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Review Paper

Analysis of the Vectors of Digital Transformation of Retail Trade in Ukraine: Determination Methodology and Trends

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ABSTRACT

This study was conducted for the retail trade; approaches to determining changes in retail trade under the influence of digitalisation of socio-economic processes were established. The purpose of the research was to analyse the vectors of digitalisation in the field of digital trade in Ukraine. The main methods used in the study were analysis, deduction, forecasting, abstraction, modelling, etc. The study analysed the main factors influencing the development of digital transformation in Ukraine. Using the developed model, it was demonstrated that technological and behavioural factors have the greatest impact; they force retailers to actively adapt to the environment and find new methods of introducing innovations into their business models. Other factors, such as socio-economic or institutional, have a much smaller impact on retail innovation. In addition, the study evaluates the interdependence of consumer needs and relevant innovations in the field of innovation and describes how certain companies have used the latest technologies to improve the quality of their business.

HIGHLIGHTS

- The aim of the article is to analyze the vectors of digitalization in the retail trade sector in Ukraine. The study emphasizes the significant impact of technological and behavioral factors, highlighting the need for retailers to adapt and innovate. It also explores the interdependence between consumer needs and relevant innovations in the retail sector. The research contributes to the understanding of digital transformation in Ukraine's retail industry and its specific features within the broader context of innovation and business sectors.

Keywords: Entrepreneurship, Innovations, Digitalization, New Technologies, Macroeconomics

Retail trade is a special type of activity: it is focused on the end consumer and has an exogenous nature of development (Jacques and Sandgren, 2018; Alderighi, 2018). Digital transformation in this industry is considered in two ways: on the one hand, it is a catalyst for changes in the marketing environment (and its corresponding impact on the business of such enterprises), and on the other hand, it is a change in operational marketing processes (Gouveia and Mamede, 2022; Cakir *et al.* 2021). Considering the development of digitalisation in most sectors of the economy, evidently, its spread in trade will be rapid (Purnomo *et al.* 2022; Limna *et al.* 2023). It is explained by the growing demands of consumers for quality and speed of service and changes in the specifics of demand development. One of the most effective methods of meeting this demand is the transition to digital business technologies (Savytska *et al.* 2022; Proskurnina *et al.* 2021).

Indeed, such technologies offer many benefits

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(Haleem *et al.* 2022; Urbanova *et al.* 2022). Using a mobile phone, a customer can contact sales staff for advice at any time and obtain the most relevant and important information about the store. Marketplaces use digital technologies to recognise and greet customers, search for products, guide customers and provide product information, reward loyalty and quickly calculate purchase prices (Jianga and Stylos, 2021; Shtal *et al.* 2021).

A significant number of scholars have analysed the development of digital transformation in Ukraine. V.P. Yanovska *et al.* (2019) focused on the digitalisation of the Ukrainian economy and changes in the business models of its enterprises. Scientists note the existing potential for the development of the IT sector and science in general in Ukraine, although they conduct a rather superficial analysis and do not provide practical advice for the development of this area. I. Shevchenko *et al.* (2022) explored the specifics of digital trade in the UK and found opportunities to use its experience for Ukraine. Yu.H. Humenna and O.Yu. Hura (2021) assessed the current realities of the introduction of innovative technologies at enterprises and explored the concept of e-commerce in the country.

The purpose of this research is to develop a methodology for identifying and analysing the vectors of digital transformation of retail trade in Ukraine. It will allow national enterprises to operate more efficiently in this area in the future and will present new opportunities for the state to develop its policy.

MATERIALS AND METHODS

A model has been developed to examine the impact of digital transformation on the activities of digital commerce representatives included an analysis of a list of factors (technological – T, institutional – I, socio-economic – SE, and behavioural – B) that became catalysts for changes in the macro environment. Using this model allowed identifying the driving force that changes the foundation of the specific features of functioning between the retailer and the consumer, and systematising the results of expert assessments of the impact of the signs of factor changes on the current development of retail trade.

