compete in the market. Consumers' motives for buying such products are to enhance their emotional and social standards and to meet a rational need.

The goal of the paper is to investigate the landscape of luxury consumption motives, guided by the theoretical framework of the Dual Process Theory (Apeiranthitou & Louka, 2020; Roy et al., 2018) and the Theory of Consumption (Sheth et al., 1991; Atkinson & Kang, 2022). The in-depth understanding of the multifaceted nature of luxury buying behaviours has underscored the necessity for a nuanced approach towards dissecting consumer motives.

As such, this study aims to refine and expand the scale of motives behind luxury consumption, with a particular focus on distinguishing between emotional and rational motivations. Employing a non-probability convenience sampling method, data were gathered from 350 participants and analysed through confirmatory factor analysis to validate the constructed scale.

The results reveal a dichotomy of motivators: price, quality, and investment emerge as rational drivers, while conspicuousness, hedonism, self-identity, and uniqueness are identified as emotional catalysts, especially in the context of jewellery consumption. The research contains both empirical and theoretical contributions. The theoretical contribution is in identifying the motives for luxury consumption as emotional or rational, which has not been sufficiently examined in the literature, possibly since there is no developed and tested scale for luxury consumption in the context of jewellery.

Several studies have developed and tested scales related to luxury consumption, but none specifically for jewellery. Dogan et al. (2020) created a luxury consumption tendency scale, while Sondhi (2017) developed a scale for attitudes towards counterfeit luxury. However, neither scale is directly related to jewellery consumption. Christodoulides et al (2009) evaluated the Brand Luxury Index scale, which could potentially be adapted for jewellery, but further research is needed. Moraes et al. (2017) explored ethical luxury consumption in the context of fine jewellery, providing insights that could inform the development of a specific scale for ethical luxury jewellery consumption.

The paper is organised as follows. After the introduction, the literature review provides the elements of emotional and rational luxury consumption within the context of the theory of consumption and the dual process theory. The methodology chapter provides an outlook of the research instrument, sample design and statistical methods. The chapter with results is organised as follows. First, based on the items selected, the research scale was refined, and the validity and reliability testing was finished using confirmatory factor analysis. The concluding chapter provides a summary of research, research limitations and future research directions.

Literature Review

Conceptualizing Luxury Consumption

The consumption of luxury goods is considered a universal practice worldwide. However, it is seen as a contradiction due to the subjective nature of the concept of

luxury as it is explained and defined based on the social context. Amatulli and Guido (2011) argued that luxury consumption could be explained using two main categories: internal and external.

Values, aesthetic pleasures, and culture drive internalised consumption. People who engage in internalised consumption tend to buy products based on their style and taste. They also engage in this type of consumption when they want to achieve a sense of self-directed pleasure, create a persona, and satisfy their internal self; it is what drives their emotional consumption. The act of externalising consumption is achieved by wearing or using items that exhibit the amount they paid for the product or by responding to a competitive urge and need for admiration.

Amatulli and Guido (2011) indicated that both concepts could co-exist; it does not have to be an either/or type of behaviour. Another categorisation is dividing the motives into self-referenced and other-referenced. Self-referenced consumption is related to pleasure, perfection, and originality; it is mainly driven by culture and personal goals, while other-referenced consumption is driven by ostentation, also known as flashiness, status, and social positioning.

Many researchers have examined the concepts and motives that lead people to consume luxury items. For example, Keller (2001) focused on the drivers of luxury consumption, while Han et al. (2010) examined the consumer typology of consumption. Additionally, Husic and Cicic (2009) argued that luxury consumption refers to the act of consuming luxury goods in a generic sense. However, due to these goods' high prices, symbolic meanings of status, extravagance, and wealth are attached to them. Moreover, Shao et al. (2019) argue that the concept of luxury consumption is closely related to consumers' goals and motivations. Belk (1988) and Wang (2022) state that consumers like to consume and possess luxury goods because they want to create a certain image or persona for themselves. This occurs because possessing luxury items can contribute to the definition of self, and this contribution happens either intentionally or unintentionally by the consumers as they tend to associate the product with themselves and their persona.

Shao et al. (2019) divided the motivations for luxury consumption into two categories: extrinsic and intrinsic. The authors identified the need to achieve and exhibit financial success, have an appealing appearance, impress others, and gain social rewards and approval as extrinsic motivators. While the intrinsic motivators are the goals, the consumers want to achieve them to live a better life and appeal to themselves. Such motivators include the consumer's psychological growth and self-esteem.

Yu and Sapp (2019) developed another categorisation of luxury consumption motivators, which they divided into three categories: symbolic, hedonic, and instrumental. Consumers' demographics and cultures highly influence these motivations.

Symbolic motivations refer to the need to exhibit wealth, social prestige, and uniqueness or the need to fit into a specific social class. These motivations are highly related to Veblenian consumption, the Snob effect, and the Bandwagon Effect. Consumers who engage in Veblenian consumption focus on exhibiting wealth and adopting a prestige-seeking behaviour. Their initial indicator of prestige and status is price, which follows a logical process whereby the higher the price of the item, the greater the prestige they associate with the item. Consumers who follow the Snob Effect typically want to achieve a sense of uniqueness by seeking limited-edition products (Bazi et al., 2020). Consumers who engage in Bandwagon consumption would like to be part of an elite group and differentiate themselves from other inferior groups. These types of consumers tend to consume luxury goods that were purchased

by the ideal group they want to be part of (Shukla and Rosendo-Rios, 2021).

Hedonic motivations refer to the need for abundance, comfort, and pleasure, which constitute hedonic consumption, defined as consumers' multisensory images, fantasies, and emotional arousal in using products (Yu & Sapp, 2019: p. 2). Additionally, Shahid et al. (2023) argued that the motivators of hedonic consumption include intrinsic enjoyment, sensory gratification, and aesthetic appeal.

Instrumental motivations appeal to perfectionist consumers. These consumers tend to focus more on quality and associate high prices with the quality of items. Many consumers find luxury goods desirable due to their association with quality (Yu and Sapp, 2019).

Based on these researchers, two groups of consumption motives are identified: emotional and rational luxury consumption motives.

Emotional consumption motives encompass hedonism, uniqueness, conspicuousness, and self-identity.

Hirschman and Holbrook (1982) defined hedonism as a form of consumption that is aroused by feelings and sentimental effects the consumer gets that result in the purchase of a product. Additionally, motivators of hedonic consumption include curiosity, which is stimulated by the consumers' need to explore the product, as well as the motivation to try new things, be part of new adventures, and be entertained (Martínez-López et al., 2016). Shahid et al. (2023) argued that hedonic products appeal to the emotions and feelings of the consumers, and the reason why consumers tend to buy such products is mainly because of an emotional connection they have with the product or the sense of pleasure and fun the product generates.

Bilge (2015) mentioned that luxury products are unique; therefore, such products are produced with the notion that they cannot be publicly attained, at least not by everyone in the market. The uniqueness value mainly focuses on the concept of rarity and exclusivity of the product presented to the consumer, and this results in an increase in demand for the product. Shahid et al. (2023) also argue that due to the limited supply of luxury goods, consumers tend to be more attached to the product, which increases its value. In addition to that, it also increases consumers' willingness to pay high prices to acquire this specific product. According to Knight and Kim (2007), there is a positive relationship between uniqueness and emotional value based on the consumer's perception of what is viewed as unique. In other words, if the consumer finds the product has a unique design, this will generate positive emotions toward the product.

Truong, McColl and Kitchen (2010) mentioned that conspicuousness is defined as the extravagant act of exhibiting one's wealth through acquiring luxury goods to display status and prestige, to position oneself in a social position, or to acquire a new social status. Wiedmann, Hennigs, and Siebels (2009) indicated that based on Veblen's theory, consumers engage in conspicuous consumption and look for luxury goods that will help them achieve the prestigious image they want to present.

Zhang and Zhao (2019) also confirm that the concept of conspicuousness is embedded in the nature of luxury goods as they work as indicators of wealth and status, and consumers tend to engage in conspicuous consumption by purchasing relatively expensive goods to impress other people in their community. Butcher et al. (2016) argued that there is a close relationship between status consumption, also known as conspicuous consumption, and emotional value, as the primary aim of conspicuous consumers is to achieve and exert status, which provides emotional gratification and satisfaction.

According to Jamal (2003), self-identity is defined as the ideas, images, and perceptions people generate about themselves that lead to the occurrence of a

behaviour. Moreover, people usually engage in behaviours that are either compatible with their self-identity or help stimulate and develop it. Thus, consumers like purchasing items that influence their self-image positively. Bilge (2015) argued that consumers who want to create a self-identity for themselves undertake luxury consumption, and they tend to achieve that by looking for products that should match their current image or the image that they want and desire. Additionally, when the aim of the consumer is self-realisation and inner satisfaction, they engage in luxury consumption and look for products that will create symbolic value.

Rational consumption motives encompass quality, price, and investment.

Many researchers emphasise the importance of quality when it comes to luxury goods (Stathopoulou and Balabanis, 2019; Wiedmann et al., 2012). Quality can affect the rational view of the consumer as it is considered an instrumental and external cue to the product. To identify whether the product is of good quality is subjective and depends on the perception of the consumer. Furthermore, consumers tend to use external features like price to assess their perception of the product's quality (Bilge, 2015). Luxury consumers always take the idea of linking premium quality to luxury products for granted, as they do not expect otherwise. Moreover, they tend to link the value of the product to its quality (Jahn et al., 2012).

It was mentioned by Bilge (2015) and Stathopoulou and Balabanis (2019) that the price is seen as an indicator of quality when it comes to luxury goods. However, this perception is highly subjective as it depends on the product itself. Bilge (2015) also mentioned that luxury goods are usually sold at high prices to reflect their high design and aesthetics. Moreover, prestige-seeking consumers consider the price a surrogate indicator of status and high value. Therefore, luxury companies tend to set high prices or prestige pricing to attract such consumers and make the product more desirable and unique (Muça and Zeqiri, 2020). However, it was argued that the price should not be the only indicator of luxury. Since some consumers are more interested in the sentimental and investment value they gain from the product, they know and can differentiate between the actual price and the perceived price (based on their judgment of the price).

Rompas (2015) defined investment as the current commitment of funds for some time in order to obtain future payments. Investments are made to gain value and monetary compensation in the future. It is also the act of buying and selling bonds, notes, assets, and agency securities to gain future value. Kapferer and Valette-Florence (2019) argue that many consumers tend to buy luxury goods because they view them as investments. They also argue that due to the use of high-quality materials in the production of luxury goods and products, expectations of investment and monetary value are also high. Turunen (2018) argues that consumers tend to be motivated to invest in and buy luxury goods because they know that their value will increase over time and that the return and resale of such products are beneficial for them.

The Jewellery Industry

Bharathi and Dinesh (2018) indicate that Jewellery is defined as luxury goods that can either be branded to confer prestige and status on their owner or, in other cases, consist of unbranded products. Even though all of these categories fall within the same spectrum, they tend to differ in terms of price, marketing techniques, and consumer perceptions and appeal.

Dauriz et al. (2014) mentioned that the jewellery industry is fast-growing due to changes in consumers' behaviour in addition to newly introduced trends that enter the market. Accordingly, jewellery manufacturers must always compete, or else they

risk becoming outdated. Ten of the most prominent Jewellery brands in the industry comprise around 12% of the world market; these brands include Cartier and Tiffany & Co. The remaining sector of the market belongs to locally developed Jewellery brands.

There are three types of consumers: 1) New money consumers, who buy Jewellery products to exhibit their wealth and status. 2) Emerging market consumers, who buy Jewellery products to upgrade their lifestyle and trust well-known brands 3) Young consumers, who buy Jewellery to use the brand as a symbol for self-expression and realisation (Dauriz et al., 2014).

Methodology

Sample design

The current study consists of quantitative exploratory research (Cooper and Schindler, 2014). A quantitative data collection process was conducted to refine the existing measurement scales in the literature due to the inconsistency of scales used to measure luxury consumption.

A non-probability convenience sampling process was used in this study. The survey method was employed for the research method. The survey was distributed through Facebook, WhatsApp, and face-to-face. The characteristics of the sample include Jewellery purchasers between 20 and 35 years old (Gen Z and Millennials); according to Sen et al. (2019), both Millennials and Gen Z tend to purchase more Jewellery relative to the older generations.

The total sample tested for this study included 350 participants, of whom 253 were female and 97 were male. The data collection process took six months (February–July 2022). After collecting the data, three methods of analysis were conducted: descriptive statistical analysis, inferential statistical analysis, and regression analysis.

Item generation and testing

According to El-Deeb and Hamed (2019), to develop a refined scale, the researcher has to follow three main phases, which start with 1) item generation and selection, followed by 2) scale refinement and purification, and the final step would be 3) validating the measurement and testing the reliability of the scale. In the first phase, the research must collect as many items as possible from the literature that present the variables or dimensions the research wants to test. Simms and Watson (2007) argue that it is important to have an extensive set of questions to enable a comprehensive and full idea of the variables in question. After the collection of items, they should be presented to a panel of researchers in the same field to review and modify any redundancies. Finally, a content validity study must be conducted, where the researcher must assess the measurement items and see if they represent the variables accurately (Tingchi Liu et al., 2013). A total of 175 items were collected (as shown in Table 1. The items were sent to four experts to review which items represented the variables accurately before moving on to the next phase.

Statistical analysis

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are employed to assess and hone the luxury consumption motive scale rigorously. This is followed by validity and reliability tests, including assessments of composite and discriminant validity, ensuring the scale's robustness and applicability.

According to Thompson (2004), factor analysis is conducted for three main reasons: the first is to test the validity score of the constructs used in a study. The second reason

is that factor analysis can give the researcher the freedom to develop theories about the nature of the variables tested. The third and final reason is that factor analysis can help summarise the relationships and effects the variables have on each other more comprehensively and simplistically. Additionally, CFA is recommended to use CFA if the researcher is using theories, as it would be beneficial because (a) the theory is directly tested by the analysis and (b) the degree of model fit can be quantified in various ways. (Thompson, 2004). EFA and CFA were conducted using SPSS and Amos software.

Validity testing

According to Malhotra (2010), a validity test is conducted during research to ensure that the study is free of distortion and bias. It refers to the extent to which the scale reflects the differences between the characteristics measured and random errors. There are different types of validity: content validity, construct validity, and criterion validity. The most used by researchers is construct validity, which focuses on identifying which constructs are valid and, therefore, measured. For this study, the construct validity and overall fitness of the model were tested with confirmatory factor analysis (CFA) using AMOS 26 software.

The overall fitness of a model can be identified by looking at certain fit indices that are developed in the CFA. This includes the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the comparative fit index (CFI), the normed fit index (NFI), the Chi-square, and finally the root mean square error of approximation (RMSEA) (El-Deeb and Awad, 2016). According to Hair et al. (2014), the p-value is considered significant when it is less than 0.05.

Results

Phase 1: Exploratory factor analysis

EFA was conducted using the selected items in the process of item generation and testing. The EFA included both a Cronbach alpha test and a KMO Test. To identify which items are valid and represent the variables and which ones should be removed. The Cronbach alpha cut-off point is greater than or equal to 0.7 (Zeqiri et al., 2022). As for the KMO test, three aspects have to be taken into consideration: 1) The Kaiser-Meyer-Olkin (KMO), which measures the adequacy of the sample, has a cut-off point of 0.6 and above (Pallant, 2007) the factor loading, and 3) the component matrix analysis. The minimum cut-off point of the factor loadings is greater than 0.5 (El-Deeb & Hamed, 2019). As for the Component matrix, it shows the degree of correlation between the items. If any of the items show a high correlation, they should be deleted.

Table 1 shows the Cronbach alpha and factor loading of the variables after removing 56 items that did not meet the cut-off points. The results show that the items are valid.

Table12
EFA Results

Variables	Item codes	Items	Factor Loadings	Cronbach's Alpha	KMO
Hedonism (H)	H13	When in a bad mood, shopping for Jewellery enhances my mood.	0.591	0.932	0.942
9 items	H12	Using Jewellery gives me pleasure.	0.754		
	H10	Jewellery consumption enhances the quality of my life.	0.578		
	H9	Jewellery consumption is a way to reduce my stress.	0.601		
	H6	Using Jewellery makes me feel better about myself.	0.689		

	H5	Purchasing Jewellery increases my happiness.	0.762		
	H4	While shopping for jewellery, I felt the excitement of the hunt.	0.602		
	H3	Purchasing Jewellery gives me much pleasure.	0.754		
	H1	Overall, I may regard jewellery as a gift I buy to treat myself.	0.551		
Uniqueness (U)	U1	I often buy Jewellery in such a way that I create a personal image that cannot be duplicated.	0.635	0.821	0.920
4 items	U4	In my opinion, Jewellery is just unique and exclusive.	0.536		
	U6	The uniqueness of Jewellery is important to me.	0.583		
	U14	I look for one-of-a-kind jewellery products to create my style.	0.555		
Conspicuousness (C)	C6	Jewellery is a symbol of high social status.	0.624	0.785	0.905
4 items	C8	Owning Jewellery indicates a symbol of wealth.	0.525		
	C9	Owning Jewellery indicates a symbol of prestige.	0.645		
	C12	I would like to know what brand of jewellery makes a good impression on others.	0.617		
Self-Identity (SI)	SI1	Wearing jewellery increases my self-Confidence.	.650	0.936	0.935
10 items	SI2	Jewellery consumption should bring me self-satisfaction.	.586		
	SI5	Jewellery ascertains my identity.	.699		
	SI6	Jewellery makes me feel good about myself.	.641		
	SI7	Jewellery is an instrument of myself-Expression.	.564		
	SI8	Jewellery plays a critical role in defining my self-concept.	.665		
	SI9	Jewellery helps me to establish the kind of person I see myself to be.	.745		
	SI11	My Jewellery purchase is part of who I am.	.656		
	SI13	The jewellery I buy is consistent with how I see myself.	.638		
	S14	The jewellery I buy reflects who I am.	.609		
Price (P)	P11	A Jewellery brand with a high price means good quality compared to other brands.	0.758		
5 items	P8	In my opinion, Jewellery brands are reasonably priced.	0.775	0.869	0.873
	P7	In my opinion, Jewellery brands offer value for money.	0.750		
	P6	In my opinion, Jewellery brands are good products for the price.	0.700		
	P4	An item being higher in price makes it more desirable to me.	0.538		
Quality (Q)	Q1	A Jewellery brand should have products of really superior quality.	0.517		
6 items	Q2	Jewellery brands have rich artistry.	0.570		
	Q5	Jewellery brands have consistent quality.			
	Q6	Jewellery brands perform consistently.	0.534	0.836	0.848
	Q7	Jewellery is bought for its excellent design.	0.614		
	Q11	Jewellery is bought for its excellent quality.	0.578		
Investment (INV)	INV3	Jewellery should be good value for money in the future.	0.605	0.850	0.827
6 items	INV1	Jewellery should have products that last and are kept for a long time.	0.527		
	INV4	Jewellery should be a long-term investment one never regrets.	0.627		
	INV5	I buy expensive jewellery because it is of good value for the money.	0.614		
	INV6	I buy expensive Jewellery because it lasts longer.	0.572		
	INV7	I buy Jewellery because I believe its value will increase in the future.	0.518		

Source: Authors

Phase 2: Confirmatory factor analysis

Table 2 shows factor loadings for all items with a p-value of less than 0.01, which

indicates high significance and validity. The following dimensions were confirmed: Hedonism (H), Self-Identity (SI), Uniqueness (U), Conspicuousness (C), Quality (Q), Price (P), and Investment (I).

