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The Impact of Digital Technology Platforms on Business Models in the Context of Consumer-Driven Processes

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Abstract:

Purpose: *The article addresses issues related to the impact of digital technology platforms on changes in contemporary business models. In this respect, the main focus of attention is the models co-created by customers.*
Design/Methodology/Approach: *The article is based on literature considerations and our research results. These studies were carried out in 2019 on a group of 120 Polish companies and concerning aspects related to the scope and role of digital technology platforms in business operations, including the attitudes demonstrated towards these platforms by the management of the surveyed companies. The article includes a model of such attitudes, built as a result of the conducted research.*
Findings: *As part of the issues raised, it was found that current business models are undergoing a significant transformation, meaning that they are increasingly based on innovative solutions and are created by consumers themselves.*
Practical Implications: *In this respect, an emphasis is placed on the critical role of digital technology platforms because providing a basis for establishing close relationships between the different actors and promoting innovation contributes to implementing changes in business models.*
Originality/Value: *The article discusses a model for measuring attitudes towards digital technology platforms.*

Keywords: *Model, business model, digital technology platforms, innovation, consumer*.

JEL Classification: *C30, O31*.

Research type: *Research article.*

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1. Introduction

How business operations are conducted is constantly changing. This is due to the constant evolution of consumer needs and requirements which, in turn, are implied by transformations in lifestyles and the intensive development of modern technologies. As a result, modern business models have a slightly different character to those used several decades or even several years ago. This is mainly since they are based on innovative solutions (Teece, 2010). This enables market players to gain a lasting competitive advantage, including (to a large extent) those enterprises that use the digital environment in their operations (Amit and Zott, 2012).

In this regard, it is necessary to mention the digital transformation, which is inseparably linked with the use of such solutions in digital technologies. They are used to improve performance indicators in the enterprise radically and to optimize individual operational processes. Moreover, they are one factor that influences the implementation of changes in business models (Westerman *et al.*, 2011). According to Kotarba (2018), digital transformation is the modification or adaptation of individual business models to the requirements of the dynamic pace of technological development, including the promotion of innovations that imply changes in social and consumer behavior. It can, therefore, be concluded that changes in business models are closely related to modern technologies and the implementation of innovative solutions.

Among such solutions are digital technology platforms (DTP). They are tools thanks to which market players can communicate and carry out various types of transactions. According to some definitions, such as the one proposed by Morgan *et al.* (2016), they are considered separate business models that generate specific value for the company. Following this train of thought, we can talk about platform business models (Täuscher and Laudien, 2018). By promoting modern IT systems and tools or business practices, DTP can significantly influence digital business models (Veit *et al.*, 2014). However, as Mini and Widjaja (2019) pointed out, many of these models are still based on traditional business. However, an important feature that distinguishes traditional and modern business models is the constantly increasing participation of consumers in their creation and development and who are becoming the creators of innovation (Karpińska, Matel, and Protasiewicz, 2017).

This article will consider the impact of digital technology platforms on changes in contemporary business models. What is essential is that attention will be paid to models co-created by the users of such platforms. This enables referring to the statement that nowadays, it is essentially the consumer who is a "co-creator of innovation" in business models, which is reflected in his/her activity in the form of sharing one's own opinions or entering various interactions with enterprises (Cova and Dalli, 2009). In addition to the reference to the literature, the article will be based on the results of our research and will address issues relating to changes in business models caused by digital technology platforms.

2. Literature Review

Changes in business models in the modern economy: Before discussing changes within business models, it is necessary to define what these models are. According to Zieleniewski (1979), the model itself allows not only orientation to be gained in the environment but also reasoning in which the values of individual variables are subject to changes and the impact of such actions on other variables is checked to be implemented. Therefore, in the model, it becomes essential to manipulate the various variables that it includes. In this way, the model becomes helpful in applying specific theoretical solutions to practical ground. In another approach, it was indicated that the model is a type of pattern in which certain elements or factors are considered. These include complementarity (combining activities to generate value), efficiency (determining the nature and scope of activities in such a way as to reduce the costs of the business), and emphasis on innovation - including the organizational structure and management of the enterprise (Foss and Saebi, 2015). The concept of a business model has been described using the following definitions:

- a conceptual tool using which it is possible to present the logic of the functioning of the enterprise, including how it generates profits because of the generated value, with the essential feature of this model being that it takes into account all the components of the enterprise and the relationships that occur between them (Osterwalder *et al.,* 2005);
- revenue streams - including future ones - and the cost structure and margin levels, and the relationship between these variables (Thompson and Strickland, 2003);
- the operating logic of an enterprise in which the generation of value for the customer is predominant (Fielt, 2013).