To conclude, the researchers used the calculated indicators using separate formulas. Thus, the following formula was used to determine the level of importance of the factor attributes (1):

$$Z_{F_i} = \sum_{j=1}^{m} \left(W_{F_{ij}} \times a_{F_{ij}} \right) \quad \ldots(1)$$

where: Z_{Fi} – evaluation of the importance of the factor attribute; w_{Fij} – the calculated coefficient of the j feature of the factor attribute F_i; a_{Fij} – the evaluation of the j feature of the factor features F_i.

The rank of the factor attribute was calculated as follows (2):

$$Q_{Z_{Fi}} = \frac{Z_{F_i}}{\sum Z_{Fi}} \quad \ldots(2)$$

where: ΣZ_{Fi} – the sum of the importance values of the j attribute of the factor attribute F_i; Q_{ZFi} – the rating rank of the factor attribute F_i.

The standardised impact score was calculated using the following formula (3):

$$N_{F_i} = \sum_{i=1}^{n} \left(V_{F_i} \times d_V \right) \times Q_{Z_{Fi}} \quad \ldots(3)$$

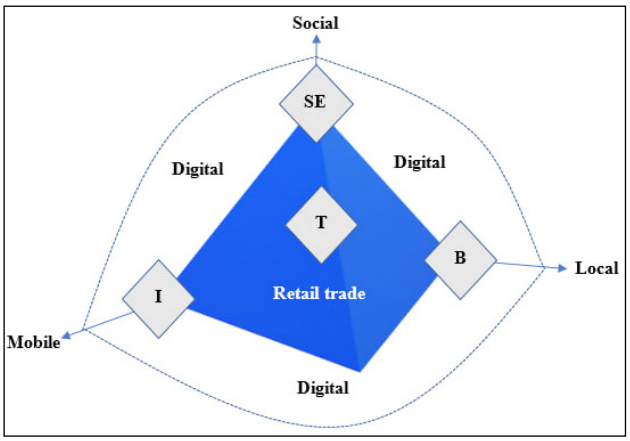
where: N_{Fi}, V_{Fi} – different types of images of the standardised evaluation of the impact of the F_i attribute on the development of retail trade; d_V – the proportion of positively evaluated attributes of the factor attribute; QZ_{Fi} – rating rank of the factor attribute F_i.

A large number of different methods were used in the research. The analysis played an important role, allowing for the collection of relevant data and drawing conclusions based on it. In addition, the historical method was used to evaluate the development of digitalisation in Ukraine in retrospect, in particular in the retail sector. Abstraction allowed eliminating of factors that could affect digitalisation in the country and analysing only the really important components. The forecasting helped to identify opportunities and prospects for Ukraine's future development in the field of new technologies, considering the current military realities and the difficulties in all areas of activity that they bring. Modelling played a very important role, allowing the establishment of a large number of models that described the digital transformation processes in Ukraine from different angles. In particular, this method was

used to establish the TISEB model, which allowed evaluating of the impact of key external factors on the development of digital transformation in the country. The deduction allowed developing of a list of options for improving the situation in terms of digital transformation in Ukraine based on general data on the state of this area in the country.

RESULTS

As mentioned above, the TISEB model, otherwise known as SoLoMo (Social, Local, Mobile), was used in this research, which divides all the factors influencing retailers' activities into separate factors described in the methodology (Fig. 1).



Source: *Compiled by the authors.*

Fig. 1: Model of external factors of retail transformation

The report by "Ovum" systematises the factors and priorities for the development of global information and communication technologies (ICT) (Oracle broadens and deepens..., 2018). It describes that of the nine common digital transformation initiatives, namely cybersecurity; digital culture; back-office digitalisation; digital skills training; use of data in business, etc. Rising customer expectations and technological advances are driving the need to explore best practices in global retailing. According to Zebra's Global Retail Vision study, 72% of US retailers plan to modernise their supply chains in real-time through automation, using the latest technologies and analytics (Reinventing retail: 2017 global..., 2017).

To evaluate the development of the transformation of the Ukrainian retail sector, a model based on the components presented in Fig. 1 was developed.