Table 2
CFA factor loadings

			Estimate	S.E.	C.R.	P
H13	<---	H	1.000			
H12	<---	H	1.219	.081	15.093	***
H10	<---	H	1.098	.083	13.257	***
H9	<---	H	1.142	.079	14.518	***
H6	<---	H	1.205	.085	14.137	***
H5	<---	H	1.016	.080	12.670	***
H4	<---	H	1.052	.094	11.145	***
H3	<---	H	.907	.074	12.186	***
H1	<---	H	1.073	.084	12.826	***
SI1	<---	SI	1.000			
SI2	<---	SI	1.043	.071	14.758	***
SI5	<---	SI	.917	.083	11.009	***
SI6	<---	SI	1.024	.068	15.116	***
SI7	<---	SI	1.026	.085	12.139	***
SI8	<---	SI	1.228	.101	12.169	***
SI9	<---	SI	1.200	.087	13.840	***
SI11	<---	SI	1.069	.089	11.987	***
SI13	<---	SI	.954	.089	10.755	***
U1	<---	U	1.000			
U4	<---	U	.674	.062	10.849	***
U6	<---	U	.799	.067	11.842	***
U14	<---	U	.881	.071	12.332	***
C6	<---	C	1.000			
C8	<---	C	.729	.073	9.992	***
C9	<---	C	.899	.082	10.984	***
C12	<---	C	.973	.084	11.563	***
P11	<---	P	1.000			
P8	<---	P	1.256	.113	11.147	***
P7	<---	P	1.317	.117	11.285	***
P6	<---	P	1.244	.115	10.804	***
P4	<---	P	1.124	.103	10.888	***
INV3	<---	Inv	1.000			
INV1	<---	Inv	.746	.086	8.720	***
INV4	<---	Inv	1.601	.152	10.562	***
INV5	<---	Inv	1.477	.146	10.104	***
INV6	<---	Inv	1.436	.145	9.934	***
Q1	<---	Q	1.000			
Q2	<---	Q	1.067	.071	15.018	***
Q5	<---	Q	1.085	.074	14.583	***
Q6	<---	Q	.684	.070	9.812	***
Q7	<---	Q	.879	.071	12.448	***
Q11	<---	Q	.823	.068	12.049	***

Source: Authors

Regarding the overall fit of the model, Table 3 shows the fitness indices that are used to identify whether the model is fit and valid or not. According to Aimran et al. (2016), the Chi-square/DF or the CMIN/Df should be less than 5, and in this model, it is 1.589, indicating model significance. Moreover, for the GFI, AGFI, NFI, and CFI to be

significant, they must be greater than 0.8 (Hair et al., 2014). Therefore, as shown in Table 6, the GFI is 0.867, the AGFI is 0.830, the NFI is 0.883, and the CFI is 0.952, indicating that they are significant. For the RMSEA, Aimran et al. (2016) stated that for it to be significant, it must be less than 0.1, and for this model, it is 0.041, which is lower than the required range. Thus, it is significant. Based on Table 3, all the indices are within the recommended thresholds, which means that the model is fit and valid.

Table 3
Fitness Index

Fitness Indices	Values
CMIN/DF < 5.0	1.589
GFI > 0.8	0.867
AGFI> 0.8	0.830
NFI> 0.8	0.883
CFI> 0.8	0.952
RMSEA< 0.1	0.041

Source: Authors

The final phase of the refinement scale is the validity and reliability tests. The validity is tested using construct validity, which would indicate if the scale used in the study measures the variables tested. Two main tests were conducted to test the validity and reliability of the construct, which include the convergent and discriminate validities. Fornell and Larcker (1981) mentioned that convergent validity is used to evaluate the shared variance of the latent variables in a model.

To determine this validity, two aspects must be evaluated: the average variance extracted (AVE) and the composite reliability (CR). The AVE is used to measure the amount of variation reported by a construct in comparison to the amount of variance caused by measurement error. Moreover, Malhotra (2010) mentioned that discriminant validity is used to show that there is no correlation between the constructs and to ensure the validity of the construct.

Fornell and Larcker (1981) mentioned that convergent validity is generally used to evaluate the shared variance of the latent variables in a model. Two aspects must be evaluated to conduct this validity test: the average variance extracted (AVE) and the composite reliability (CR). The AVE is used to measure the variance generated by the construct and the level of measurement error. For an AVE to be considered acceptable, it must be greater than 0.5. As for the CR, it is used to measure the reliability of the variables and is more accurate than the Cronbach alpha test. For a CR to be considered reliable, it must be greater than or equal to 0.7.

Tables 4 and 5 show the results of the convergent validity, where the CR levels for all the variables are greater than 0.7, indicating their reliability. As for the AVE, uniqueness, conspicuousness, investment, and self-identity do not meet the cut-off point; however, it was argued by Fornell and Larcker (1981) that if the AVE is lower than 0.5 and the CR is greater than 0.7, then the construct is still valid and reliable. Moreover, some researchers also tend to use discriminant validity to ensure the validity of a construct (Ul Hadia et al., 2016). It is generally measured by calculating the square root of the AVE. Based on the results of the discriminate validity test, uniqueness and self-identity do not meet the validity requirement, as they correlate with Hedonism. However, Nazim and Ahmad (2013) argue that if the correlation coefficient is less than 0.85, the measure still has discriminate validity, i.e., the variables are distinct from each other. As shown in Table 5, the correlation coefficient between hedonism and uniqueness is 0.717. As for hedonism and self-identity, it is 0.755, which is less than the

required cut-off point; thus, the construct meets the discriminate validity requirement. Based on the results, conspicuousness, self-identity, uniqueness, and hedonism are factors that consumers consider when buying Jewellery from an emotional perspective. On the other hand, quality, price and investment represent the rational or cognitive motives that young consumers look at when purchasing Jewellery

Table 5
Variables CR and AVE

Variables	CR	AVE
Uniqueness (U)	0.786	0.481
Hedonism (H)	0.924	0.577
Price (P)	0.852	0.538
Conspicuousness (C)	0.759	0.442
Investment (INV)	0.801	0.455
Self-Identity (SI)	0.896	0.492
Quality (Q)	0.855	0.500

Source: Authors

Table 6
Variables discriminate validity

	U	H	P	C	INV	SI	Q
U	**0.694**						
H	0.717	**0.759**					
P	0.560	0.552	**0.734**				
C	0.473	0.590	0.525	**0.665**			
INV	0.428	0.466	0.323	0.519	**0.675**		
SI	0.670	0.755	0.536	0.660	0.550	**0.701**	
Q	0.506	0.509	0.532	0.507	0.265	0.430	**0.707**

Source: Authors

Based on the above analysis, the final scale is defined (Appendix 1).

Conclusions

In conclusion, this study aims to create a refined scale for luxury consumption. The unified scale was developed while taking into consideration the conceptualisation of various luxury consumption studies. Then, luxury values were categorised based on secondary data: emotional versus rational concepts (Keller, 2001; Bowden, 2009; Butcher et al., 2016; Knight and Kim, 2007). We show that the following four concepts were included within the emotional motives of luxury consumption: hedonism, conspicuousness, uniqueness, and self-identity. Rational values consist of quality, investment, and price.

This is one of the first studies to categorise motives under rational and emotional and to form a unanimous refined scale. The current research integrated various concepts and conceptual frameworks to create the scale. This scale was refined while taking into consideration the Theory of Consumption and the Theory of Dual Process as theoretical bases to develop the scale. This theoretical contribution, which resulted in the creation of a unified scale of 44 verified items from 175 items, can be applied in future research. Luxury researchers can use the following scale to understand the views and motives of luxury consumers when buying luxury products, not just Jewellery.

Luxury and jewellery retailers can use the following scale to understand which aspects are important and focus on them in their production process, product presentation, and marketing.

As a result of the limitations the current study came across, a few suggestions and concepts for future research are suggested. The sample number can be higher than 350 initially because this will result in better model fit and analysis data. Additionally, non-probability selection was used, which limits the study's generalizability (Malhotra, 2010). Other concepts like materialism and sustainability could be added to the scale. A more diverse group of respondents could be studied, such as middle-aged adults and older ones.

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Appendix 1. Luxury Jewellery Consumption Scale

Hedonism
- When in a bad mood, shopping for Jewellery enhances my mood.
- Using Jewellery gives me pleasure.
- Jewellery consumption enhances the quality of my life.
- Jewellery consumption is a way to reduce my stress.
- Using Jewellery makes me feel better about myself.
- Purchasing Jewellery increases my happiness.
- While shopping for jewellery, I felt the excitement of the hunt.
- Purchasing Jewellery gives me much pleasure.
- Overall, I may regard jewellery as a gift I buy to treat myself.

Uniqueness
- I often buy Jewellery in such a way that I create a personal image that cannot be duplicated.
- In my opinion, Jewellery is just unique and exclusive.
- The uniqueness of Jewellery is important to me.
- I look for one-of-a-kind jewellery products to create my style.

Conspicuousness
- Jewellery is a symbol of high social status.
- Owning Jewellery indicates a symbol of wealth.
- Owning Jewellery indicates a symbol of prestige.
- I would like to know what brand of jewellery makes a good impression on others.

Self-Identity
- Wearing jewellery increases my self-confidence.
- Jewellery consumption should bring me self-satisfaction.
- Jewellery ascertains my identity.
- Jewellery makes me feel good about myself.
- Jewellery is an instrument of myself-expression.
- Jewellery plays a critical role in defining my self-concept.
- Jewellery helps me to establish the kind of person I see myself to be.
- My Jewellery purchase is part of who I am.
- The jewellery I buy is consistent with how I see myself.

Price
- A Jewellery brand with a high price means good quality compared to other brands.
- In my opinion, Jewellery brands are reasonably priced.
- In my opinion, Jewellery brands offer value for money.
- In my opinion, Jewellery brands are good products for the price.
- An item being higher in price makes it more desirable to me.

Quality
- A Jewellery brand should have products of really superior quality.
- Jewellery brands have rich artistry.
- Jewellery brands have consistent quality.
- Jewellery brands perform consistently.
- Jewellery is bought for its excellent design.
- Jewellery is bought for its excellent quality.

Investment
- Jewellery should be good value for money in the future.
- Jewellery should have products that last and are kept for a long time.
- Jewellery should be a long-term investment one never regrets.
- I buy expensive jewellery because it is of good value for the money.
- I buy expensive Jewellery because it lasts longer.

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Exploring the Link Between Education Length and Employment Outcomes among Youth in Europe: A Hierarchical Clustering Approach

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Abstract

Background: As the world rapidly evolves, digitalisation continues, and artificial intelligence is used, it is crucial to understand how education systems are preparing future generations to succeed in this very dynamic environment where there is a tremendous demand for skilled workers. **Objectives:** This paper analyses similarities and differences between European Union Member States regarding the educational attainment of young adults and their performance in the labour market. **Methods/Approach:** Ward's cluster method in hierarchical cluster analysis for output and outcome indicators of young adult education systems is used for two selected years: 2012 and 2021. **Results:** Belgium, Cyprus, Denmark, France, Ireland, Latvia, Lithuania, Luxembourg, and the Netherlands have the highest average percentage of young adults with tertiary education in 2021. On the other hand, Belgium, Bulgaria, Hungary, Ireland, Lithuania, Malta, Poland, and Romania have the highest average employment and income benefits of tertiary education for young adults. **Conclusions:** The average share of 25-to 34-year-olds with tertiary education increased significantly in the EU-27 between 2012 and 2021, partly due to higher demand for skilled workers in labour markets. Higher levels of education are generally associated with better employment opportunities and higher wages. However, there are large differences across EU economies. The results can help governments and education policymakers design future policies and provide insights into cross-country comparisons.

Keywords: cluster analysis; educational attainment; labour market outcomes; tertiary education; young adults

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Introduction

With the huge influx of new technologies and the emergence of artificial intelligence, it is important to understand how different industries and sectors see the need for change in education systems and what their expectations are in this regard. We see that the world is rapidly evolving, digitalisation is advancing, and AI is coming into play and replacing some jobs. The skills people need to master to be successful are changing, and the demand for manual and routine cognitive skills is decreasing. Can education systems prepare future generations to succeed in this dynamic environment with a massive demand for skilled workers?

Data show that the average share of 25-to 34-year-olds with tertiary education in the EU-27 increased from 36.2% in 2012 to 44.4% in 2021 (Eurostat, 2023a). It is critical that higher education is of high quality and relevance and that it provides students with knowledge and skills that will enable them to succeed upon graduation.

In this paper, we were interested in trends related to the higher education of young adults in EU member states and the economic benefits of higher education. In this study, these economic benefits are limited to labour market outcomes. Using a cluster analysis for 2012 and 2021, this paper examines how countries in the EU cluster with respect to the educational and labour market status of young adults with higher education. Higher levels of education are generally associated with better employment opportunities and higher wages.

The OECD's Education Glance 2022 report inspired this study, providing a wide range of indicators on the current state of education systems in member and partner countries, looking at outcomes, the impact of education systems, participation and progress within education institutions, and inputs into education systems or learning environments. The focus is on the rise of tertiary education and its associated benefits (OECD, 2023).

We were interested in analysing the similarities and differences among EU member states in terms of output and outcome indicators of their education systems. According to the OECD report, output indicators examine the characteristics of those who leave the education system, such as their educational attainment. In contrast, outcome indicators examine the direct effects of the output of the education system, such as employment and income benefits that result from continuing higher education (OECD, 2012). For this reason, we applied Ward's cluster method in hierarchical cluster analysis to two groups of variables in two selected years. To our knowledge, this is the first work to group EU economies using the chosen indicators linking educational attainment and economic opportunities for young adults with actual data, including trends. Unlike OECD's Education Glance 2022 report (2023), our study covers all EU member states using a hierarchical cluster analysis approach.

The first group of indicators provides information on the characteristics of young adults from the perspective of educational attainment through the indicators that measure their educational attainment and trends in tertiary education. This group of indicators includes the ratio between the share of graduates in business, administration, and law and the share of graduates in STEM to track the development of tertiary education. According to human capital theory (Becker, 1962; Rosen, 1976), higher levels of education improve status in the labour market and lead to greater wealth. Therefore, we also include an indicator that measures the proportion of 15-29-year-olds who are still in education. Young people who are neither in education nor employment and training (NEETs) are of great policy importance for many reasons, which is why two indicators for NEETs were selected.

Depending on the available data, a second set of indicators was selected to provide information on the participation of young people with tertiary education in

the labour market and to identify similarities and differences across EU-27 countries in analysing the benefits of higher levels of education in terms of better labour market performance. The idea of conducting a cluster analysis in two years stems from the objective of identifying trends in selected indicators and the movement of countries from one cluster to another.

Using cluster analysis for the years 2012 and 2021, this paper examines how countries in the EU cluster are concerned with the educational and labour market status of young adults with tertiary education. Considering the already mentioned background, the following reasons also speak for the choice of these two years. Raising the educational attainment of the workforce was one of the priorities of the 2020 targets of Europe, as the EU considers a highly skilled European workforce essential to maintaining global competitiveness and fostering economic growth and prosperity (Cedefop, 2013). On average, the EU has met its target, but there are significant discrepancies between countries, as noted and predicted by Dragomirescu-Gaina et al. (2015), Rodríguez-Pose et al. (2009), and Vandeplas (20121). Moreover, in 2000, the European Union set itself a new strategic goal under the Lisbon Strategy, namely, to make the Union the most competitive and dynamic knowledge-based economy in the world - an economy capable of sustainable economic growth. One of the prerequisites for achieving the goals the EU set itself in Lisbon is certainly investment in education and training. We thought that the 10-year period would be sufficient to identify trends. However, because some data for the indicators we selected were not available in 2011 due to the specific age group we studied, 2012 was selected. During this period, most countries implemented certain education reforms.

The remainder of the paper is organised as follows. The second section reviews previous studies on the relationship between educational attainment and the labour market. The third section presents the data and methods used, and the fourth section provides insight into the main results of the empirical research. The final section is the conclusion.