As already mentioned, recent changes in business models are mainly related to innovation. In this context, the growing importance of the digital business model is emphasized. This model is defined primarily through the prism of the importance of modern digital technologies in its implementation. For Veit *et al.* (2014), the model is digital when these technologies imply fundamental changes in the way business is conducted and significantly affect profits. In this model, the critical importance of these technologies is revealed about resource optimization - which is possible, for example, through solutions for sharing these resources or intensifying interactions between various entities and IT systems (Li *et al.*, 2012, Planing, 2017).

The digital business model is inextricably linked to a specific place of conducting business, which includes space related to the virtual world (Weill and Werner, 2013). It is worth noting that digital business models are implemented based on specific digital business strategies in which the integration of IT activities takes place on a large scale and favors the implementation of specific improvements and changes leading to the generation of value (Bharadwaj *et al.,* 2013, Ismail *et al.*, 2017, Tärnell, 2018).

Currently, many modern business models are based on digital technologies. They are referred to as:

- the brokerage model - in this model, organizations create virtual markets that enable buying and selling transactions, with brokers usually charging a commission for organizing these transactions;
- the merchant model - the sale of products or services only via the Internet or together with traditional distribution channels (e.g., stationary outlets);
- information broker (the infomediary model) - collection, processing, and paid access by organizations to data on customers and producers' offers;
- the advertising model - generating income thanks to the increased attractiveness of websites;
- affiliate network (the affiliate model) - reaching a wide range of customers by establishing cooperation with affiliated partners who place links to the portal of a given organization on their websites;
- the subscription model - enabling periodic access to digital services in exchange for an appropriate fee;
- tariff (the utility model) - a model similar to the subscription model with the difference that the amount of fees for using digital services depends on the actual use of them (for example, a fee for the volume of downloaded data);
- virtual community (the community model) - the use of volunteering to implement marketing activities (Afuah and Tucci, 2020; Rappa, 2006).

Varian (2005) also attempted to distinguish the most crucial modern business models that reflect the changes that have taken place in these models over the past few years. These models are described in Table 1.

Table 1. *Modern models of digital business according to Varian*

Model name	Characteristics
The original cheaper than a copy	- selling digital products much cheaper than in normal distribution by, for example, adding them to magazines and newspapers
A copy more expensive than the original	- the use of technical or legal safeguards by manufacturers
Physical complements	- various types of additions to digital content - including, for example, the possibility of free download of music from the Internet based on a code placed on a T-shirt promoting a specific album
Information complements	- providing users with free material after they have purchased digital content (for example, access to new functionalities)
Subscriptions	- constant supply of specific content in return for a fee
Personalised version	- adding original, unique additions to the purchased content
Advertising by the producer (advertise)	- sending product advertisements in pdf format

Advertisements of other entities (advertise other things)	- broadcasting advertisements on one internet portal
Licences	- collective charges for user groups
Ransom	- this is a model popularised by the writer Stephen King along with the promotion of his book *The Plant*; it publishes part of the digital content and makes it conditional to provide users with further parts after the author or organisation has been given a specific amount of money
Public provision (public support)	- co-financing of the publication of digital content by public institutions or the European Union
Awards (prizes, awards, and commissions)	- for example, procurement from public institutions

Source: *Own creation.*

Recent changes in business models also relate to the fact that consumers themselves have an increasing share in creating and developing such models. This aspect is also closely related to innovation. As noted by Von Hippel *et al*. (2011), the traditional approach - which was still dominant at the turn of the 20th and 21st centuries, although innovations were generated on a large scale as part of the DTP operation - took place with relatively little involvement from the users (consumers) themselves. An apparent change can currently be seen in this respect, which is greatly facilitated by the intensive development of modern technologies, including mainly ICT (Information and Communication Technologies).