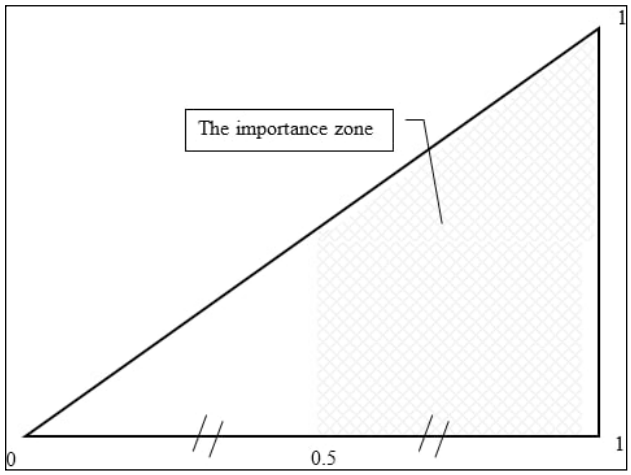
Table 1 summarises the methodology for ranking the importance of the factor attributes developed in the survey.

Table 1: Method of ranking attributes of factor attributes according to the TISEB model

Factor attributes	**Important**	**Unimportant**	**Evaluation of importance**	**Balanced assessment**
F_{ij}	Calculation coefficient	Calculation coefficient	Z_{Fi}	Q_{ZFi}
$\{T_1, T_2, T_3, \ldots, T_n\}$			Z_T	Q_{ZT}
$\{and_1, and_2, and_3, \ldots, and_n\}$			Z_I	Q_{ZI}
$\{SE_1, SE_2, \ldots, SE_n\}$			Z_{SE}	Q_{ZSE}
$\{B_1, B_2, B_3, \ldots, B_n\}$			Z_B	Q_{ZB}
			ΣZ_{Fi}	1

Source: *Compiled by the authors.*

Fig. 2 presents the criterion model for determining the importance of the factor attributes used in the assessment.



Source: *Compiled by the authors.*

Fig. 2: Visualisation model for determining the importance of factor attributes

To determine how important the attributes of the valence factors are, a questionnaire with "yes" or "no" answers can be conducted, which will allow evaluating of the strength of their influence on retail. The logic of this survey allows concluding, as presented in Table 2.

Table 2: The logic of determining the valence of the influence of factor attributes

Factor attributes	Driving feature	Deterrent feature	Overall score
F_{ij}	Evaluation	Evaluation	ΣV_{Fi}
$\{T_1, T_2, T_3, \ldots, T_n\}$	D_{Tij}	C_{Tij}	ΣV_{Ti}
$\{I_1, I_2, I_3, \ldots, I_n\}$	D_{Iij}	C_{Iij}	ΣV_{Ii}
$\{SE_1, SE_2, \ldots, SE_n\}$	D_{SEij}	C_{SEij}	ΣV_{SEi}
$\{B_1, B_2, B_3, \ldots, B_n\}$	D_{Bij}	C_{Bij}	ΣV_{Bi}

Source: *Compiled by the authors.*

After evaluating V_{Fi}, which is essentially the overall score of the factor's impact on the development of digitalisation, it becomes possible to estimating N_{Fi}, which is a normalised impact evaluation. To do this, use formula (3) described in the methodology. By assessing the indicator N_{Fi} it becomes possible to conclude the impact of the factor on the development of retail digitalisation and how significant it is. The logic for determining the impact of the factor depending on value N_{Fi} is presented in Table 3.

Table 3: A scale for linking linguistic and normalised evaluations to determine the trend of change in retail

Normalised evaluation	Linguistic evaluation	Benchmark
N_{Fi}	O_{Fi}	D vs. C
0-0.25	Imperceptible impact	D vs. C
0.26-0.5	Low impact	D vs. C
0.51-0.75	Moderate impact	D vs. C
0.76-1	High impact	D vs. C

Source: *Compiled by the authors.*

Contactless and tokenised card transactions, including those made through NFC-enabled devices such as smartphones, smartwatches and payment services such as Apple Pay, Google Pay and Garmin Pay, account for almost a third of all non-cash transactions in terms of both volume and number (30% and 29% respectively) in Ukraine. The number of contactless cards in circulation continues to grow, with one in seven payment cards in Ukraine being contactless as of the beginning of 2019; this expansion of contactless payment infrastructure has contributed to an increase in the speed of grocery purchases, and experts estimate that contactless payments account for 31% of all non-cash transactions in Ukraine.