Literature review

Trends in European Union countries indicate an increase in the length of education. The average share of 25-to 34-year-olds with tertiary education in the EU-27 increased from 36.2% in 2012 to 44.4% in 2021 (Eurostat, 2023a). The OECD (2023) emphasises that labour market outcomes by educational attainment are among the most important measures that link education to individuals' economic opportunities and help answer the question of how educational attainment affects labour market participation. While human capital theory explains that higher levels of education improve labour market status and lead to greater prosperity, developing countries show that they are unable to absorb larger numbers of highly skilled workers, leading to higher unemployment and higher employer expectations. So, is promoting higher education always the best policy for increasing economic growth in every country? The COVID-19 pandemic has shown that adults with higher levels of education are more resilient to change, especially changes that include digitalisation (OECD, 2023; Pejic Bach et al., 2023). Furthermore, Zeqiri et al. (2022) surveyed student satisfaction and gender-related anxiety during the COVID-19 pandemic. It has been shown that the interaction between student and teacher, technology use, and student engagement has a positive influence on student satisfaction.

The relationship between education and labour market outcomes has been studied before but from different perspectives. There is evidence in the literature of positive and negative correlations between educational attainment and labour

market status in different countries. Several hypotheses explain why both positive and negative correlations occur. The human capital theory, originally developed by Becker (1962) and Rosen (1976), assumes that individuals have certain productive skills that are used to generate income, and education and training are investments that can increase productivity. Higher productivity leads to higher wages, higher labour supply, and thus better health for individuals (Meara et al., 2007) and consequently economic growth.

In contrast, the signalling theory (Spence, 1973) states that highly educated individuals have higher wages because educational attainment creates credentials that employers view as a good sign of employees' abilities rather than actual skills acquired. Opportunity cost theory states that in times of higher unemployment, the opportunity cost of further education is low, and the level of education increases. Similarly, the 'parking lot' hypothesis states that in times of economic stagnation and recession, when there is a lack of employment opportunities, education serves as a 'parking lot' for students to continue their education with a higher degree or qualification. The term was originally coined by Barbagli (1982) and further elaborated by Ballarino et al. (2013).

Kodde (1988) analysed Dutch data and showed that high unemployment does not induce young people to pursue additional education but motivates them to continue their education to improve their skills and employment prospects. A brief literature review on the relationship between education and labour market outcomes is provided by Ionescu (2012). The mechanisms by which education affects labour market outcomes are as follows: the number of years of schooling (positively related to higher earnings), educational attainment (higher educational attainment leads to better occupational status than lower educational attainment), attainment of a particular degree (higher educational attainment improves a worker's impression and employability), involvement of the education system in the school-to-work transition, Investment in education (increases human capital), quality of schooling, individual educational pathway, parents' educational pathway, type of curriculum (the presence of apprenticeships increases graduates' employability), and sector (in the private sector, education is more strongly related to productivity than in the public sector).

A further overview of the relationship between education and the labour market can also be found in (Masárová et al., 2022). The work of Ionescu (2012) further focuses on the study of access to education and labour market outcomes in 32 European countries, including the United States and Japan. The author found that higher levels of education increase the chance of finding and keeping a job in times of crisis but that higher participation in education is not necessarily associated with higher employment rates. The author concludes that investment in education primarily promotes positive labour market outcomes (employment, earnings) rather than reducing negative ones (unemployment). These results are also found in Diaconu (2014) for the case of Romania. The author found that higher levels of education lead to better employment opportunities and higher incomes. The study on the employability of graduates in Latvia (Jaunzeme and Busule, 2022) showed that a high percentage of graduates are employed within one year after graduation (88%) and that 80% are employed in highly skilled positions. Employability increases with years after graduation. This motivated us to detect countries with similar labour market outcomes and find similarities between their policies and socioeconomic development.

However, many determinants may play a role in the relationship between educational attainment and labour market status. Iannelli (2002) found a positive

impact of parental education on the higher education and labour market outcomes of young people in Eastern European countries, which is less pronounced in Western European countries and almost absent in Nordic countries. Oswald-Egg and Renold (2021) found that university graduates with work experience have better labour market prospects. They found that university graduates with work experience gained through vocational training earn significantly better starting salaries and find their first job more quickly. The results of Masárová et al. (2022) show the regional differences in the analysis of the educational level and employment status but highlight that the employment rate of individuals with higher education is higher than that of individuals with lower educational level.

Developing countries, however, are a special case in terms of the relationship between education and labour market outcomes. Although these countries should promote higher education to drive economic growth, their markets cannot absorb the increasing number of highly skilled graduates, leading to higher unemployment among higher-skilled workers and lower wages. This shows that education needs to be controlled for the sake of countries' development. In connection with this finding, Jovović et al. (2017) confirmed that a mismatch between education supply and labour market demand can have a significant impact on economic growth. The need to integrate education and economic policies is also highlighted by Erdem and Tugcu (2012), as their research shows that a higher rate of college graduates in Turkey increases unemployment because the labour market is unable to absorb a larger number of highly skilled workers. Success in the labour market also depends on the field of study. A study by Żyra and Shevchuk (2012) showed that in Poland, the expansion of students in humanities, economics and business, and engineering could be one of the reasons behind the higher unemployment rate, which was not the case for science/mathematics studies. The importance of the fields of study on labour market success was confirmed by Hojda et al. (2022).

Andrejević Panić and Lozanov-Crvenković (2019) investigated higher education indicators coherency in Central and Eastern Europe. They have observed the relationship between the average number of years of schooling that the education system offers to the eligible population and government expenditures on research and development in higher education, government expenditures on higher education, and government expenditures on higher education institutions. The unbalanced panel analysis included data for those variables for five countries (Bulgaria, Hungary, Romania, Slovakia, and Serbia) in the period from 2002 to 2012, resulting in models that show functional links between government expenditure and efficiency.

Tudor et al. (2023) chose cluster analysis and the OLS method between clusters to investigate the influences between education and labour market outcomes in the EU in the context of sustainable development and investment in education at the country level in 2000 and 2021. The empirical results show that a cluster of countries with the lowest investment in education is characterised by a negative impact of educational dropouts on employee compensation, the number of hours worked by each employee, and labour productivity. In contrast, the group of countries with high levels of investment in education shows that a university degree and participation in vocational training programs lead to higher wages and higher productivity. At the same time, government financial support for students reduces the number of hours worked, lowers unemployment among those with primary and secondary education, and increases the employment rate among university graduates. An average level of investment in education led to negative influences between workers' wage levels and real labour productivity, while participation in educational activities and vocational

training programs increased wage rates and real productivity. This approach is similar to ours, but Tudor et al. (2023) use different years for cluster analysis and other variables, including macroeconomic indicators such as education investment and GDP, while we focus only on the education variables identified and systematically tracked in the OECD Education Study.

Regarding the earning premium of tertiary education, the OECD data shows that in 22 EU countries that are OECD members - the premium for tertiary education in 2020 was about 38% (OECD, 2023). In 2020, 14 out of 22 EU OECD members (including the UK) were below the OECD average, while Hungary, Germany, the Czech Republic, Slovakia, Austria, the UK, Portugal, and Ireland were above the OECD average. On the EU level, the largest wage premium for a tertiary degree was observed in a set of Central and Eastern European countries (Romania, Hungary, Bulgaria, Poland, and Lithuania), as well as in Cyprus and Portugal. It appears that higher education pays off more in countries with relatively lower levels of tertiary education, where earning premium is more pronounced (Vandeplas, 2021).

This paper analyses the similarities and differences among EU member states in terms of output and outcome indicators of their education systems from the perspective of young adults. Additionally, it identifies similarities and differences across EU-27 countries in analysing the benefits of higher educational attainment in terms of better labour market performance for young adults. For this reason, we applied Ward's cluster method in hierarchical cluster analysis to two groups of variables in two selected years. The idea of conducting a cluster analysis in two years stems from the goal of identifying trends in selected indicators and the movement of countries from one cluster to another to provide the basis for future comparisons and more detailed analyses of education systems.

Data and methods

Data sources

Following the literature review conducted and based on the indicators proposed in the OECD report Education at a Glance 2022 (OECD, 2023), a careful selection of variables was made for the analysis. The full list of observed variables can be found in Table 1.

Data for all variables are collected for 27 European Union Member States: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Educational attainment refers to the highest level of education completed by an individual field of study and is categorised according to ISCED Fields of Education and Training. According to the International Standard Classification of Education (Eurostat, 2023b), levels 0-2 include less than primary, primary, and lower secondary education, levels 3 and 4 include upper secondary or post-secondary non-tertiary education, and levels 5-8 include tertiary education.

The variables are divided into two groups: variables related to education and employment (Table 1).

Table 1
List of Observed Variables

Variable group	Variable	Variable code	Observed period	Source
Education-related variables	Tertiary educated population (25-34), in %	TEduc	2012, 2021	Eurostat (2023a)
	Educational attainment of 25- to 34-year-olds with tertiary education (in %) in relation to upper secondary or post-secondary non-tertiary education	EducA	2012, 2021	Eurostat (2023a)
	% of graduates in business, administration and law compared to STEM	BStem	2013, 2020	Eurostat (2023a)
	The participation rate of young people in education and training 15-29 (inc. NEETs)	PRate	2012, 2021	Eurostat (2023b)
	NEET rates, tertiary educated, age 15-29	NEETRate	2012, 2021	Eurostat (2023b)
	NEETs 15-29, unemployed/inactive	NEETUn	2012, 2021	Eurostat (2023b)
Employment-related variables	Inactivity rate of tertiary educated 30-34	IRate	2012, 2021	Eurostat (2023)
	Unemployment rates of 25- to 39-year-olds with tertiary education	URateT	2012, 2021	Eurostat (2023b)
	Unemployment rate of 25- to 39-year-olds with upper secondary or post-secondary non-tertiary education relative to those with tertiary education	URateTL	2012, 2021	Eurostat (2023b)
	Relative income of 18- to 64-year-olds with tertiary education in relation to upper secondary or post-secondary non-tertiary education	Earn	2013, 2021	Eurostat (2023a)
	The employment rate of 30-34-year-olds with tertiary education	ERateT	2012, 2021	Eurostat (2023a)
	The employment rate of 30- to 34-year-olds with tertiary relative to those with upper secondary or post-secondary non-tertiary education	ERateTL	2012, 2021	Eurostat (2023a)

Source: Authors' work

Education-related variables

Variables related to education represent the output indicators of the education system for young adults (25-34 years old) (OECD, 2023). In case we could not find data for 25-34-year-olds for the European Union Member States, we chose the age group that is closest and for which data are available. Selected variables are:

- The variable TEduc is the percentage of the population aged 25-34 with completed tertiary education.
- The EducA variable is the ratio of the percentage of 25-34-year-olds with tertiary education to the percentage of individuals with upper secondary and post-secondary non-tertiary education in the same age group.
- The BStem variable is the ratio of the percentage of graduates in business, administration, and law compared to graduates in STEM. It is used to observe similarities between countries with similar BStem rates.
- The PRate variable indicates the percentage of 15- to 29-year-olds still in education and training as a percentage of all 15- to 29-year-olds, including those not in education, training, or employment (NEETs). This is an indicator of

the percentage of people continuing their education above the secondary level.

- However, young people aged 15 to 29 who are not in education, employment, or training (NEETUn) are of great policy concern (OECD, 2023), as this occupational status can have several long-term consequences. The status of a NEETUn has a negative impact on labour market prospects and social outcomes, even in the long run.
- The NEETRate variable shows the percentage of NEETs with tertiary education in the 15-29 age group. Although NEET has negative consequences regardless of the reasons that led to it, one can become NEET due to inactivity or lack of opportunities (employment and education), which makes a difference in economic policies. The large differences between the percentage of unemployed and inactive NEETs in the analysed EU countries are captured by the variable NEETRate, which measures the ratio between the percentage of unemployed and inactive NEETs in the population aged 15-29.

Employment-related variables

Variables related to employment refer to the labour market outcomes of the education system for young adults. The OECD (2023) emphasises that labour market outcomes by educational attainment are among the most important measures that link education to individuals' economic opportunities and help answer the question of how educational attainment affects labour market participation. Depending on the available data, the following three indicators were selected to provide information on the labour market participation of young people with tertiary education in the EU-27 in 2012 and 2021. Variables are as follows:

- The inactivity rate of 30-34-year-olds with tertiary education (IRate) is the proportion of persons neither working nor actively looking for a job among 30-34-year-olds with tertiary education.
- The unemployment rate of 25-39-year-olds with tertiary education (URateT) as the ratio of unemployed 25-39-year-olds with tertiary education to the labour force of 25-39-year-olds with tertiary education.
- The employment rate of 30-34-year-olds with tertiary education (ERateT) as the ratio of employed 30-34-year-olds with tertiary education to the working age population of 30-34-year-olds with tertiary education.

Three additional indicators were added to identify similarities and differences across EU-27 countries in analysing the benefits of higher educational attainment in terms of better labour market performance:

- The analysis of the relationship between individuals' education and their labour market outcomes is concluded with the most recent indicator, which examines the income benefits of education by comparing and relating the mean net income of 18- to 64-year-olds with tertiary education to that of the same age group with upper secondary or post-secondary non-tertiary education (Earn).
- The variable compares the employment rates of 30-34-year-olds with tertiary education with those of 30-34-year-olds with upper secondary or post-secondary non-tertiary education and reports their ratio (ERateT).
- The indicator completes the analysis by relating the unemployment rate of 25 to 39-year-olds with upper secondary or post-secondary non-tertiary education to the same age group with tertiary education (URateTL).

Statistical analysis

First, the statistical descriptive analysis of the observed variables is performed separately for each observed year, and the results are compared. After the initial insight into the variables, all variables are standardised, and the hierarchical cluster analyses are performed. The hierarchical cluster analysis is based on Ward's cluster method or Ward's minimum variance cluster method. In Ward's cluster method, all objects, in this case, the observed countries, represent a cluster. In each subsequent step, Ward's cluster method searches for a pair of clusters so that the increase in total variance within the cluster is minimised after the merger (Murtagh & Legendre, 2014). Hierarchical cluster analysis also uses squared Euclidean distances as a measure of distance or dissimilarity (Hossain & Abufardeh, 2019). Two hierarchical cluster analyses are performed for each variable group. One hierarchical cluster analysis is performed for the year 2012, while the second analysis is performed for the year 2021. The optimal number of clusters and cluster memberships will be determined based on the dendrograms created. However, to compare cluster memberships and hierarchical cluster analysis results between two observed groups of variables and two observed periods, the dendrograms are used to determine only an optimal number of clusters in all hierarchical analyses performed. Finally, parallel coordinate plots are used to compare cluster properties using the mean values of the observed variables.

Due to some missing data, the values of the corresponding variables for the closest year were used as approximations. However, we believe that such an approach did not significantly affect the structure of the clusters.

Results

Education-related variables

Table 2 shows the descriptive statistics results for the education-related variables. The results are based on data from 2012 and 2021, although it should be emphasised that due to the lack of data in 2012 and 2021 for the variable BStem, data from 2013 and 2020 were used as estimates for those years.

According to the results presented in Table 2, the average share of 25-34-year-olds with tertiary education in the EU-27 increased from 36.2% in 2012 to 44.4% in 2021. This increase was highest in Austria, from 22.8% to 42.4%. Countries with a larger increase are Portugal, Croatia, Malta, and Slovakia, while only Romania shows a slight decrease. In 2021, Luxembourg and Ireland stand out with over 60%, Cyprus, Lithuania, and the Netherlands with over 50% of the share of 25-34-year-olds with tertiary education. The lowest share of 25-34-year-olds with tertiary education in 2021 was recorded in Romania and Italy, with less than 30%. The ratio between the percentage of 25-to 34-year-olds with tertiary education and the percentage of the same age group with completed upper secondary or post-secondary non-tertiary education (EducA variable) recorded the strongest increase among the observed variables.

The BStem variable, which tracks trends in tertiary education, also shows a slight increase in the percentage of graduates in business, administration, and law relative to the percentage of graduates in STEM in the EU average (from 98 to 102) despite the increasing global popularity of STEM in recent years. About the same proportion of students, on average, graduate with degrees in business, administration and law, and STEM. There are significant differences between countries, however, with this share varying from 34% in Cyprus in 2021 to 172% in Sweden. The increase in popularity of STEM compared to business, administration, and law was most pronounced in Malta, Cyprus, and Greece in 2021 compared to 2012. Cyprus, Malta, and Luxembourg

recorded almost twice as many STEM graduates as graduates in business, administration, and law in 2021, while the share of graduates in business, administration, and law was highest in Sweden, Slovenia, and Finland in 2021 compared to STEM. Croatia recorded the largest increase in graduates in business, administration, and law compared to STEM.