A significant increase in the involvement of consumers in the processes related to the development of modern business models can be considered a completely new paradigm of innovation, which is defined as "open innovation". Within its framework, the emphasis is on the fact that, in principle, every person can contribute to the development of business models, with enterprises themselves favouring this by creating a UIC (user innovation community), i.e., a community of innovation users. Thanks to such communities, enterprises encourage users to generate completely new ideas, consisting of developing new products or modifying solutions already used (Ma *et al.*, 2019).

Therefore, in modern business models, attention is focused primarily on customers (consumers) and not on products or geographical areas in which the business is conducted. It is recognized that customers can generate specific value for the enterprise, including supporting innovative solutions and promoting a positive image for the enterprise on the market. More and more often, customers are becoming an inseparable part of the organization - not just passive buyers of products and services. Therefore, modern enterprises treat them as an essential source of innovation and specific values, and not only as the basis of profits (Appelbaum *et al*., 2018).

According to Ritzer and Jurgenson (2010), consumers thus become part of a prosumer society in which they are already actively involved - not only in consumption but also in the production of goods, services, or experiences. At present, consumers want to have a significant influence on co-shaping their own experience of purchasing products and services and using the offer of companies operating on the market. Such an opportunity is provided by their involvement in creating modern business models (Prahalad and Ramaswamy, 2004).

A customer-oriented approach to building and developing modern business models brings numerous benefits. Among them, first, it that it is necessary to meet customer needs effectively. Thanks to the involvement of consumers in activities conducted by enterprises, it becomes possible to constantly respond to their requirements - which contributes to the creation of products and services closely tailored to these requirements. This leads to an increase in profits and, at the same time, promotes a positive image for the company on the market. Consumers, noticing that an enterprise tries to take care of their needs, are more likely to purchase its products and services and become more involved in its promotion on the market (for example, formulating positive comments on internet forums). Such benefits lead to an increased level of competitiveness (Damanpour and Schneider, 2006).

Therefore, recent changes in business models are closely related to the pursuit of the highest possible level of innovation and customer (consumer) orientation. These changes aim to increase the efficiency and level of competitiveness of the enterprise and the quality of customer service, and the products and services offered. In general, it should be noted that changes in business models are currently seen as a critical factor in ensuring the success of an organization (Gilley, 2009). Such changes must take place with the emergence of modern technologies or changes in consumer needs. At the same time, it is essential to involve all organization members, including its stakeholders, in these changes. This leads to taking advantage of the economies of scale and generation of value (Anthony, 2004).

Modern business models are primarily built on digital technology platforms. *Such platforms* are defined as digital tools that allow establishing and intensifying relationships between various market entities, including enterprises, consumers, and even administrative entities (public administration bodies). This is done by enabling these entities to make transactions - including business ones - and communicate with each other using the Internet. The direct effect of this is connecting trade partners and creating business networks (Sun *et al.,* 2015). Another definition indicates that digital technology platforms are a type of base or foundation on which a given IT or technology system framework is built. A characteristic feature of DTP is the ability to implement new functionalities and develop complementary products, services, and technologies (Gawer, 2014).

Digital technology platforms, according to de Reuver, Sørensen, and Basole (2015), can be viewed from two perspectives. The first (technical) one is that these platforms

are seen as codebases that are extensible, meaning that new modules and functionalities can be added to them at any time. On the other hand, from the socio-technical perspective, these platforms are considered a set of technical components - including software and hardware - and related organizational processes and standards.

Due to the complexity of the definitions concerning DTP, our proposal was formulated in this regard. It emphasized that digital technology platforms are tools of an electronic (digital) nature that can take services or content. It is possible to create the basis for establishing and intensifying contacts between various entities operating on the market. An essential feature of these platforms is the ability to expand them with new modules or functionalities constantly.

The development of digital technology platforms primarily determines changes in business models. In this regard, Zott, Amit, and Massa (2011) indicated that these changes mainly result from the convergence of various tools and channels. This was and is visible, among others, in the media industry. The effect is the creation of large, integrated platforms related to communication and mobile technologies. Significantly, the new platforms form the basis for building and developing new business models.