The logistics infrastructure market of the Ukrainian economy has undergone significant transformations in recent years. Intelligent logistics has emerged as an industry that encompasses consulting services, supply chain and network design, diagnostics and optimisation, and e-logistics solutions. In the World Bank's 2019 Global Logistics Competitiveness and Efficiency Index, Ukraine ranks 80th in the world, considering infrastructure development, logistics competence, cargo tracking and on-time delivery (The Legatum Prosperity Index, 2020). All of this indicates the existing problems in the field of digitalisation in the logistics sector in the country, which must be resolved over time using all possible tools from both the state and individual entrepreneurs.

The new generation of consumers requires new communication and consumer experiences, including self-service checkouts and technologies that allow customers to take goods off the shelves and pay by debit card. Features of the decision-making process for purchases are described in Table 4.

Data management is one of their top priorities, and many companies are planning to introduce new technological solutions to personalise services and products and automate processes using AI and machine learning (Future opportunities in FMCG..., 2019). Ukrainian retailers are focusing on digitalising their marketing activities, including integrating customer channels, introducing digital data analytics, digitising physical stores, and introducing enhanced payment options and digital customer service. A systematisation of the results obtained in the study is presented in Table 5.

Table 6 summarises the vectors of change in retail trade.

The processes outlined in Table 6 will be further embedded in retail store operations to ensure that they are able to fully respond to the ever-increasing needs of consumers.

DISCUSSION

The role of digital transformation for economic development was explored by H. Aly (2020). He explored the connection between digital transformation and economic development, labour productivity and employment in developing

Table 4: Key areas of change in the interaction between customers and retailers

Stages	Elements of digitalisation	Retail trade enterprise	Digitalisation areas
Issue awareness	Combining trade channels	"Auchan"	To increase sales in the toy segment and attract new customers, Auchan developed the AuchanKids mobile app with games for children and adults
		"Lamoda"	A mobile application that allows virtual trying on of sneakers
Information search	Data analysis	"Silpo", "Fora"	Using Vodafone data to develop an up-to-date consumer profile.
		"AGROMAT"	Using Wi-Fi data for customer segmentation
Search for information, evaluate options	Store digitalisation	"More Piva", "Allo"	Using electronic price tags
		"Auchan"	Opening of Nova Poshta mini-branches in the chain's physical stores
		"Novus"	QR code in the store with all the basic information
			Digital screens with current promotions/discounts
		"MetroCash&Carry"	Mobile application ServeMe-GetServed with the ability to quickly search for information
Evaluating options Purchase decisions	Extended payment options	"Novus"	Self-service terminals
		"Kasta"	Biometric payment
		"Fora"	Payment using the yoCard mobile application
		"Velmart"	Self-payment using the Pick&Go app
		"Silpo"	Payment using a mobile application (bank)
Review of the purchase	Digital customer service	"Silpo"	KISSA self-study programme with advanced functionality

Source: *Compiled by the authors.*

Table 5: Evaluating the digital transformation of retailers in Ukraine

Factor group	Attributes	Driving feature	Deterrent feature	Evaluation
T	$\{T_1, T_2, T_3, \ldots, T_n\}$			D
SE	$\{SE_1, SE_2, \ldots, SE_n\}$			C
B	$\{B_1, B_2, B_3, \ldots, B_n\}$			D
I	$\{I_1, I_2, I_3, \ldots, I_n\}$			C

Source: *Compiled by the authors.*

Table 6: Changes in the development of digital trade

Transformation trend	Essence of transformation
Information support	Establishment of knowledge bases, best practices of the operator's activities, personalisation of user databases
Implement support for SMS and voice messaging servers	Remote communication with consumers, individualisation of offers
Development of models and algorithms for complex business processes	Development of models and algorithms for complex business processes
E-commerce and development of electronic payment systems	Synchronisation of sales data with the retailer's information system
Developing interactive integration of information processes with partners	Data exchange, synchronisation of sales and procurement processes
Organisation of the information field	Equipping the store with digital information devices
Implementation of electronic document management and accounting	Accelerating management decision-making without losing quality
Process innovation	They are designed to reduce staff costs, optimise and accelerate business procedures, increase productivity and improve the quality of customer service at all stages of contact.