Table 2
Descriptive Statistics of education-related variables A, n=27 European Union Member States

Statistics	Year	Variable					
		TEduc	EducA	Bstem*	PRate	NEETRate	NEETUn
Average	2012	36	85	98	52	13	120
	2021	45	113	102	54	9	65
Standard deviation	2012	9	38	38	7	7	69
	2021	10	50	35	7	5	33
Coefficient of variation	2012	25	44	39	14	56	58
	2021	22	44	34	13	54	50
Minimum	2012	23	35	39	41	4	56
	2021	23	40	34	42	3	25
Maximum	2012	54	166	172	71	38	283
	2021	63	237	172	66	27	152

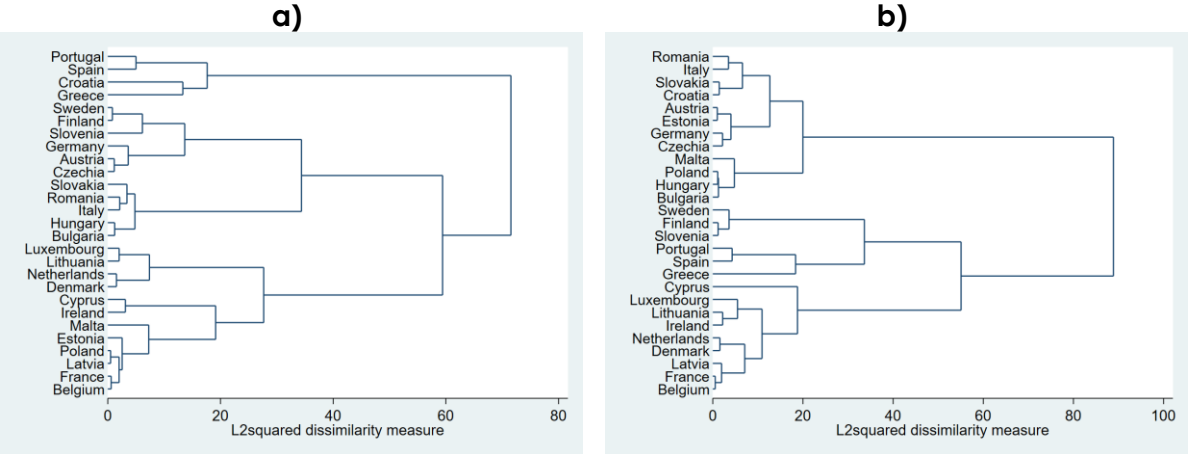
*Note: * Data from 2013 and 2020 were used.*
Source: Authors' work

The participation rate of young people aged 15-29 still in education and training (variable PRate) increased by 2 percentage points on average in the EU between 2012 and 2021, reaching 54% in 2021. Thus, slightly more than half of young people aged 15-29 participated in education and training in both years. In 2021, compared to 2012, the largest increases were in Ireland (37%), Greece (20%), Bulgaria, and Spain (19%), while the largest decreases were in Lithuania. Some positive trends can also be observed in the statistics from NEETs. The percentage of tertiary educated NEETs (NEETRate) decreased by an average of 4 percentage points in the EU between 2012 and 2021 and was 9% on average. The ratio between the percentage of unemployed and inactive NEETs (NEETUn) also decreased significantly over the observed period, indicating that more young people are 'NEET' because they are inactive rather than because they cannot find a job. It can also be observed that the highest data variability is in 2012 for the variable NEETUn, while the situation changes completely in 2021, where the highest variability is found for the variable EducA, indicating changing trends and the popularity of tertiary education in EU Member States. On the other hand, the lowest data variability in both years seems to be for the variable NEETRate.

The dendrograms of the performed hierarchical cluster analyses, using Ward's clustering method, and squared Euclidean distances, based on the variables related to employment in 2012 and 2021, are shown in Figure 1. A comparison of the two resulting dendrograms showed that the optimal number of clusters in both cases should be 4.

Table 3 provides cluster averages for various education-related variables across two time points (2012 and 2021) within the European Union member states. It employs hierarchical clustering using Ward's method and squared Euclidean distances.

Figure 1
Dendrograms, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6 Variables related to employment A: **a)** 2012 **b)** 2021



Source: Authors' work

Table 3
Cluster Averages, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6, education-related variables

Year	Cluster	Variable					
		TEduc	EducA	Bstem*	PRate	NEETRate	NEETUn
2012	1	32	94	130	50	24	270
	2	33	61	134	57	8	89
	3	26	46	86	45	17	84
	4	43	109	74	52	11	100
2021	1	47	143	123	59	16	137
	2	46	102	154	65	5	69
	3	36	73	105	49	10	50
	4	55	160	73	55	8	60

*Note: * Data from 2013 and 2020 were used.*
Source: Authors' work

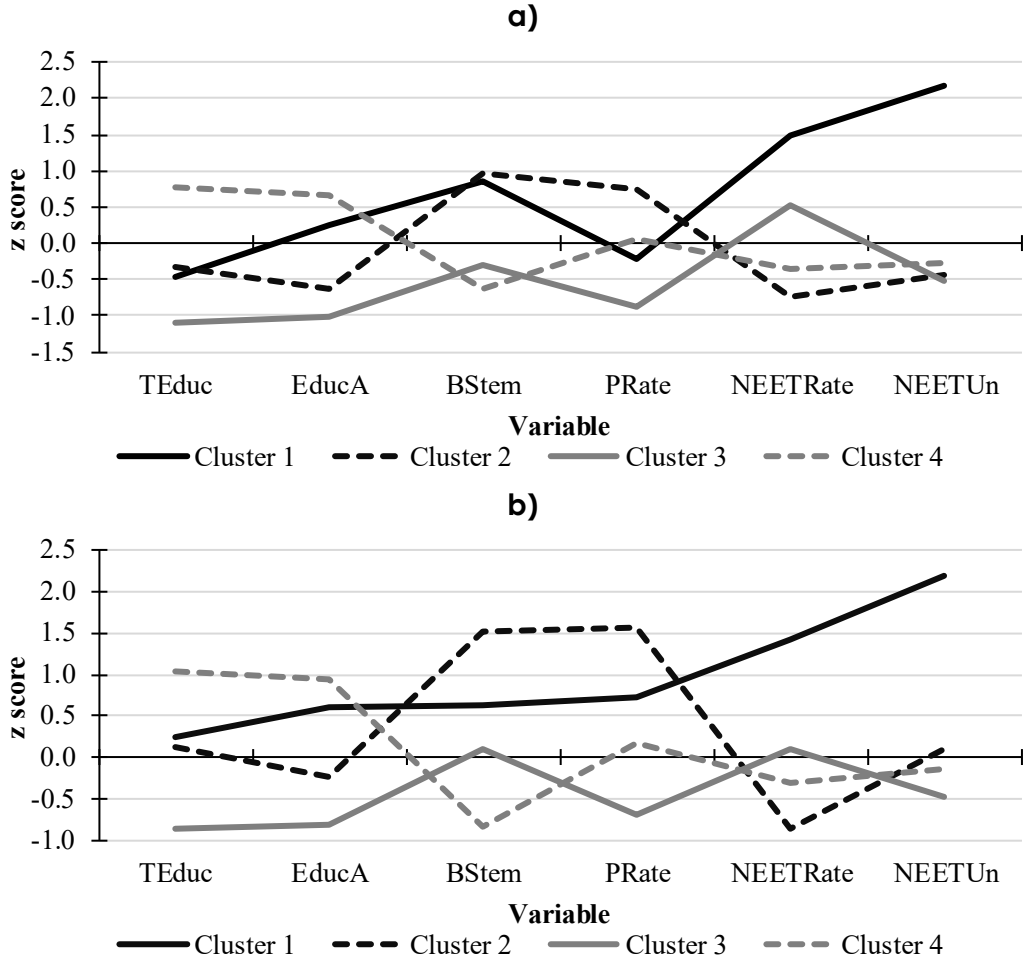
Figure 2 shows parallel coordinates plots for the hierarchical cluster solutions with four clusters in 2012 and 2021. Each line represents an average standardised value of countries that are placed in the same cluster for all observed education-related variables.

Table 4 contains the cluster members for each formed cluster in both observed years and the country allocated to each cluster. In general, most countries remained within the same cluster in 2021 compared to 2012.

According to the hierarchical cluster analysis performed, cluster 1 in 2021 includes Greece, Portugal, and Spain, with a relatively high proportion of 25- to 34-year-olds with higher education. Almost every second citizen aged 25-34 has a tertiary education (about 47%). On average, 43% more 25- to 34-year-olds have a tertiary degree than the same age group with upper secondary or post-secondary non-tertiary education. Young people's participation rates in education and training increased on average compared with 2012, placing them among the economies with relatively higher participation rates in education and training among 15- to 29-year-olds. These countries had significantly higher shares of unemployed to inactive NEETs, averaging 137% in 2012. Members of this cluster also had a higher proportion of graduates in business, administration, and law compared to STEM. In 2020, there were,

on average, 23% more graduates in business, administration, and law than in STEM. However, the proportion of NEETs with tertiary education is relatively high in the 15-29 age group. 16% of 15-29-year-olds with tertiary education were, on average, neither in education nor in employment.

Figure 2
Parallel Coordinates Plot, Hierarchical Clustering Members, Standardised Values, k = 6 education-related variables: **a)** 2012 **b)** 2021



Source: Authors' work

Cluster 2 in 2021 consists of Finland, Slovenia, and Sweden, in contrast to 2012, when Austria, the Czech Republic, and Germany were also members. Over nine years, the share of 25-34-year-olds with tertiary education has increased significantly, averaging 46% in 2021. Almost half of the subpopulation of 25- to 34-year-olds in these countries had a tertiary degree on average. Compared to STEM, these economies had the highest proportion of tertiary graduates in business, administration, and law and had the highest participation of young people in education and training. Also, economies in this cluster were characterised by the lowest average share of NEETs with tertiary education in the 15-29 age group in 2012, averaging 5%.

Cluster 3 is characterised by the relatively lowest share of 25- to 34-year-olds with tertiary education in both years studied. Although this cluster consisted of five economies in 2012 (Bulgaria, Hungary, Italy, Romania, and Slovakia), it expanded in 2021 with the addition of Austria, Croatia, the Czech Republic, Estonia, Germany, Malta, and Poland to the existing countries. In these economies, the subpopulation of

25- to 34-year-olds with upper secondary or post-secondary non-tertiary education predominates on average compared to 25- to 34-year-olds with tertiary education. In 2021, there were about the same number of graduates in business, administration, and law as in STEM. The proportion of NEETs with tertiary education in the 15-to-29-year-old age group was relatively high on average in both years.

Table 4
Cluster Members, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6 Variables based on education-related variables

Cluster	2012		2021	
	# of countries	Cluster members	# of countries	Cluster members
1	4	Croatia; Greece; Portugal; Spain	3	Greece; Portugal; Spain
2	6	Austria; the Czech Republic; Finland; Germany; Slovenia; Sweden	3	Finland; Slovenia; Sweden
3	5	Bulgaria; Hungary; Italy; Romania; Slovakia	12	Austria; Bulgaria; Croatia; the Czech Republic; Estonia; Germany; Hungary; Italy; Malta; Poland; Romania; Slovakia
4	12	Belgium; Cyprus; Denmark; Estonia; France; Ireland; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland	9	Belgium, Cyprus, Denmark, France, Ireland, Latvia, Lithuania, Luxembourg, Netherlands

Source: Authors' work

The results of the cluster analysis, when indicators are analysed for 2021, show that cluster 4, consisting of Belgium, Cyprus, Denmark, France, Ireland, Latvia, Lithuania, Luxembourg, and the Netherlands, has the highest average share of individuals with tertiary education aged 25-34 (55%), which is about 10 percentage points higher than the EU-27 average. The characteristics of the cluster remained relatively stable in 2021 compared to 2012, with a slight change in the structure of the cluster. In these countries, the share of unemployed to inactive NEETs is relatively lower. In 2021, there were, on average, 60% more 25-34-year-olds with tertiary education than the same age group with upper secondary or post-secondary non-tertiary education. Members of this cluster also have a higher proportion of tertiary graduates in STEM compared to business, administration, and law. In 2020, there were, on average, 27% more graduates in STEM than in business, administration, and law. The proportion of young people aged 15-29 in education and training is relatively low, averaging 55%, as is the proportion of NEETs with tertiary education in the 15-29 age group. 8% of 15-29-year-olds with tertiary education were neither in education nor training in 2021. Compared to 2012, the ratio of inactive to unemployed NEETs has increased, with inactive NEETs predominating. This is the case in all clusters except for Cluster 1, which consists mainly of economies with higher unemployment rates.

Employment-related variables

Table 5 shows the descriptive statistics results for the employment-related variables. The results are based on data from 2012 and 2021, although it should be emphasised that due to the lack of data in 2012 for the variable Earn, data from 2013 were used as estimates for those years.

Table 5
Descriptive Statistics of employment-related variables, n=27 European Union Member States

Statistics	Year	Variable					
		IRate	URateT	URateTL	Earn*	ERateT	ERateTL
Average	2012	8	7	170	141	85	110
	2021	8	5	166	138	88	109
Standard deviation	2012	5	5	59	14	6	8
	2021	4	3	43	16	4	6
Coefficient of variation	2012	62	70	35	10	7	7
	2021	45	66	26	12	5	5
Minimum	2012	3	2	95	115	74	96
	2021	5	2	73	111	76	94
Maximum	2012	23	25	333	175	95	128
	2021	22	17	240	178	94	119

*Note: * Data from 2013 were used.*
Source: Authors' work

On average, 88% of all 30-34-year-olds with tertiary education were employed in the EU-27 in 2021, ranging from 76% in Greece to 93.5% in Malta. This figure has increased by 2.5 percentage points since 2012. Compared to the employment rates of 30-34-year-olds with upper secondary, post-secondary non-tertiary education, we can see that the employment rate of 30-34-year-olds with tertiary education is higher on average by 9%, except for the Czech Republic and Luxembourg in 2021, where it is lower. This means that the subpopulation of 30-to 34-year-olds with lower educational attainment (upper secondary, post-secondary non-tertiary education) has higher employment rates in these two countries than the subpopulation with tertiary education. The difference is most significant in Italy, Ireland, and Greece. Interestingly, it was highest in Ireland in 2012, at 28%. The employment rate of 30–34-year-olds with tertiary education in 2021 compared to 2012 increased the most in Hungary (18%) and Slovakia (16%), while it decreased the most in Latvia and Luxembourg (by 3%) and Romania (by 2%).

Another important measure of labour force participation analysed is the share of 30-34-year-olds with tertiary education who are neither working nor actively looking for a job or their inactivity rate. This measure is critical when we consider, on the one hand, government spending on tertiary education and, on the other, the underutilisation of skills acquired in these subpopulations. Although the average inactivity rate of 30-34-year-olds with tertiary education has decreased from 8.42% in 2012 to 7.83% in 2021 in the EU-27 analysed, there are large differences between countries. The Czech Republic is at the top of the inactivity rates of 30-34-year-olds with tertiary education, with 22.3% in 2021, while Slovenia, Lithuania, and Malta have the lowest inactivity rates, with around 4.7%. The most significant decline from 2012 to 2021 was in Hungary, from 18.1% to 5.4%.

In 2021, the average unemployment rate for 25-39-year-olds with tertiary education in the EU-27 was 4.88%, while the average unemployment rate for 25-39-year-olds with upper secondary, post-secondary non-tertiary education was 7.43%, more than 2.5 percentage points higher. According to the data, this labour market indicator has the most extensive dispersion in both years. The highest unemployment rate for 25-39-year-olds with tertiary education was recorded in Greece in both years studied, at 25% in 2012 and 17% in 2021. Most EU economies experienced a decline in the unemployment rate in the subpopulation studied, except Germany, Luxembourg, Austria, Finland, and Sweden. The Czech Republic recorded the lowest

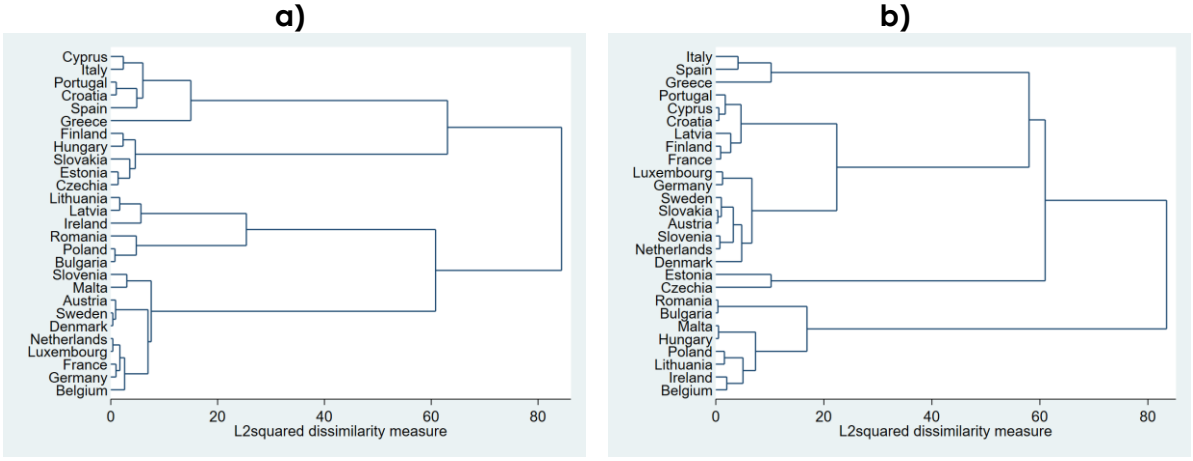
unemployment rate for the subpopulation studied, at 1.7%, Malta at 1.6%, and Poland at 2.1% in 2021.

The expectation that higher levels of education lead to better labour market outcomes is supported in part by data on the unemployment rates for 25-39-year-olds with upper-secondary or post-secondary non-tertiary education compared to the same measure for the same age group with tertiary education. These benefits of tertiary education are most pronounced in Belgium in 2021 (by 140%, or nearly 5 percentage points), Lithuania, Romania, Bulgaria, Poland, and Ireland. On the other side of the spectrum are EU economies where this difference is smallest, such as Greece, Germany, Luxembourg, and the Netherlands. Only in Denmark in 2021 was the unemployment rate higher among 25-39-year-olds with tertiary education than among the same age group with upper-secondary or post-secondary non-tertiary education.

In terms of relative earnings in 2021, 18- to 64-year-olds with tertiary education earn on average 37.69% more than the same age group with upper secondary, post-secondary non-tertiary education, ranging from 11% in Denmark to 78% in Bulgaria and Romania.

Figure 3

Dendrograms, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6, employment-related variables: **a)** 2012 **b)** 2021



Source: Authors' work

Table 6 presents cluster averages for various employment-related variables among the 27 European Union member states, analysed through hierarchical clustering using Ward's method and squared Euclidean distances.

To enrich the analysis of the results, Figure 4 shows parallel coordinate plots for the hierarchical cluster solutions with four clusters in 2012 and 2021. Each line represents an average standardised value of countries placed in the same cluster for all observed employment-related variables.