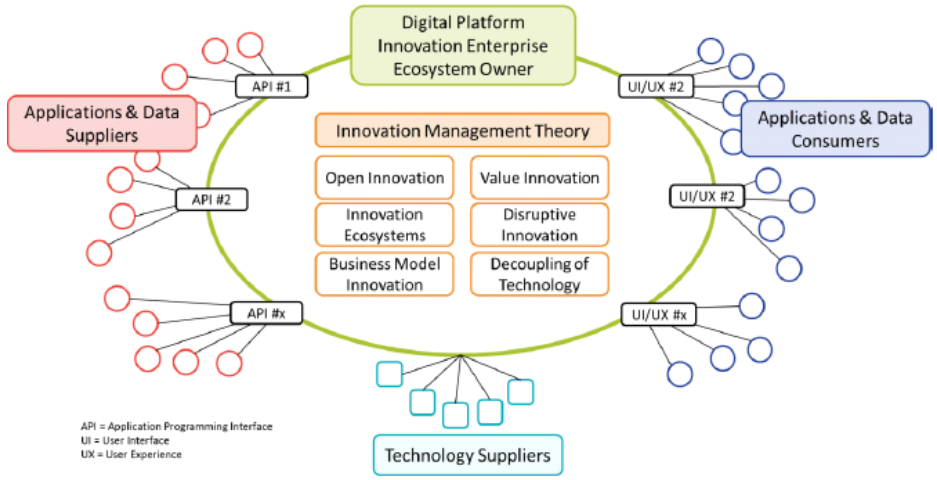
Brousseau and Penard (2007) noted that today's digital business models do not imply changes only in the digital sphere. The authors pointed out that these changes can be seen as "intermodal" (i.e., those visible within the various areas of the organization). These changes, therefore, concern not only digital content but also physical products and services and related infrastructure. Moreover, digital business models largely "crossover" with traditional models, thus resulting in innovation and new marketing strategies in those not directly related to the digital market. This demonstrates the incredible complexity of the changes induced in modern business models, including those based on digital technology platforms.

These changes, compared to traditional models, are manifested in several primary areas. This mainly concerns the entity responsible for a given model. In the past, it used to be a producer acting either in a direct relationship with the supplier or in a network created by the supplier. Currently, the business model works largely thanks to an intermediary who creates the basis for establishing interactions between other entities. Differences can also be seen in terms of the product owner (formerly a specific company and now, increasingly, platform users), the source of value (now interactions between users but previously the features or functions of products and services), the basis for gaining competitiveness (product development versus continuous development of the business model) and sources of profit (previously revenues from the sale of products and services, and now several other sources including, for example, commission paid for access to complex functionalities of a given platform) (Zhao *et al.*, 2020).

It is worth noting that the vast majority of digital business models are currently created based on DTP. This is since these platforms create the basis for establishing broad interactions between, for example, enterprises and customers - which thus determines the possibility of using a customer-oriented approach. At this point, it is worth presenting the concept of Nordström and Biaström (2002), in which it was noted that the primary role in creating any innovation belongs to consumers. For this reason, most enterprises operating on the market use the support offered by consumers as part of creating innovations. This takes place as part of the model configuration of products and services, which is increasingly promoted in business operations and is an expression of changes in business models currently happening on a large scale.

Such a configuration would not be possible without DTP, which allows the network effect to be obtained so that their activities are concentrated on a broad group of users who offer support in improving the functioning of DTP or generating innovation. Digital technology platforms are tools to stimulate consumer activity to co-create innovative solutions whereby companies, through these platforms, can engage in dialogue with consumers and access the knowledge available to both individual users as well as entire online communities. The members of these communities, therefore, become a source of new product development. Importantly, DTPs operate in a business ecosystem that brings together a variety of stakeholders, including consumers. This is shown in Figure 1.

Figure 1. *Digital technology platform as a tool for business-consumer cooperation*



Source: *Bouwer, 2016.*

Characteristic of DTP, which operates in a business ecosystem, is the creation of a network of various types of relationships and connections between various entities. To a large extent, this also applies to consumers who are responsible for generating

ideas and sharing their experience in creating innovations. This is done through specific interfaces (UIs), which are accessible via these platforms.

It is worth mentioning here the concept of open innovations - under which open digital platforms for cooperation in innovation operate. Thanks to such platforms, it is possible to use external resources to generate innovation, which is a consequence of open space for any initiatives submitted by users. For these platforms, for example, there are joint open laboratories where experiences and ideas can be exchanged. One of the types of open innovations is crowdfunding and crowdsourcing platforms - thanks to which enterprises can obtain financial and intellectual resources from users (De Falco *et al.*, 2017).