Source: *Compiled by the authors.*

countries. He concludes that there is a positive connection between digital transformation and economic development and labour productivity; the interaction between employment is positive, but the data on employment is not so clear, which is why it requires further study. The importance of technological transformation and how it contributes to innovation has been explored by D. Ren *et al.* (2017). The research discusses the importance of technological transformation in promoting innovation-led development and economic growth. The scientists emphasise that there is a need for institutions to explore new models of technology transformation to further develop innovations and find opportunities for their further implementation.

N.L. Savytska (2014) explored the drivers and barriers to the development of online retail in her study. The researcher describes that the activities of retailers are influenced by a significant number of external forces, which causes the exogeneity of this type of business. In addition, it describes the analysis methods that can be used to develop an assessment of the external environment and its impact on retailers: PEST, STER, PESTLE methods (where P is a political factor, E is an economic or environmental factor, S is a socio-cultural factor, T is a technological factor, L is a legal factor). In addition, these factors are used to conduct a SWOT analysis (Strengths, Weaknesses, Opportunities, Threats).

An interesting relationship between digitalisation in the retail sector and monetary policy is found by C. Glocker and P. Piribauer (2021). The researchers note that the digital transformation in the retail sector may have contributed to the inability of central banks to meet their inflation targets in recent years. The authors argue that digitalisation has increased competition and made prices more flexible, which has reduced the overall level of price stability in the economy.

L.J. Kao *et al.* (2022) assessed the effectiveness of digital transformation in their study. They noted that the effectiveness of investments in digital transformation may vary depending on the industry and some of its characteristics, including the quantity and quality of investments in it. W. Reinartz *et al.* (2019) analysed how the development of digital technologies will affect the specifics of doing business in retail. Researchers have demonstrated that the development of social networks and the Internet in general has led to the transition of businesses to this area. The establishment of platforms results in the establishment of centres that connect the branded product with additional goods and services, offering distinct value, while collecting data for personalised recommendations and automated purchases.

In today's environment, to ensure the quality of Ukraine's sustainable development, the government should pay much more attention to digital technologies. With more support, the country could significantly improve its position in this area on the world stage and thus make it one of its main foreign specialisations. Admittedly, it should be understood that such actions are virtually impossible to implement in wartime. Nevertheless, the development of national policy in this area in the post-war period would have allowed for much more efficient use of the country's resource base and improved its economic and social opportunities.

CONCLUSION

This study analyses the development of retail trade in Ukraine in the context of the introduction of digital technologies. It has been demonstrated that large enterprises are introducing modern digital tools that, in one way or another, influence consumers' willingness to make purchases. The construction of such infrastructure provides links and covers all types and forms of connections between production, distribution, exchange and consumption. An important element of this system is the proliferation of retail formats: conventional store-based trade, trade in open markets, i.e., offline retail, and e-commerce — online and mixed; the proliferation of such forms affects both the speed of digital development and the way individual businesses respond to certain environmental events.

The study demonstrated that technological and behavioural factors have the most significant impact on digital transformation, and described how they interact with businesses. To remain competitive in today's economy, retailers must transform their operations based on modern marketing concepts, including the development of communication relationships with consumers and the introduction of innovative marketing capabilities and digital marketing technologies.

It is relevant for further research to explore the specific features of the development of digital transformation in other countries and to find opportunities to use their experience in Ukraine. In addition, it is important to conduct further research in this area in Ukraine and find opportunities to develop the country's future policy in terms of digitalisation and the development of new technologies. To make the results easier to compare, the TISEB model can be used to analyse the situation in other countries.

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