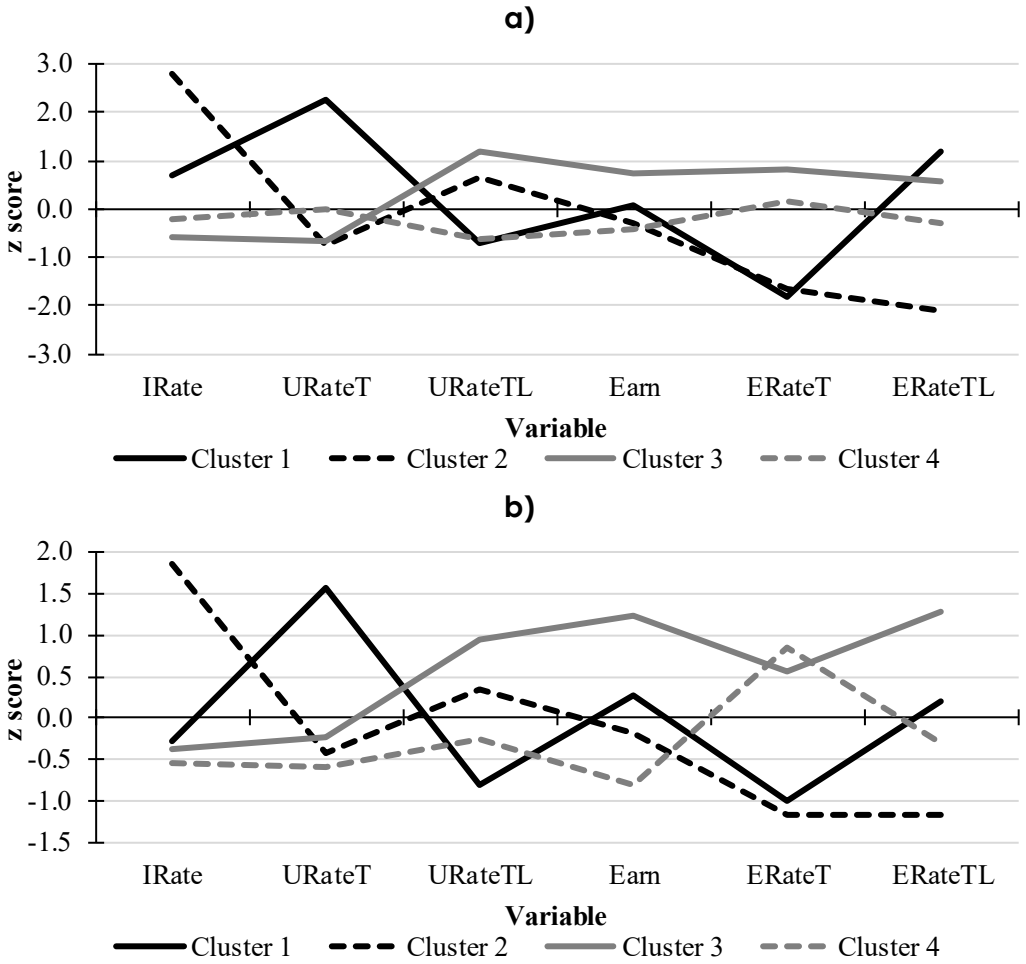
For the sake of clarity, we will first analyse the results of the cluster analysis for the year 2021, considering the employment-related variables. We will then compare these results with the cluster analysis results for 2012 to identify trends in indicators that measure young adults' labour market outcomes in terms of educational attainment. Table 6 presents the allocation of countries according to clusters in observed years.

Table 6
Cluster Averages, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6, employment-related variables

Year	Cluster	Variable					
		IRate	URateT	URateTL	Earn*	ERateT	ERateTL
2012	1	7	15	122	145	79	111
	2	18	5	191	138	78	101
	3	6	6	227	159	89	120
	4	6	4	155	129	91	108
2021	1	10	12	136	139	80	116
	2	18	2	194	133	81	97
	3	6	3	217	150	92	112
	4	7	5	139	131	89	107

Note: * Data from 2013 were used.
Source: Authors' work

Figure 4
Parallel Coordinates Plot, Hierarchical Clustering Members, Standardised Values, k = 6 employment-related variables: **a)** 2012 **b)** 2021



Source: Authors' work

Cluster 1 in 2021 consists of Greece, Italy, and Spain, countries with a relatively low share of 30-34-year-olds with tertiary education who are not in the labour force or relatively low inactivity rates for this age group, averaging 10%. These countries are

characterised by the significantly highest unemployment rates for 25-39-year-olds with tertiary education, which averaged 12% in 2021. This is not surprising, as these are also the countries with the highest average overall unemployment rates, well above the EU-27 average in 2021 (Eurostat, 2023a). At the same time, employment rates for 30-34-year-olds in these countries are relatively lower in the EU-27, at 80% in 2021. However, when analysing the advantages of tertiary education over upper secondary or post-secondary non-tertiary education in terms of labour market outcomes and income, the countries in this cluster show the lowest advantages in 2021 when analysing unemployment rates for subpopulation studied, relatively higher advantages in employment rates for the 30-34-year-olds, and relatively higher earnings premium. Measured by relative earnings in 2021, 18- to 64-year-olds with tertiary education in these countries earned, on average, 39% more than the same age group with upper secondary or post-secondary non-tertiary education. The subpopulation of 30-34-year-olds with tertiary education has 16% higher employment rates than the subpopulation with upper secondary or post-secondary non-tertiary education. The characteristics of this cluster were relatively similar in 2012, with Croatia, Cyprus, and Portugal as members of this cluster, along with Greece, Italy, and Spain. In Croatia, labour market indicators have improved for the subpopulation under study, although the inactivity rate of 30-34-year-olds with tertiary education has increased from 6.2% in 2012 to 7.7% in 2021. However, the benefits of higher education have improved in all cases except relative earnings. In terms of relative earnings in 2021, 18- to 64-year-olds with tertiary education in Croatia earn, on average, 44% more than the same age group with upper secondary or post-secondary non-tertiary education in 2021. Portugal has significantly improved the labour market situation for the subpopulation studied by reducing the unemployment rate, increasing the employment rate, and increasing the benefits of higher education with respect to the unemployment rate.

Table 6
Cluster Members, Hierarchical Clustering, Ward's Method, Squared Euclidean Distances, n = 27 European Union Member States, k = 6, employment-related variables

Cluster	2012		2021	
	Number of countries	Cluster members	Number of countries	Cluster members
1	6	Croatia; Cyprus; Greece; Italy; Portugal; Spain	3	Greece; Italy; Spain
2	5	the Czech Republic; Estonia; Finland; Hungary; Slovakia	2	the Czech Republic, Estonia
3	6	Bulgaria; Ireland; Latvia; Lithuania; Poland; Romania	8	Belgium, Bulgaria, Hungary, Ireland, Lithuania, Malta, Poland, Romania
4	10	Austria; Belgium; Denmark; France; Germany; Luxembourg; Malta; Netherlands; Slovenia; Sweden	14	Austria, Croatia, Cyprus, Denmark, Finland, France, Germany, Latvia, Luxembourg, Netherlands, Portugal, Slovakia, Slovenia, Sweden

Source: Authors' work

Cluster 2 in 2021 consists of the Czech Republic and Estonia. These are the countries with the relatively highest inactivity rates among 30-34-year-olds, averaging 18%. On average, 81% of all 30-to 34-year-olds with tertiary education were employed in these economies in 2021. When analysing the advantages of tertiary education over upper secondary, post-secondary non-tertiary education in terms of labour market

outcomes and earnings, the countries in this cluster show the lowest advantages in 2021 when analysing employment rates for the subpopulation studied, relatively higher advantages in unemployment rates for those aged 25-39, and relatively lower earnings advantages. In terms of relative earnings in 2012, 18- to 64-year-olds with tertiary education in these countries earned, on average, 33% more than the same age group with upper secondary, post-secondary non-tertiary education. The characteristics of this cluster were relatively similar in 2012, with Finland, Hungary, and Slovakia as members of this cluster, along with the Czech Republic and Estonia. Hungary has significantly improved labour market performance for the subpopulation studied. In Finland, inactivity rates have declined significantly for the subpopulation studied, as have the benefits of higher education in terms of unemployment rates.

Countries characterised by relatively best labour market outcomes in 2021 for the tertiary-educated subpopulation under study form group 3: Belgium, Bulgaria, Hungary, Ireland, Lithuania, Malta, Poland, and Romania. On average, they have the lowest inactivity rates and highest employment rates among 30-34-year-olds with tertiary education. The unemployment rates for those aged 25-39 were relatively lower. Moreover, the advantages of tertiary education over upper secondary or post-secondary non-tertiary education are most pronounced in terms of labour market outcomes and earnings. In terms of relative earnings in 2021, 18- to 64-year-olds with tertiary education in these countries earn, on average, 50% more than the same age group with upper secondary, post-secondary non-tertiary education. Unlike in 2012, in 2021, Belgium, Hungary, and Malta joined this cluster, and Latvia is no longer a member of this cluster. Malta changed the cluster membership partly due to a significant increase in the benefits from tertiary education in 2021 with respect to 2012 from the perspective of unemployment rates for the age group analysed. In Latvia, the inactivity rate for the subpopulation studied has increased, and the benefits of higher education for the age group studied have decreased slightly.

Interestingly, cluster 4 in 2021 consists of 14 EU economies: Austria, Croatia, Cyprus, Denmark, Finland, France, Germany, Latvia, and Luxembourg, that, on average, have relatively low inactivity rates (7%) and higher employment rates (89%) among 30-34-year-olds with tertiary education and relatively low unemployment rates (5%) among 25-39-year-olds with tertiary education. However, this group of economies is characterised by relatively lower benefits from tertiary education over upper secondary, post-secondary, and non-tertiary education.

When we analyse the results of the cluster analysis in relation to the variables related to education, we can see that the characteristics and structure of the cluster remained relatively stable. For some countries, the cluster membership changed.

Discussion

The cluster analysis was conducted for the years 2012 and 2021. The idea of clustering economies in two years seemed particularly interesting because it shows how the cluster structure changes over time. In addition, the cross-section of the cluster in a given year shows the characteristics of the education systems of the EU member states from the perspective of young adults and their labour market performance. Data show that although the share of young adults with tertiary education increased significantly on average between 2012 and 2021, there are still significant differences across European Union countries, ranging from below 30% in Italy and Romania to over 60% in Luxembourg and Ireland. Austria, Portugal, and Croatia stand out as the countries where the share of young adults with tertiary education has increased the most over the observed period.

Tracking trends in tertiary education, the ratio of the share of graduates in business, administration, and law to the share of graduates in STEM shows a slight increase on average despite the increasing global popularity of STEM in recent years. The increase in popularity of STEM compared to business, administration, and law was most pronounced in Malta, Cyprus, and Greece in 2021 compared to 2012. Cyprus, Malta, and Luxembourg recorded almost twice as many STEM graduates as business, administration, and law graduates in 2021, while the proportion of business, administration, and law graduates was highest in Sweden, Slovenia, and Finland in 2021 compared with STEM. Croatia recorded the largest increase in graduates in business, administration, and law compared to STEM.

The share of NEETs with tertiary education (NEETRate) decreased by an average of 4 percentage points in the EU between 2012 and 2021. However, in many EU economies, the share of NEETs with tertiary education still exceeds 10% in 2021 (in Bulgaria, the Czech Republic, Greece (26.8%), Spain, Croatia, Italy, Romania, Cyprus, and Slovakia). Given the negative impact this status has on labour market prospects and social outcomes, this finding can guide governments and education policymakers in designing future policies to reduce this rate. NEET Rates of less than 5% are recorded in Germany, Malta, the Netherlands, Finland, and Sweden. The ratio between the percentage of unemployed and inactive NEETs (NEETUn) has also declined significantly over the period, suggesting that more young people are 'NEET' because they are not in employment rather than because they cannot find work.

On average, 88% of all 30-34-year-olds with tertiary education in the EU-27 were employed in 2021, ranging from 76% in Greece to 93.5% in Malta. This figure has increased by 2.5 percentage points since 2012. Comparing the employment rates of 30-34-year-olds with upper secondary or post-secondary non-tertiary education shows that the share of employed 30-34-year-olds with tertiary education is, on average, 9% higher, except for the Czech Republic and Luxembourg in 2021, where is lower. The difference is most pronounced in Italy, Ireland, and Greece.

Although the average share of economically inactive 30-34-year-olds with tertiary education has decreased in the EU-27, there are large differences between countries. The Czech Republic is at the top of the inactivity rates of 30-34-year-olds with tertiary education in 2021, while Slovenia, Lithuania, and Malta have the lowest inactivity rates. Hungary recorded the most significant decline. In 2021, the average unemployment rate for 25-39-year-olds with tertiary education in the EU-27 was 4.88%, while the average unemployment rate for 25-39-year-olds with upper secondary or post-secondary non-tertiary was 7.43%, more than 2.5 percentage points higher. According to the data, this labour market indicator has experienced the most extensive dispersion in both years, with Greece having the highest unemployment rate and the Czech Republic, Malta, and Poland having the lowest. The expectation that higher levels of education lead to better labour market outcomes is supported in part by data on the unemployment rates for 25-39-year-olds with upper-secondary or post-secondary non-tertiary education compared to the same measure for the same age group with higher education. These benefits of tertiary education are most pronounced in Belgium, Lithuania, Romania, Bulgaria, Poland, and Ireland in 2021. On the other side of the spectrum are EU economies where this difference is smallest, such as Greece, Germany, Luxembourg, and the Netherlands. In terms of earnings premium, 18- to 64-year-olds with tertiary education earn on average 37.69% more than the same age group with upper secondary or post-secondary non-tertiary education, ranging from 11% in Denmark to 78% in Bulgaria and Romania.

Conclusion

As the world rapidly evolves, digitalisation continues, and AI is used, it is important to understand how education systems are dealing with these challenges and whether they can prepare future generations to succeed in this dynamic environment with a tremendous demand for skilled workers. The education system must provide young people with the skills and knowledge that are in demand in the labour market. Data show that the average share of 25-34-year-olds with tertiary education in the EU-27 increased from 36.2% in 2012 to 44.4% in 2021, partly the result of higher demand for skilled workers in labour markets (OECD, 2022). Raising the educational attainment of the workforce was one of the priorities of the 2020 targets of Europe, as the EU considers a highly skilled European workforce essential to maintaining global competitiveness and fostering economic growth and prosperity.

Higher levels of education are generally associated with better employment opportunities and higher wages. Given the importance of education to a country's economic growth, policymakers around the world must be informed about the state of the education system in order to respond to current challenges.

This paper focuses on the analysis of similarities and differences among the 27 Member States of the European Union in the indicators of outcomes and outputs of their education systems from the perspective of young adults using Ward's cluster method in hierarchical cluster analysis for two groups of variables in two selected years: 2012 and 2021. The first group of variables, related to education, provides information on the characteristics of young adults from the perspective of educational attainment and trends in tertiary education. Depending on the available data, a group of indicators related to employment was selected to provide information on the participation of young people with tertiary education in the labour market and to identify similarities and differences across EU-27 countries in analysing the benefits of higher levels of education in terms of better labour market performance.

In all economies except Romania, the share of 25-34-year-olds with tertiary education increased in the analysed period. Regarding the first set of variables, Belgium, Cyprus, Denmark, France, Ireland, Latvia, Lithuania, Luxembourg, and the Netherlands have, on average, the highest percentage of young adults with tertiary education and the highest percentage of tertiary graduates in STEM compared to Business, Administration, and Law in 2021. The expectation that higher levels of education lead to better labour market outcomes is supported in part by data on the unemployment rates for 25-39-year-olds with upper-secondary or post-secondary non-tertiary education compared to the same measure for the same age group with tertiary education. In terms of relative earnings in 2021, 18- to 64-year-olds with tertiary education earn on average 37.69% more than the same age group with upper secondary, post-secondary non-tertiary education, ranging from 11% in Denmark to 78% in Bulgaria and Romania. However, over the 9 years, Denmark, Germany, Ireland, Latvia, Lithuania, Luxembourg, the Netherlands, and Finland show a decline in the benefits of higher education in terms of the unemployment rate for 25-39 year-olds. In Denmark, the unemployment rate of 25-39-year-olds with tertiary education was higher than that of the same age group with upper secondary and post-secondary non-tertiary education in 2021, raising the question of appropriate government education policies.

Belgium, Bulgaria, Hungary, Ireland, Lithuania, Malta, Poland, and Romania have, on average, the most pronounced employment and income benefits of tertiary education for young adults. These countries had, on average, the most favourable labour market outcomes for young adults with tertiary education in 2021. Although the average share of inactive 30-to 34-year-olds with tertiary education has declined

slightly in the EU-27, there are large differences across countries. The Czech Republic is at the top of the inactivity rates of 30-to 34-year-olds with tertiary education in 2021, while Slovenia, Lithuania, and Malta have the lowest inactivity rates. The countries that succeeded in significantly reducing the inactivity rate of 30- to 34-year-olds with tertiary education over the 9 years were Finland, Hungary, and Slovakia, so it would be interesting to examine the background to this trend. In Greece, on the other hand, the inactivity rate increased significantly. In terms of earnings premium, 18- to 64-year-olds with tertiary education earn on average 37.69% more than the same age group with upper secondary or post-secondary non-tertiary education, ranging from 11% in Denmark to 78% in Bulgaria and Romania. In many EU economies, the share of NEETs with tertiary education in 2021 is still above 10% (in Bulgaria, the Czech Republic, Greece (26.8%), Spain, Croatia, Italy, Romania, Cyprus, and Slovakia). The results can guide governments and education policymakers in designing future policies and provide insight into how countries compare.