Social media plays a significant role in enabling consumers to play an active part in creating innovation, mainly those that ensure the integration of DTP with customer service systems. This is because they lay the foundations for creating different communities that can focus on implementing innovative solutions. Because contact through these platforms is established efficiently and cost-free, this can lead to innovation in a relatively short time and without excessive expenditure. It is worth emphasizing that generating innovations currently takes place not only within specific social networks - including closed groups, using the support of messaging applications such as Messenger - but also blogs and thematic microblogs (Szwajlik and Słupińska-Peszko, 2017).

Thus, innovative changes in contemporary business models - which are aimed at the broadest possible use of digital technologies and create various types of networks or multi-faceted innovation management - lead to the consumer becoming a co-creator of innovation. This is mainly implied by using DTP such as crowdfunding platforms or social media, which bring together many users and use their knowledge to generate new ideas and innovative design products, services, or processes. What is more, the consumer is currently also becoming a co-creator of changes in business models. It is worth emphasizing that megatrends primarily determine how the modern market and individual enterprises function in the field of consumption, resulting in its individualization and virtualization by implying a broader involvement of consumers in creating value and developing innovative ideas.

Consumers conside that is possible to meet their needs effectively, thanks to their activity in product design and implementation (Roberts and Alpert, 2010). This is why the concept of sharing economy is widely promoted and in which the sharing of specific resources is dominant. Importantly, this activity is mainly due to the functionalities offered by digital technology platforms. They allow, for example, a community of users focused around the idea of creating a new concept to be created - the effect of which becomes a specific, innovative product or service.

3. Research Methodology

At this point, it is worth referring to the results of our research. The studies were carried out between February the 18th and 28th, 2019. They covered 120 enterprises that had received a subsidy from the Innovative Economic Operational Program to implement and develop digital technology platforms. The research was conducted using the CATI (Computer Assisted Telephone Interviews) method. This method is characterized by a high degree of standardization and is part of the quantitative paradigm, with its primary advantage being that its results can be generalized to the entire population (Gerrind, 2001). For the quantitative data collected in computer-assisted telephone interviews (CATI), a quantitative analysis of this type of research was foreseen according to the classical research paradigm. Firstly, a tabular analysis, taking into account the two-variable tables, was carried out, and then induction tests of intergroup differences were used. The method was based on a survey questionnaire consisting of 23 questions.

Based on CATI interviews, it is worth presenting data concerning the respondents' answers to the question regarding the impact of DTP on the creation and development of modern business models. This data is included in Table 2.

Table 2. *The impact of digital technology platforms on innovative business models*

Question 12. Do you agree with the statement that digital technology platforms enable the creation and development of innovative business models?			
		Frequency	Percentage
	I strongly agree	63	52.1
	I rather agree	45	37.2
	I neither agree nor disagree	12	9.9
	I rather disagree	1	0.8
	Total	121	100.0

Source: *Own creation.*

89.3% of the respondents (i.e., the vast majority) stated that digital technology platforms impact the creation and development of business models. This is confirmed by the analyses carried out in this respect in the literature on the subject (as mentioned above).

The following section shall present the respondents' views on the impact of DTP on the increase in quality and intensity of the relationships that enterprises establish with various stakeholders, including customers. These views are shown in Table 3. 75.2% of respondents considered that digital technology platforms increase the quality and intensity of relationships established by enterprises with stakeholders. In this respect, it should be emphasized that this also applies to customers. In this way, DTP is a platform thanks to which consumers may purchase products and services offered by individual enterprises and exchange specific information and contribute to building new business models.

Table 3. *The impact of digital technology platforms on business-stakeholder relations*

Question 13. To what extent do digital technology platforms increase the quality and intensity of the relations established by the company in which you perform your professional duties with all stakeholders - including (mainly) suppliers, contractors, distributors or customers?			
		Frequency	Percentage
	very much	44	36.4
	to a large extent	47	38.8
	neither to a great nor small extent	11	9.1
	to a small extent	2	1.7
	to a very small extent	6	5.0
	I have no opinion on this	11	9.1
	Total	121	100.0

Source: *Own creation.*

Apart from CATI, our research also used the categorical regression analysis for CATREG qualitative variables, allowing for quantitative evaluation of qualitative data and optimal scaling (it allows the values of specific variables based on the values of other variables to be predicted), which led to the construction of the DTP model. In this model, attitudes towards digital technology platforms in enterprises were measured, which was possible thanks to the analysis of Question 13: 'To what extent do digital technology platforms increase the quality and intensity of the relations established by the company in which you perform your professional duties with all stakeholders, including main suppliers, contractors, distributors or customers?'. This question includes both assessment elements related to knowledge and those related to evaluating this phenomenon ("increase in quality and intensity").