However, this study has some limitations. The results depend on the choice of variables used for cluster analysis and the choice of years of observation. The analysis is limited to a very narrow but important aspect of the educational system, educational attainment, and labour market outcomes of young adults in European Union member states. Of course, the consequences of the strong growth of tertiary education can be seen not only in labour market outcomes but also beyond that as a contribution to economic growth and society as a whole. This aspect has not been taken into account. Also neglected was the very important dimension of investment in the education system, from financial resources to human and material resources. Finally, the education system was not considered from the point of view of quality. For some indicators, we did not have data for the age group we wanted to analyse to get a picture of the labour market outcomes of young adults, so we used data for a subset of that age group. In some cases, we did not have data for a subset of the age group we wanted to analyse, so we were forced to use data for the 18- to 64-year-old age group, such as relative earnings, which we considered an extremely important indicator of the benefits of tertiary education over upper secondary or post-secondary non-tertiary education. Due to some missing data, the values of the corresponding variables for the nearest year were used as approximations, although we believe that such an approach did not significantly affect the cluster structure.

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Enhancing Financial Performance through Absorptive Capacity: Evidence from Croatian Export Companies in Domestic and International Markets

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Abstract

Background: Export activities represent one of the prerequisites for the growth and development of economies. In combination with new digital technologies, they create a sustainable advantage and competitiveness in the market. **Objectives:** The focus of this research was to determine whether there is a significant difference and connection between the absorptive capacity of accepting new technologies and its influence on financial performance in the domestic and foreign markets. **Methods /Approach:** The relationship between the absorptive capacity of the application of new technologies and its influence on financial performance was investigated in a sample of Croatian companies. Structural equation modelling was used to investigate the relationship between absorptive capacity and financial performance. **Results:** The results of the research confirm a statistically significant relationship between the absorptive capacity of accepting new technologies and its influence on the financial performance of export companies. **Conclusion:** The analysis revealed that absorptive capacity significantly impacts the financial performance of Croatian export companies, with a stronger influence observed in foreign markets compared to domestic ones. These findings suggest that investing in the ability to absorb and apply new technologies is crucial for enhancing financial outcomes, particularly in the global marketplace.

Keywords: absorptive capacity; new digital technologies; export; export companies of the Republic of Croatia; sustainable development

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Introduction

The business that takes place today in the global international market requires timely and quick reactions to make high-quality and accurate business decisions, as well as constant innovation and quick exchange of knowledge and capital. New business models, innovations, and new digital technologies dictate business and create business conditions. Today, it is impossible to imagine a business without new digital technologies, which ensure faster and easier business, increased visibility and flexibility, and greater efficiency and productivity. In the process of digitalisation and digital transformation itself, today, an indispensable and important part is digital servitisation and digital service information, which today is an integral part of it (Marić et al., 2024). Today, digital technologies are rapidly changing and thus affect the ability of companies and the entire economy to adapt to the processes of globalisation and technological transformation (Abdulkadyrov et al., 2023). How important digital technologies are, and with them the process of digital transformation, is confirmed by the research of Zhao et al. (2024) and Liu et al. (2023) that the digital transformation of companies has a positive impact and improves the innovation performance of companies. Achieving a competitive advantage today is closely related to both digital technologies and a sustainable way of doing business, so the importance of technological development in the field of the internet and new digital technologies on the internet and their impact on sustainable development is significant (Roblek et al., 2020).

Previous research on the relationship between absorptive capacity and financial performance has consistently underscored the pivotal role of absorptive capacity in enhancing organisational innovation, competitiveness, and performance outcomes. The importance of absorptive capacity and its connection and impact on innovations and financial results is proven by Kostopoulos et al. (2011). Papazoglou and Spanos (2021) explore absorptive capacity and prove that absorptive capacity has a weak effect on financial performance. However, it gets stronger over the years if companies incorporate novel knowledge in patented inventions. The role of absorptive capacity within different technology search dimensions of high-tech manufacturing firms and innovation quality shows that absorptive capacity positively moderates the relationship between technological search and innovation quality (Duan et al., 2021). Absorptive capacity is a strong indicator related to innovation and knowledge transfer, and the effects of absorptive capacity on financial performance are directly related to the results of innovation and knowledge (Tengjian et al., 2018). It has been proven that companies that export and import largely depend on absorptive capacity, which increases productivity in the short term (Okafor, 2021). Studies have highlighted that companies with higher absorptive capacity are better positioned to leverage external knowledge, adapt to technological advancements, and achieve superior financial results. These investigations, however, have often focused on broad industry contexts and have not deeply explored the differential impact of absorptive capacity on domestic versus international financial performance.

The main aim of this research is to determine whether there is a significant difference and connection between the absorptive capacity of the application of new digital technology and the financial performance of export companies, considering such companies operate both in the domestic and foreign markets.

The survey was conducted in the territory of the Republic of Croatia, including Croatian export companies (micro, small, medium, and large), and it was conducted on a randomly selected sample of 194 export companies.

The results should influence companies' management in a better understanding and, finally, the application of new knowledge and technologies in increasing export

activities. Knowing the state of export activities and exports of export companies of the Republic of Croatia, it is possible to create the export policy of the Republic of Croatia and make quality decisions in the direction of encouraging and improving the exports of the Republic of Croatia. Moreover, export companies and their international trade of goods and services are the key factors of economic progress and the development of society as a whole. New digital technologies and their application are one of the prerequisites for creating sustainability and long-term competitiveness in the market. "In technology-based companies, analysing characteristics of entrepreneurial behaviour is relevant to increasing business performance and competitiveness throughout its life cycle" (de Freitas Michelin et al., 2023., p.55).

Many authors explore absorptive capacity and define it as the ability to recognise and use new knowledge, the ability to learn, the ability and speed of responding to changes in the environment, but also as a key component for innovation capabilities (Cohen & Levinthal,1990; Zahra & George, 2002; Malhotra et al., 2005; Kranz et al., 2016; Sancho-Zamora et al., 2022). Absorptive capacity is closely connected to firm innovation and financial performance. The absorptive capacity of a company is linked to innovation and has significant and direct relationship (Yaseen, 2020; Sancho-Zamora et al., 2021a; Sancho-Zamora et al., 2021b), but also is linked to financial performance affecting the overall firm performance (Calantone et al., 2002; Rajapathirana & Hui, 2018; Lilly & Juma, 2014; Tzokas et al.,2015; Laviniki et al., 2021). Only a few researchers confirm the relationship between absorptive capacity and export activities in a way that absorptive capacity has a significant role in linking foreign business knowledge to innovativeness and increases export performance (Ferreras-Méndez et al., 2019; Li et al., 2022; Boateng et al., 2023). The connection between digital technologies and export activities has also been proven to affect export performances (Boccia et al., 2022; Zhang & Wang, 2022; Oh & Kim, 2023; Lu et al., 2022).

This work contributes to the literature by providing empirical evidence from the specific context of Croatian export companies, illustrating that absorptive capacity not only positively influences overall financial performance but also has a more pronounced effect in international markets. By quantitatively demonstrating the varying magnitudes of absorptive capacity impact on domestic and foreign financial outcomes, this research sheds light on the strategic importance of absorptive capacity for firms operating in the global arena. It underscores the need for targeted strategies to enhance absorptive capacity as a means of boosting financial success, particularly in foreign markets, thereby offering nuanced insights into the operationalisation of absorptive capacity for international competitiveness and growth.

Literature Review

Export activities

Business models are an indispensable part of technological transformations. Therefore, their application, as well as the innovation of business models, helps and creates an advantage for companies in production and technological innovations (Phamthi and Ngominh, 2022). Both digital technologies and digital transformation are necessary prerequisites for long-term sustainability and competitiveness, and due to that, "digital technologies have a great impact on organisational strategic goals achievement" (Tomičić-Pupek et al., 2023, p.2). "It could be argued that using innovative digital tools

and digital transformation is unavoidable for most enterprises" (Hunady et al., 2022, p.40).

Export-oriented companies are more stable in their operations and ensure easier transfer of new knowledge, technologies, and capital. Exports improve the country's competitive advantages by adopting new knowledge and technologies. Studies that connect Information and Communications Technology (ICT) and new digital technologies with export activities confirm and prove the benefits and advantages of new technologies in export activities. Research conducted by Kere and Zongo (2023) suggests that ICT use, particularly internet use, has positive and significant effects on exports and negative effects on imports of primary products and total goods.

Abendin et al. (2022) find a significant positive effect of digitalisation on bilateral trade for the Economic Community of West African States (ECOWAS). The development of the digital economy has had a significant positive impact on the export competitiveness of China's manufacturing industry which was proven by Wang et al. (2023). Adeleye and Eboagu (2019) reveal that ICT development has a statistically significant positive relationship with economic growth. Oh and Kim (2023) study the process of adopting advanced digital technologies (ADTs) and found that the effect of adopting ADTs on firm performance depends on the productivity level, performance types, and technology combination. They also reveal that multiple technology adopters obtain higher rates of sales and significant export growth compared to single technology adopters (Oh & Kim, 2023).

The importance of digital technologies adaptation was examined by Zahoor and Lew (2023), who confirm that the adoption of digital technologies significantly moderates the relationship between the strategic flexibility of international strategic alliances positively and the international marketing capability of small and medium-sized enterprises. Boccia et al. (2022) explore new digital technologies (cloud computing and the use of social media), and the results show a significant relationship between the ICT capacities related to cloud adoption and export indicators. However, the use of social media appears weakly able to impact the export performance indicator. Zhang and Wang (2022) show that the improvement of digital technology level enhances the scale of digital service trade import and export significantly. The empirical evidence in research conducted by Lu et al. (2022). discovered that the enhancement in digital service level could increase the export volume of seventeen provinces that have opened China-Europe Railway Express from 2011 to 2020. Abeliansky and Hilbert (2017) confirm that ICT has a significant effect on export performance.

The focus of this research is Croatian export companies. In the Republic of Croatia, a mere 15% of all businesses, spanning micro to large enterprises, engage in export activities. Despite this small percentage, these exporting companies play a pivotal role in the national economy, being responsible for employing over half of the workforce in the private sector, making significant contributions to investment and revenue generation, and dominating development funding and profit realisation. The European Union stands as Croatia's largest trading bloc, underpinning most of its export and import transactions. Among its primary trade partners—Italy, Germany, Slovenia, and Hungary—Croatia reported significant growth in exports, highlighting the dynamic nature of its foreign trade relationships. Given its status as a "small country" with inherent economic and market constraints, it is imperative for Croatia to foster a culture of innovation and technological advancement. Embracing digitalisation and the digital transformation of its economy is seen as a strategic move to enhance its export capabilities and overall competitiveness on the global stage. By focusing on these areas, Croatia aims to overcome its technological gaps and secure

sustainable, long-term growth and development within the European Union's competitive landscape.

Absorptive capacity and financial performance

Cohen and Levinthal (1990, p.128) define "absorptive capacity as the ability of a company to identify, assimilate, and transform knowledge or adopt new knowledge from the environment into the company". To recognise new external knowledge, an organisation must have the ability to have absorptive capacity. "An organisation's absorptive capacity will depend on the absorptive capacities of its members" (Cohen & Levinthal, 1990, p.5). Dimensions of absorptive capacity, according to Cohen and Levinthal (1990), are (1) the ability to value knowledge through experience and investment, (2) the ability to assimilate, and (3) the ability to apply. According to Zahra and George (2002, p.2), absorptive capacity is "a dynamic capability about knowledge creation and utilisation that enhances a firm's ability to gain and sustain a competitive advantage. The ability to recognise, evaluate, and use external knowledge is a critical component of innovative capabilities. It leads to the absorptive capacity of a company that is necessary today for further long-term sustainable growth and development. According to Zahra and George (2002), absorptive capacity is part of two subsets: potential capacity and realised capacity. "Potential capacity comprises knowledge acquisition and assimilation capabilities, and realised capacity centres on knowledge transformation and exploitation" (Zahra & George, 2002, p.2). According to previous research and more recent data, companies with a greater absorption capacity can more easily collect information from the environment and use it in the direction of improving their performance (Sancho-Zamora et al., 2021a)

Zahra and George (2002) define four organisational capabilities that are key for creating absorptive capacity: (1) knowledge acquisition, (2) assimilation, (3) transformation, and (4) exploitation. Empirical research by Sancho-Zamora et al. (2022) proves that an essential element of absorptive capacity is the ability to learn, which enables organisations to manage knowledge better to improve the level of innovation. The combination of internal and external knowledge is a prerequisite for innovation capabilities, so Kranz et al. (2016) confirm that in developing innovative strategies, companies must recognise and apply information from the environment and use it within the organisation through their learning mechanisms to create and expand the knowledge needed to create a competitive advantage. The ability and speed of responding to changes in the environment are also largely conditioned by the absorption capacity of the company (Malhotra et al., 2005). It was also proven through the research of Zhang et al. (2015) that the existence of absorptive capacity in companies facilitates the acquisition and assimilation of new knowledge and its final application. Sancho-Zamora et al. (2021a) explore the role of proactivity in the relationship between absorptive capacity and performance and prove that companies that are proactive and use external knowledge and information can expect better performance.

This paper also deals with financial performance, which can be connected with firm performance. Financial performance is just one of the factors that affect the overall performance of a firm. Firm performance is a result that several factors can determine. Different authors define and approach firm performance differently. Calantone et al. (2002) believe that the innovativeness of the company and its orientation towards learning contribute greatly to its performance. They have also proven that earning orientation improves firm performance, i.e. business performance (return on investment (ROI), return on assets (ROA), return on sales (ROS), and overall

profitability) (Calantone et al., 2002). Rajapathirana and Hui (2018) measured firm performance as a set of three measures: (1) innovation performance, (2) market performance, and (3) financial performance. Venkatraman and Ramanujam (1986) state that organisational performance has two main elements: financial performance and operational performance, which consist of market share and quality. However, when we talk about financial performance, it will be conditioned by several non-financial elements of the corporate management of the organisation, the satisfaction of stakeholders (e.g. customers), which later leads to financial performance (Gunday et al. 2011). Interesting research was conducted by Flatten et al. (2011, p.137) indicating that "strategic alliances of small and medium-sized companies mediate both the relationship between absorptive capacity and firm performance and the relationship between each dimension of absorptive capacity and firm performance". The connection of digital (smart) technologies with operational performance was proven in the study by Lee et al. (2023), where the achievement of operational excellence is correlated with digital (smart) technologies.

Previous research indicated that innovation and financial performance are closely related, and this has also been confirmed through research (Lilly and Juma, 2014), which proves their positive relationship. Innovation is a dimension that provides companies with long-term sustainable growth and development. Recognition and assimilation through the absorption capacity that companies have can maintain and increase the knowledge needed for innovation in the long term, thus influencing financial performance. The relationship between absorptive capacity and innovation is linked in research that observes the potential and realised absorptive capacity of a company and proves that the potential and realised absorptive capacity have a significant and direct relationship with the innovative performance of the company (Yaseen, 2020). Research was conducted that proves the positive effect of absorptive capacity on the innovative ability of a company, which ultimately leads to positive business performance (Sancho-Zamora et al., 2021; Sancho-Zamora et al., 2021b).

It was also confirmed that absorptive capacity, in combination with the application of new technologies in high-tech companies, contributes to better performance in terms of new product development, market performance, and profitability (Tzokas et al.,2015). Previous research has proven that absorptive capacity affects high-tech companies. In contrast, the same has been proven in sectors with low technological intensity and confirmed that absorptive capacity affects and has a positive effect on the financial performance of companies in the mentioned sectors (Laviniki et al., 2021). Boateng et al. (2023) deal with absorptive capacity and prove that absorptive capacity has a significant role in linking foreign business knowledge to innovativeness. Entering foreign markets is not easy, especially for small and medium-sized enterprises, but research by Ferreras-Méndez et al. (2019) shows that a focus on cooperation with industrial partners contributes to increasing the company's absorptive capacity and export performance.

Research carried out in the territory of the Republic of Croatia proves that higher levels of absorptive capacity drive innovation, which is especially noticeable in companies that are exporters. Research carried out in China shows that absorptive capacity is an important factor in promoting innovation and has an important intermediary role in the positive impact of export activities (Li et al., 2022). However, to our best knowledge, the relationship between absorptive capacity and the financial performance of export companies has not been thoroughly investigated in the territory of the Republic of Croatia.

Methodology

Research Instrument

This research aims to examine the relationship between the absorptive capacity of the application of new technologies and its influence on the financial performance of Croatian export companies. Until now, this area has been mostly conceptualised through the literature, while there are very few related research instruments, and the above provides the motive and challenge for this research. The research constructs from Tables 1 and 2 are (1) absorptive capacity of the application of new technologies (AK), (2) financial performance (export activity) of Croatian export companies (FIN), measured by Likert scale (1—strongly disagree, 5—strongly agree).

Table 1

Construct of measuring the absorptive capacity of the application of new technologies (AC)

Code	Particle
AC1	We regularly organise learning groups to discuss the consequences of new knowledge.
AC2	We have special mechanisms to solve conflicts when employees have different understandings and interpretations of new knowledge.
AC3	We have special procedures for employees to share knowledge and practical experiences.
AC4	We have special training programs that help employees grasp new knowledge.
AC5	Our employees frequently make product and process improvement suggestions based on new knowledge.
AC6	We periodically review our long-term forecasting (e.g. market trends and technology development) based on new knowledge.
AC7	We have systematic procedures for implementing new knowledge to develop new products.
AC8	We constantly consider how to exploit knowledge better.

Source: author's work according to Zhang et al., 2015.

Table 2

Construct of measuring the financial performance at foreign and domestic markets of Croatian export companies (FIN_FOREIGN & FIN_DOMESTIC)

Code	Particle
	Financial performance at foreign markets (FIN_FOREIGN)
FIN1	Considering the overall economic picture, our export activity to foreign markets has increased.
FIN3	Considering the overall economic picture, our total revenue in the foreign market has increased.
FIN5	Considering the overall economic picture, our profit in the foreign market has increased.
FIN7	Considering the overall economic picture, our share in the foreign market has increased.
	Financial performance at foreign markets (FIN_DOMESTIC)
FIN2	Considering the overall economic picture, our activity in the domestic market has increased.
FIN4	Considering the overall economic picture, our total revenue in the domestic market has increased.
FIN6	Considering the overall economic picture, our profit in the domestic market has increased.
FIN8	Considering the overall economic picture, our share in the domestic market has increased.

Source: author's work

Research model and data analysis

Based on all the above in the previous sections, the importance of absorptive capacity and recognising and applying new digital technologies in business, especially in foreign markets, is obvious.

To test the set research hypotheses, the main research question was asked:

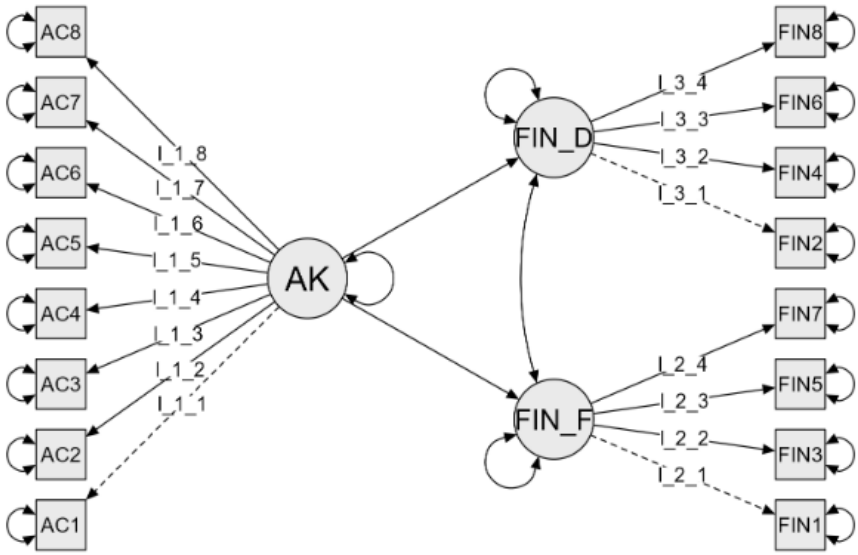
- *RQ0: Is there a statistically significant relationship between the absorptive capacity of the application of new technology and the financial performance at domestic and foreign markets of export companies?*

Based on the research conducted in the Republic of Croatia and regarding the concept of absorptive capacity and financial performance of export companies, the following research propositions are being defined:

- *RP1: Absorptive capacity of the application of new technology (AC) affects financial performance at domestic markets (FIN-DOMESTIC) in export companies of the Republic of Croatia.*
- *RP2: Absorptive capacity of the application of new technology (AC) affects financial performance at foreign markets (FIN-FOREIGN) in export companies of the Republic of Croatia.*

Figure 1 presents the research model.

Figure 1
Research model



Source: Author's work

The study operationalises absorptive capacity (AC) as a latent variable, measured through indicators that capture the extent to which firms acquire, assimilate, transform, and exploit new technologies to enhance their performance. Financial performance in domestic (FIN-DOMESTIC) and foreign (FIN-FOREIGN) markets is also operationalised as latent variables, with indicators derived from financial statements and performance metrics specific to each market context. Data collection involved a survey administered to a representative sample of Croatian export companies, complemented by financial data extracted from verified databases.

The Confirmatory Factor Analysis (CFA) served to validate the measurement model, ensuring the constructs' reliability and validity. Following this, Structural Equation Modeling (SEM) was performed to test the proposed relationships between AC and financial performance in domestic and foreign markets. Model fit was assessed using

several fit indices, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), as recommended by contemporary SEM literature for their sensitivity to model misfit.

Data collection

In Croatia, only 15% of companies are exporters, yet these firms are crucial to the economy, employing 51% of the workforce, generating 66% of total sales revenue, and contributing 73% to development investments. According to 2022 data, Croatia's exports grew by 30.4% to €23.96 billion, while imports increased by 46.4% to €41.57 billion, leading to a €17.6 billion trade deficit. The EU remains Croatia's main trading partner, accounting for over two-thirds of both exports and imports. Key trade partners include Italy, Germany, Slovenia, and Hungary, with notable increases in exports to these countries. As a "small country" with economic and market limitations, Croatia is encouraged to invest in new technologies and digital transformation to boost competitiveness and export excellence, addressing the need for sustainable growth and avoiding technological lag behind EU counterparts.

The research was conducted in the Republic of Croatia on a random sample of 194 export companies (micro (38%), small (25%), medium (18%), and large (19%) divisions according to the Croatian Accounting Law). To test the set research propositions, a primary sample survey was conducted using the structured survey questionnaire method (online survey questionnaire). The questionnaire was sent online to 500 randomly selected addresses from the Croatian Chamber of Commerce's register of exporters (the register of Croatian exporters numbers 1,243 companies). This research combines the absorptive capacity of the application of new digital technologies and their relation to financial performance, i.e., the export of Croatian export companies.

Results

Descriptive statistics

Table 3 presents the descriptive statistics for the manifest variables related to absorptive capacity (AC) and financial performance in both foreign (FIN_FOREIGN) and domestic (FIN_DOMESTIC) markets. The analysis includes data from 194 respondents, encompassing a range of variables from AC1 to AC8 for absorptive capacity and FINANC1 to FINANC8 for financial performance, with each measured on a Likert scale from 1 to 5, where 1 indicates strong disagreement, and 5 indicates strong agreement with the statements provided.

For absorptive capacity (AC), the variables AC1 through AC8 exhibit mean values ranging from 2.964 (AC2) to 3.510 (AC7), indicating a moderate level of agreement among respondents regarding the company's ability to absorb and apply new technologies. Standard deviations for these variables range from 1.095 to 1.260, reflecting a moderate dispersion of responses. The minimum and maximum values across these items are 1.000 and 5.000, respectively, showcasing the full range of response options utilised by participants.

In terms of financial performance in foreign markets (FIN_FOREIGN), the variables FINANC1, FINANC3, FINANC5, and FINANC7 show mean values between 3.320 and 3.397, suggesting a moderately positive perception of financial performance in foreign markets. The standard deviation for these items ranges from 1.166 to 1.222, indicating a similar variability in responses as seen with the AC variables. The range for these variables also spans from 1.000 to 5.000.

For financial performance in domestic markets (FIN_DOMESTIC), the variables FINANC2, FINANC4, FINANC6, and FINANC8 display mean values from 3.026 (FINANC6) to 3.278 (FINANC2), slightly lower on average than those for foreign markets, which could suggest a nuanced difference in perceived performance across market types. The standard deviations for these variables, ranging from 1.101 to 1.191, are comparable to those of the AC and FIN_FOREIGN variables, reflecting a consistent level of response variability across all categories. The minimum and maximum values mirror those of the other groups, with all respondents utilising the full response scale.

This descriptive analysis provides an initial overview of the data, revealing moderate agreement with the variables associated with absorptive capacity and financial performance, with a notable range of responses indicated by the standard deviations. The data also hint at a slightly more favourable perception of financial performance in foreign markets compared to domestic ones among the participating Croatian export companies. These findings set the stage for further inferential analysis to test the proposed relationships between absorptive capacity and financial performance in these companies.

Table 3
Descriptive statistics of manifest variables

	Valid	Mean	Std. Deviation	Minimum	Maximum
Absportptive capacity (AC)					
AC1	194	3.113	1.095	1.000	5.000
AC2	194	2.964	1.098	1.000	5.000
AC3	194	3.320	1.260	1.000	5.000
AC4	194	3.072	1.189	1.000	5.000
AC5	194	3.273	1.166	1.000	5.000
AC6	194	3.469	1.107	1.000	5.000
AC7	194	3.510	1.223	1.000	5.000
AC8	194	3.361	1.126	1.000	5.000
Financial performance at foreign markets (FIN_FOREIGN)					
FIN1	194	3.345	1.169	1.000	5.000
FIN3	194	3.387	1.183	1.000	5.000
FIN5	194	3.320	1.222	1.000	5.000
FIN7	194	3.397	1.166	1.000	5.000
Financial performance at foreign markets (FIN_DOMESTIC)					
FIN2	194	3.278	1.158	1.000	5.000
FIN4	194	3.144	1.191	1.000	5.000
FIN6	194	3.026	1.122	1.000	5.000
FIN8	194	3.077	1.101	1.000	5.000

Source: author's work

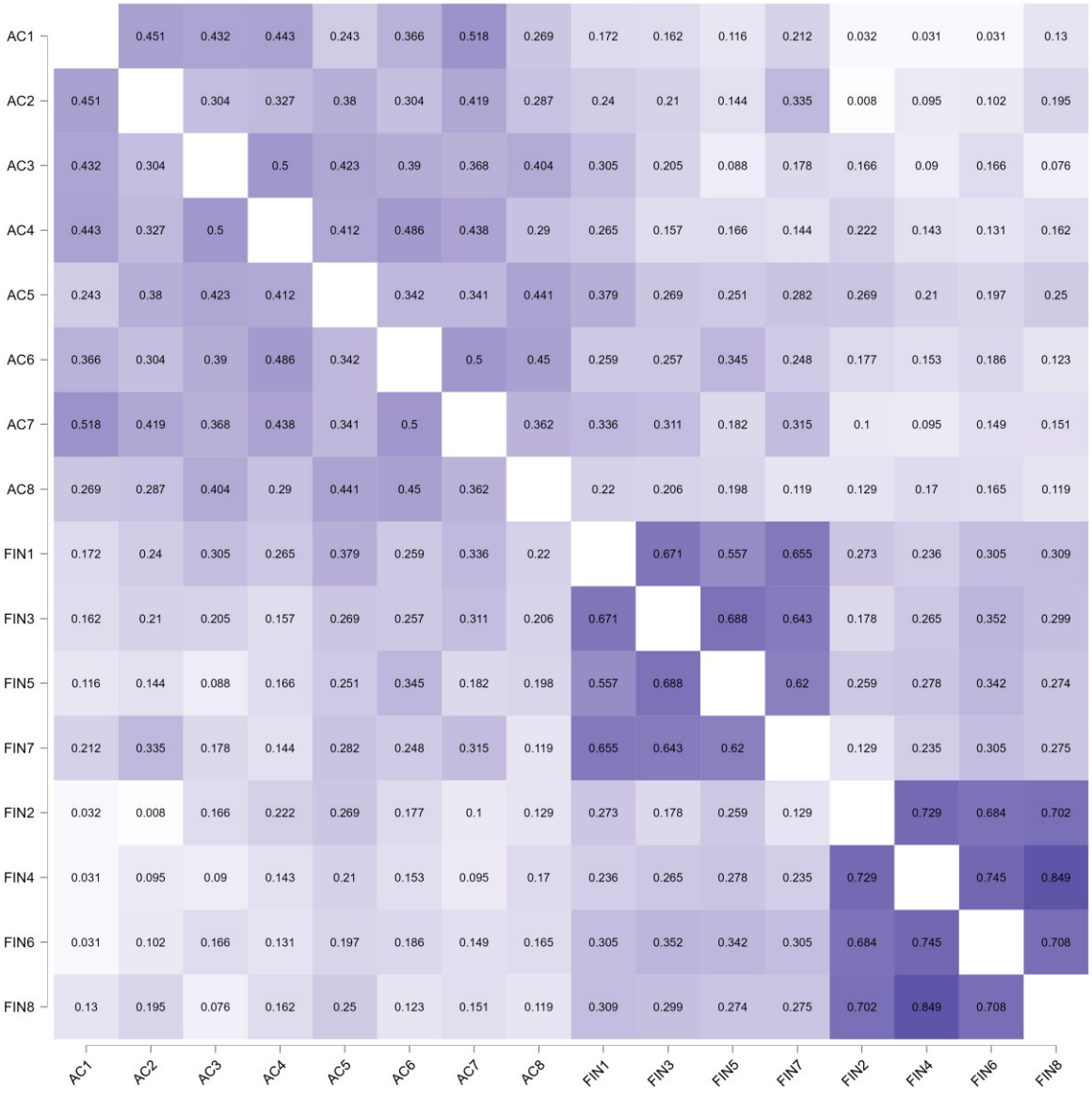
Figure 2 presents the heatmap of Pearson's correlations. Appendix 1 provides a detailed analysis of Pearson's correlation. Significant correlations were observed between variables measuring absorptive capacity and financial performance in Croatian export companies, both in domestic and international contexts. The study revealed a consistent positive relationship between indicators of absorptive capacity and financial performance in foreign markets, indicating that companies with higher absorptive capacity tend to achieve better financial outcomes abroad. This relationship is underscored by moderate Pearson's r values and highly significant p-values, suggesting a robust link between the ability to assimilate and apply new knowledge and international financial success.

Additionally, the analysis highlighted a strong positive correlation within the absorptive capacity variables themselves, exemplifying the coherence of the absorptive capacity construct. This internal consistency within the measures of absorptive capacity suggests a closely integrated relationship between its various dimensions. Similarly, financial performance metrics, especially those related to foreign markets, demonstrated high internal consistency, indicating that these variables effectively capture the financial achievements of firms in international arenas.

These findings lend empirical support to the theoretical proposition that absorptive capacity is a crucial determinant of financial performance, particularly in foreign markets. They also affirm the reliability of the constructs used to measure both absorptive capacity and financial performance, highlighting the importance of knowledge absorption capabilities in enhancing a firm's financial success across different market environments.

Figure 2

Pearson's r heatmap



Source: author's work

Confirmatory factor analysis

Table 5 presents the results of the Chi-square (χ^2) test as part of the confirmatory factor analysis conducted to examine the research propositions of the model. In the provided analysis, two models are compared: the Baseline model and the Factor model.

The Baseline model, often representing the null model where all variables are uncorrelated, exhibits a χ^2 value of 1680.382 with 120 degrees of freedom. The substantial χ^2 value suggests a significant discrepancy between the expected and observed data, implying a poor fit of the Baseline model to the data.

Conversely, the Factor model, which represents the proposed structure of latent variables underlying the observed variables, shows a markedly improved fit with a χ^2 value of 230.176 and 101 degrees of freedom, achieving statistical significance with a p-value less than .001.

The results, particularly the significant p-value associated with the Factor model, support the proposed structure of relationships among the variables under investigation. The Maximum Likelihood (ML) estimator used in this analysis further reinforces the robustness of these findings.

Table 5
Chi-square test

Model	X^2	df	p
Baseline model	1.680.382	120	
Factor model	230.176	101	< .001

Note. The estimator is ML; Source: Authors' work

Table 6 displays various fit indices for evaluating a structural model's alignment with observed data. The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values are 0.917 and 0.902, respectively, indicating a good model fit as both exceed the commonly accepted threshold of 0.9.

The Root Mean Square Error of Approximation (RMSEA) stands at 0.081, with its 90% confidence interval ranging from 0.067 to 0.095, suggesting a moderate fit; values closer to 0.06 are preferred, but up to 0.08 are acceptable. The RMSEA's significance level further substantiates the model's adequacy.

The Standardized Root Mean Square Residual (SRMR) is 0.056, well below the 0.08 benchmark, denoting a satisfactory model fit. Lastly, the Goodness of Fit Index (GFI) at 0.965 exceeds the 0.95 standard, confirming an excellent fit. Overall, these indices collectively affirm a strong model fit to the data.

Table 6
Fit measures

Index	Value
Comparative Fit Index (CFI)	0.917
Tucker-Lewis Index (TLI)	0.902
Root mean square error of approximation (RMSEA)	0.081
RMSEA 90% CI lower bound	0.067
RMSEA 90% CI upper bound	0.095
RMSEA p-value	2.017×10-4
Standardised root mean square residual (SRMR)	0.056
Goodness of fit index (GFI)	0.965

Source: author's work

Table 7 presents the factor loadings for the absorptive capacity (AC) and financial performance (FIN_FOREIGN and FIN_DOMESTIC) indicators, all showing strong and significant associations with their respective latent factors, as evidenced by high estimates and very low p-values (< .001).

The z-values, all above critical values, indicate robust statistical significance across all indicators.

Table 7
Factor loadings

Factor	Indicator	Estimate	Std. Error	z-value	p
AC	AC1	0.679	0.077	8.845	< .001
	AC2	0.611	0.078	7.784	< .001
	AC3	0.803	0.087	9.186	< .001
	AC4	0.794	0.081	9.758	< .001
	AC5	0.684	0.083	8.255	< .001
	AC6	0.735	0.076	9.694	< .001
	AC7	0.841	0.083	10.131	< .001
	AC8	0.630	0.081	7.819	< .001
FIN_FOREIGN	FIN1	0.923	0.073	12.574	< .001
	FIN3	0.999	0.072	13.898	< .001
	FIN5	0.941	0.077	12.150	< .001
	FIN7	0.919	0.073	12.536	< .001
FIN_DOMESTIC	FIN2	0.913	0.070	12.949	< .001
	FIN4	1.106	0.066	16.839	< .001
	FIN6	0.902	0.068	13.347	< .001
	FIN8	0.991	0.062	15.986	< .001

Source: author's work

Structural equation modeling

Table 8 provides the results of the structural equation model analysis, showcasing the impact of absorptive capacity (AC) on financial performance in domestic (FIN_DOMESTIC) and foreign (FIN_FOREIGN) markets for Croatian export companies.

The regression coefficients indicate a positive and significant relationship between AC and financial performance in both contexts. Specifically, a unit increase in AC leads to a 0.324 increase in financial performance domestically and a more substantial 0.614 increase internationally. These outcomes are statistically significant, as evidenced by p-values of 0.004 and less than .001, respectively, and confirm both hypotheses H1 and H2.

The R-squared values of 0.058 for domestic performance and 0.204 for foreign performance suggest that while AC explains a moderate portion of the variance in financial outcomes, its impact is notably stronger in foreign markets. This difference highlights the potentially greater importance of absorptive capacity for achieving success abroad compared to domestic markets.