The mutual relations between the overall assessment of the impact of digital technology platforms on the increase in quality and intensity of business operations and other assessment elements were examined, including what is most interesting from the point of view of the issues addressed in the paper - cognitive elements (Question 12): 'Do you agree with the statement that digital technology platforms enable the creation and development of innovative business models?' It was assumed that digital technology platforms could transform the enterprise in the human dimension (their assessment of this phenomenon, the scope of its use, expectations, etc.), cybersecurity (new IT challenges related to hardware and software), economic (related to the calculation of actual and potential profits and losses) and social (changes in the structure of the enterprise and relation to its structure, type, and intensity of relations with the environment). The structural factor, where the measurement level is orderly, is decisive about the issues covered in the paper.

The model was constructed in several stages, which made up the top-down method (descending) and in which the following steps were taken successively:

- Including a set of variables in the model (including cybersecurity) which, according to the researcher, have an impact on the independent variable (attitudes towards DTP).
- Manipulating the order of variables using repeated iterations to achieve the highest score.
- Model building and evaluation.
- Reduction of the number of variables by the weakest predictor.
- Creation of a reduced model.
- Comparing the previous and the next (reduced) model.
- Repeating Points 4 to 6 until the most satisfactory numerical result is obtained.

Thanks to the constructed model, it became possible to indicate which factors had the most important influence on attitudes towards digital technology platforms. In this regard, considering the structural factor, the following numerical results were taken into account:

- The beta (β) coefficient - this is the so-called 'standardized regression coefficient' (not dependent on the range of the variable, calculated from the slope coefficient (regression coefficient) which allows the comparison of individual predictors in the regression model, ranging from -1 to +1; such a scale determines that values oscillating around zero indicate weak or no relationship between the predictor and the dependent variable.
- Relevance - this parameter describes the individual predictors.
- The F Statistic - represents the total goodness of fit and shows the size of the explained variance; when creating a model, the variables which have the lowest values of this statistic are sequentially eliminated.
- Correlation matrix - this consists of zero-order correlations as well as partial and semi-partial correlations; zero-order correlations are isolated correlations between the independent variable and the dependent variable, partial correlations take into account the correlation of a given predictor as well as the dependent variable with other variables in the model, while semi-partial correlations take into account the interaction of a given independent variable with other variables in the model but do not take into account the correlation of the dependent variable with other predictors; these correlations take values from -1 to +1.
- Significance - this is the importance of individual variables, expressed as part of unity, in the model (the maximum value is 1); the higher the importance assigned to a given predictor, the more significant a role it plays in the model; the value of this parameter may be expressed as a percentage.
- Tolerance - a measure of the collinearity of variables; it is the reciprocal of R^2 (tolerance = 1 - R^2) and takes values from 0 to 1; the closer the tolerance of the predictor is to 1, the less it is collinear with other variables in the model; Collinearity should be avoided as the closer this coefficient is to zero,

the more a given variable is redundant and the more useless information it carries - variables in the model should be strongly correlated with the dependent variable and weakly with each other; the phase of data validation is essential for the construction of the model, and then the issue of outlier observations should be resolved; The CATREG regression model is susceptible to outlier data.

Table 4 presents the individual components of the optimal scaling model for the structural factor (taking into account Question 12).

Table 4. *Components of the top-down optimal scaling model for the structural factor (Question 12)*

Model component name (predictor)	Beta coefficient	Degrees of freedom (df)	F	Relevance	Zero correlation
Question 12.	0.209	2	1.675	0.193	0.116
	Partial correlation	Semi-partial correlation	Significance	Post-transformation tolerance	Tolerance before transformation
	0.265	0.204	0.055	0.955	0.914

Source: *Own creation.*

When analysing the data in Table 4, it should be noted that the most critical factor influencing attitudes towards DTP is the economic factor (0.386, which means that it explains 38.6% of the variability of the independent variable) and the socio-demographic factor (0.208). In the case of Question 12, the validity is at a level of 0.055, which means that the attitudes in the surveyed enterprises are only, to a small extent, conditioned by the factor related to the creation and development of innovative business models because of using digital technology platforms.