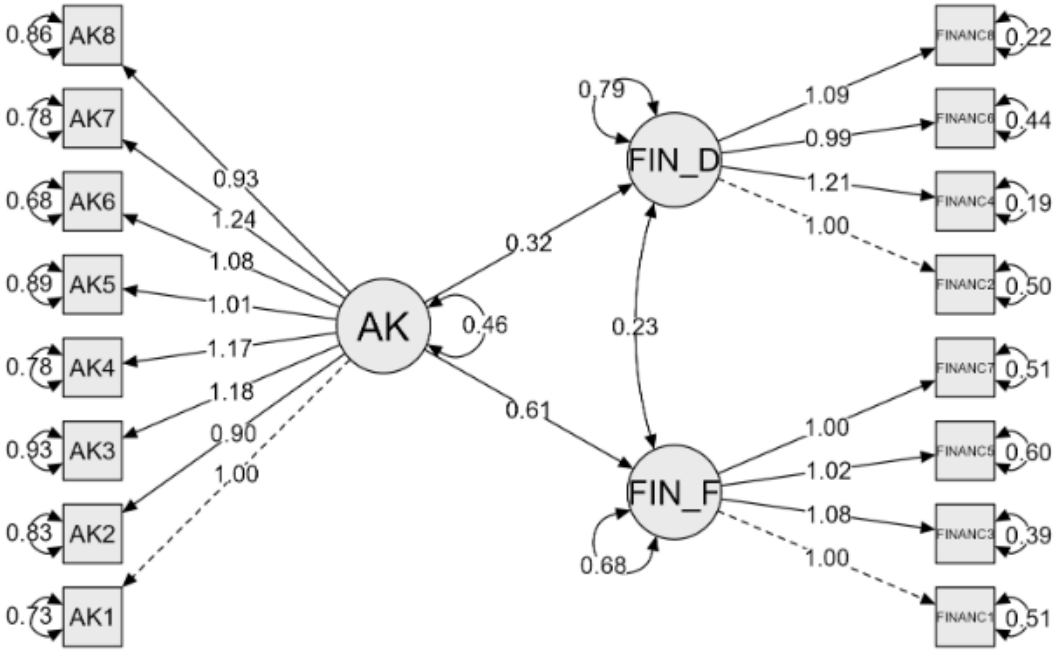
The findings confirm that the ability to apply new technology, measured by absorptive capacity, improves company earnings, especially in overseas markets, indicating that being innovative is particularly valuable for international success. Figure 3 presents the estimated model.

Table 8
Regression coefficients and r-squared of structural equation model

Predictor	Outcome	Estimate	Std. Error	z-value	p	R-squared	Research propositions
AC	FIN_DOMESTIC	0.324	0.112	2.883	0.004***	0.058	RP1-confirmed
	FIN_FOREIGN	0.614	0.125	4.916	< .001***	0.204	RP2-confirmed

*Note: *** statistically significant at 1% level; Source: Author's work*

Figure 3
Estimated model



Source: Author's work

Discussion

In this paper, the concept of absorptive capacity and its role in the acquisition, assimilation, transformation, and exploitation of new technology, as well as the financial performance of export companies of the Republic of Croatia and its connection, was tested based on the set research model to confirm the research hypotheses. Two hypotheses were set: H1: Absorptive capacity of the application of new technology affects financial performance at domestic markets in export companies of the Republic of Croatia; H2: Absorptive capacity of the application of new technology affects financial performance at foreign markets in export companies of the Republic of Croatia. The study operationalises the absorptive capacity and financial performance in domestic and foreign markets as latent variables. The study revealed a consistent positive relationship between indicators of absorptive capacity and financial performance in foreign markets, indicating that companies with higher absorptive capacity tend to achieve better financial outcomes abroad. The analysis highlighted a strong positive correlation within the absorptive capacity variables themselves (high internal consistency) but also

demonstrated high internal consistency regarding financial performance metrics, especially those related to foreign markets. Through Structural equation modelling, the regression coefficients indicate a positive and significant relationship between absorptive capacity and financial performance in both contexts and confirm both hypotheses H1 and H2. These findings confirm that the ability to apply new technology, measured by absorptive capacity, improves company earnings, especially in overseas markets, indicating that being innovative is particularly valuable for international success.

Through this paper, the importance and benefits of absorptive capacity and its relation to financial performance are highlighted and proven. Absorptive capacity is an important factor for a company to be able to absorb and use both internal and external information and resources in the function of long-term sustainable growth and development. According to data by conducted research, it can be partly connected to research by Zhai et al. (2018) that explore and claim that companies that have a high absorption capacity can exchange information from the environment and within the organisation faster and with better quality, and with existing knowledge promote the transformation of new knowledge thus improve company innovation performance. Ma et al. (2021) also prove that absorptive capacity has a positive effect on firm performance. Cuevas-Vargas et al. (2022), through their research, prove that ICT adoption has a significant impact on absorptive capacity and thus has an influence on greater business performance. All of the previous research mentioned in this paper also explores, connects, and proves the relationship between absorptive capacity and financial (firm) performance, but very few of them connect absorptive capacity with financial outcomes abroad. Due to that, this research reveals that absorptive capacity is a crucial determinant of financial performance, particularly in foreign markets.

The process of recognising and strengthening absorptive capacity lies in, as already mentioned, knowledge acquisition, assimilation, transformation, and exploitation. The absorptive capacity is expected to experience even greater recognition and use by managers because it is the key element that contributes to the recognition of new knowledge and, thus, better positioning on the market. Having in mind the primary goal and purpose of the absorptive capacity, which is to provide the effectiveness of knowledge (both internal and external), opens up vast opportunities for its wider use in numerous domains and areas to understand the importance of knowledge and its contribution to the firm performance in this case financial performance in foreign markets. The absorptive capacity was observed in this paper in the context of new digital technologies and the willingness and ability of the company to recognise new technologies on the market, their integration into business, and, ultimately, their use. Absorptive capacity is a necessary organisational ability so that companies can accept new digital technologies but influence innovation performance (Kastelli et al., 2022). Their results show that digital capacity has a positive effect on innovation with the presence of absorptive capacity as a mediator (Kastelli et al., 2022). Also, authors Rauniar et al. (2023) emphasise the importance of using absorptive capacity during the initial phase of the adoption of new digital technology. Regarding all the factors mentioned above and due to research conducted, organisations nowadays cannot be competitive, sustainable, recognisable, productive, and successful without their absorptive capacity.

Doing business in a foreign market ensures the long-term growth and development of the company, and its long-term sustainability affects the overall growth and development of an economy. Nowadays, it is impossible to do business without the application of new digital technologies. By researching the key predictors for export

activities, it was proven that absorptive capacity, i.e. the dimension of potential absorptive capacity (external acquisition of knowledge) and the dimension of realised absorptive capacity (external application of knowledge) were confirmed in the conducted research as key factors of export performance, i.e. activities (Ahimbisibwe et al., 2016). It has also been proven that absorptive capacity, in combination with global intangible resources, has a significant impact on export results (França and Rua, 2018). New technologies bring greater visibility, recognition, and flexibility in foreign business markets and ultimately prove their impact on financial performance.

Through the empirical research conducted and the results obtained, the limitations and recommendations for future research can be stated. This is the basis for further research, so according to future interests and the intention of future research, the proposed variables through this paper can be refined but also increased or decreased. Appropriate statistical methods and tests were applied to test the set research propositions. The sample of this research included export companies in the Republic of Croatia. This research was conducted in the territory of the Republic of Croatia, so for future research in this direction, it would be good to examine export companies of neighbouring EU countries (but also beyond) and for further research even globally, which would provide a basis and a database for comparison with selected criteria and areas. Likewise, this research includes only export companies of the Republic of Croatia. In further research, it would be desirable to investigate and examine the same relationship of dependent and independent variables on domestic companies of the Republic of Croatia, but also broader. Also, for further research, it would be desirable to focus on each group of companies, separately micro, separately small, separately medium, and separately large, to examine whether there is a difference in terms of the size of the company. It would be desirable to examine the same from the perspective of the company's age and classification of activities.

Through the conducted research, certain scientific and applied goals have been achieved. A critical review of the existing research area was conducted. The paper explains the concept of absorptive capacity in general, absorptive capacity, and its role in the context of the application of new technology and connection to financial performance (export activity), all based on the sample of Croatian export companies. The analysis revealed that absorptive capacity significantly impacts the financial performance of Croatian export companies, with a stronger influence observed in foreign markets compared to domestic ones. It defines the key determinants of the absorptive capacity concept as one of the key predictors of creating and improving financial performance in the context of the application of new digital technology in export companies.

Conclusion

This study revealed a connection between the absorptive capacity of the application of new technology and the financial performance (export activity) of Croatian export companies. The survey included 194 export companies from the Republic of Croatia, making it the first research of its kind in the country to explore the connection between the absorptive capacity of the application of new digital technology and the financial performance (export activity) of Croatian export companies. Absorptive capacity is not a new concept, but it is constantly developing and is the focus of many researchers. Moreover, it can change the way companies operate, how they think, and how they seek and adopt new knowledge and new technologies. Although absorptive capacity is not a new concept, it is not recognised enough by managers and companies themselves, so it should be further explored and connected with new

knowledge, innovation, and new technologies in the desire to create a more sustainable business and sustainable organisation. Precisely in the context of sustainable development and long-term competitiveness, recent research links absorptive capacity and sustainability, whereby absorptive capacity is a strong predictor of sustainable capabilities and green innovation adoption (Aboelmaged and Hashem, 2019). The importance of knowledge and the green economy is also confirmed by Zhao et al. (2024), who use absorptive capacity as a moderator between knowledge spillover and the green economy with a positive moderation effect. Likewise, digital transformation in renewable energy companies leads to better financial results (Ren and Li, 2022).

This paper aimed to determine whether there is a statistically significant relationship between the absorptive capacity of the application of new technology and the financial performance at domestic and foreign markets of export companies. In line with theoretical assumptions and empirical results, the results of this paper confirm a positive and significant relationship between absorptive capacity and financial performance in both contexts (the financial performance at domestic and foreign markets) and confirm both hypotheses H1 and H2. At the same time, the impact is notably stronger in foreign markets. This significant scientific contribution breaks new ground for further research in this area. The results of these studies provide a better understanding of the importance of the concept of absorptive capacity in the adoption and use of new digital technologies in terms of their influence on export activity, i.e., financial performance in foreign markets.

The impact of this research is visible in the awareness of both researchers and managers of export companies of the importance of absorptive capacity in the context of new digital technology influencing financial performance (export activity). Due to the research results, it can be stated that its impact represents a new research model that combines absorptive capacity in the context of new technology adoption and the financial performance of export companies. The importance of digitalisation that is connected to digital technologies and absorptive capacity is investigated by the authors Abou-foul et al. (2021), where they prove that digitisation and servitisation have a direct and positive effect on the financial performance of companies (Marić et al., 2024). The impact of digital transformation, along with indispensable digital technologies, on the financial performance of companies has also been proven in research by Li et al. (2023). It is the understanding of the concept of absorptive capacity and its importance that can have an impact on financial performance, thus affecting the sustainable development of the organisation, especially in the field of export, i.e., the export activities of a company. This research is the first to show the results of this type in the Republic of Croatia and beyond, where it can argue about the great importance and impact of the presented results that can indicate the importance of absorptive capacity and its role in the context of the application of new technology and connection to financial performance in the field of export, i.e. companies export activities.

This research shows the great impact of the absorptive capacity of accepting new digital technologies on the financial performance of export companies, which should be given more attention in the near future among managers of export companies (but also domestic ones) and among researchers in this field and all stakeholders. Knowledge sharing as one of the components of absorptive capacity has been proven to be essential for stakeholders' understanding of business in general and the details of business processes (Riana et al.,2019). An important role of absorptive capacity is also the influence on innovative behaviour, which is closely related to and affects financial performance (Kang and Lee, 2017). The obtained research results

can be used to expand the current knowledge about the absorptive capacity concept and its connection to the financial performance (export activities) of a company in the function of creating sustainable development and growth in the field of export.

Contribution to existing knowledge is obvious when presenting and testing a set of research propositions. The presented research and used constructs have not been included and connected in any research so far, which improves the current state of the research area. The existing knowledge about the absorptive capacity concept in this research has been expanded, including knowledge about its importance and impact on financial performance. Through the applicative contribution of this paper, the idea was to make the managers of the Republic of Croatia aware of the importance of identifying, assimilating, and transforming knowledge or adopting new knowledge from the environment into the company to affect financial performance. The manager's role is to build good relationships with other stakeholders to improve and influence their open innovations (Naqshbandi, 2016), which consequently affects the absorptive capacity. Again, with the importance of sustainable development, it has been proven that managers play an important role in recognising and acquiring external knowledge, thereby developing ecological competencies, while on the other hand, organisations that can assimilate, transform, and exploit knowledge develop ecological competences (Dzhengiz & Niesten, 2020). This research should be considered a review of the current status due to the research conducted and an overview of the concept of absorptive capacity, digital technologies, export activities, and financial performance. The obtained results can provide valuable inputs for future research but also expand the current research with new constructs that can capture the conceptual differences between the current research and its construct as well as a potential new one.

In conclusion, there are many opportunities for future investigation and methodological approaches to the absorptive capacity concept in many areas related to this research. By analysing the relevant scientific literature and the results of the conducted research, it is possible to conclude that many researchers deal with the absorptive capacity they observe and investigate in the context of new knowledge and innovations (Lilly & Juma, 2014; Zhang et al., 2015; Kranz et al., 2016; Yaseen, 2020; Sancho-Zamora et al., 2021,b). Likewise, researchers have recognised and are investigating the importance of ICT and its impact on increasing export activities (Adeleye & Eboagu, 2019; Boccia et al., 2022; Kere & Zongo, 2023; Zahoor & Lew, 2023) while this research connects these two essential elements, absorptive capacity and financial performance, i.e. export activities.

Doing business in international markets and being involved in the global market are significant prerequisites and factors that contribute to the success and competitiveness of a country. The internationalisation and globalisation of the market open up space for export-oriented companies, which creates opportunities for domestic companies in terms of their greater recognition, visibility, sustainable development, and competitiveness. For companies to achieve their market growth, both locally and globally, they need to develop strategies and find ways to strengthen their export activities, thereby influencing the increase in their operational efficiency and profitability, as well as the competitiveness of the entire economy. Due to all the above, it is necessary to mention that "CEE countries' exports have been supported by improved technological competitiveness, especially innovative outputs (patents)" (Bierut & Kuziemska-Pawlak, 2017, p.522). Finally, this research depicts directions that should be investigated in future work. Although the concept itself is not relatively new,

it still requests further systematic investigation and research in this area, further recognition, and application.

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Appendix 1

Pearson's Correlations

Variable		AC1	AC2	AC3	AC4	AC5	AC6	AC7	AC8	FIN1	FIN3	FIN5	FIN7	FIN2	FIN4	FIN6	FIN8
1. AC1	Pearson's r	—															
	p-value	—															
2. AC2	Pearson's r	0.451	—														
	p-value	< .001	—														
3. AC3	Pearson's r	0.432	0.304	—													
	p-value	< .001	< .001	—													
4. AC4	Pearson's r	0.443	0.327	0.500	—												
	p-value	< .001	< .001	< .001	—												
5. AC5	Pearson's r	0.243	0.380	0.423	0.412	—											
	p-value	< .001	< .001	< .001	< .001	—											
6. AC6	Pearson's r	0.366	0.304	0.390	0.486	0.342	—										
	p-value	< .001	< .001	< .001	< .001	< .001	—										
7. AC7	Pearson's r	0.518	0.419	0.368	0.438	0.341	0.500	—									
	p-value	< .001	< .001	< .001	< .001	< .001	< .001	—									
8. AC8	Pearson's r	0.269	0.287	0.404	0.290	0.441	0.450	0.362	—								
	p-value	< .001	< .001	< .001	< .001	< .001	< .001	< .001	—								
9. FIN1	Pearson's r	0.172	0.240	0.305	0.265	0.379	0.259	0.336	0.220	—							
	p-value	0.017	< .001	< .001	< .001	< .001	< .001	< .001	0.002	—							
10. FIN3	Pearson's r	0.162	0.210	0.205	0.157	0.269	0.257	0.311	0.206	0.671	—						
	p-value	0.024	0.003	0.004	0.029	< .001	< .001	< .001	0.004	< .001	—						
11. FIN5	Pearson's r	0.116	0.144	0.088	0.166	0.251	0.345	0.182	0.198	0.557	0.688	—					
	p-value	0.107	0.045	0.222	0.021	< .001	< .001	0.011	0.006	< .001	< .001	—					
12. FIN7	Pearson's r	0.212	0.335	0.178	0.144	0.282	0.248	0.315	0.119	0.655	0.643	0.620	—				
	p-value	0.003	< .001	0.013	0.046	< .001	< .001	< .001	0.098	< .001	< .001	< .001	—				
13. FIN2	Pearson's r	0.032	0.008	0.166	0.222	0.269	0.177	0.100	0.129	0.273	0.178	0.259	0.129	—			
	p-value	0.656	0.913	0.021	0.002	< .001	0.014	0.164	0.073	< .001	0.013	< .001	0.074	—			
14. FIN4	Pearson's r	0.031	0.095	0.090	0.143	0.210	0.153	0.095	0.170	0.236	0.265	0.278	0.235	0.729	—		
	p-value	0.667	0.187	0.212	0.047	0.003	0.033	0.188	0.018	< .001	< .001	< .001	< .001	< .001	—		
15. FIN6	Pearson's r	0.031	0.102	0.166	0.131	0.197	0.186	0.149	0.165	0.305	0.352	0.342	0.305	0.684	0.745	—	
	p-value	0.664	0.158	0.020	0.069	0.006	0.009	0.038	0.022	< .001	< .001	< .001	< .001	< .001	< .001	—	
16. FIN8	Pearson's r	0.130	0.195	0.076	0.162	0.250	0.123	0.151	0.119	0.309	0.299	0.274	0.275	0.702	0.849	0.708	—
	p-value	0.070	0.006	0.295	0.024	< .001	0.087	0.035	0.097	< .001	< .001	< .001	< .001	< .001	< .001	< .001	—

Source: author's work