The research indicated an alternative proposal to create a model of attitudes towards DTP. This model was based on synthetic indicators - indexes or scales. In this case, the independent variables are synthetic values obtained from two or more direct indicators (questionnaire questions). The direct advantage of this approach is the reduction of the number of independent variables, which makes it possible to reduce the distance between the R-squared coefficient and the corrected R-squared. As a result, a model explaining the more significant part of the variation of the dependent variable can potentially be obtained. The undoubted advantage of such an approach may be obtaining transparency by introducing order and structuring individual factors into groups.

Data were synthesized based on a simple, arbitrary summation followed by averaging sets of indicators. From the methodology perspective, these are the so-called 'reflective indicators' (i.e., not related to a common cause) but, according to the researcher's assumptions, are classified into a more general category. The

following five synthetic indexes were distinguished: cybersecurity (represented by one index), economic (one index), human (eight sub-indexes), structural (four indexes), and structural and demographic (two sub-indexes). Question 12 was classified as a structural factor in which the measurement level of the variable is ordinal. The attempt to make the model using Question 13 as a dependent variable and those mentioned above and described indexes as independent variables generated the following results:

Table 5. *Summary of the overall coefficients of the top-down optimal scaling model (descending)*

Multiple R	0.361
R-squared	0.131
Adjusted R-squared	0.052

Source: *Own creation.*

Table 6. *ANOVA variance analysis for the optimal scaling model obtained by the top-down (descending) method*

	Sum of squares	**Degrees of freedom (df)**	**Average square**	**F**	**Relevance**
Regression	15.805	10	1.580	1.653	$p \leq 0.1$
Residual	105.195	110	0.956		
Total	121.000	120			

Source: *Own creation.*

In social sciences, the results of calculations in inductive statistics, which show a probability value (p) above 0.05, are considered statistically insignificant. Sometimes an exception is made to this rule, and test results are quoted - which, although they exceed 0.05, are not higher than 0.1. Of course, there is a high (10%) risk of making a Type 1 error, but such a result should at least be noted in the margin. The model based on synthetic indexes explains the variability in Question 13 to a much lesser extent than the model developed first. The most important factor explaining more than a quarter (25.4%) of the variability of the independent variable is the structural (sociodemographic) factor covering the size and industry of the enterprise. This is a premise for further exploration in this regard.

Therefore, the CATREG model described above was supplemented with intergroup comparisons to find the specific 'characteristics' of the use of digital platforms from the perspective of various groups of respondents (multidimensional characteristics of the studied population). In this respect, for Questions 12 and 13, they are contrasted with Question 2 (If in Question 1 you indicated 'definitely yes' or 'yes,' 'Please specify for how long have digital technology platforms been used in the enterprise in which you currently perform your professional duties.') and 22 ('Please specify in which type of enterprise, given the size of the workforce, you perform your

professional duties.'). The analyses regarding Questions 2 and 12 are presented in Table 7.

There are no statistically significant differences between the studied groups in this respect. Both almost 100% agree that digital technology platforms enable the creation and development of innovative business models. It is worth noting that the force of positive conviction to the statement is higher for companies of higher seniority level (over three years).

Table 7. *Time of using digital technology platforms vs. the development of innovative business models*

Question 12. Do you agree with the statement that digital technology platforms enable the creation and development of innovative business models?	**Question 2. Please specify how long digital technology platforms have been used in the company where you currently perform your professional duties.**			
	up to 3 years		**over 3 years**	
	N	**%**	**N**	**%**
I strongly agree	25	43.1	37	59.7
I rather agree	29	50.0	16	25.8
I neither agree nor disagree	4	6.9	8	12.9
I rather disagree	0	0.0	1	1.6
I strongly disagree	0	0.0	0	0.0
Mann-Whitney's Intergroup Comparison Test	ni.			
Test of significance of relationships between Pearson chi-square variables and Cramer's V contingency coefficient	ni.			

Source: *Own creation.*

Table 8 presents data on the increase in the quality of relations between the enterprise and its stakeholders in using DTP and the time of their use.

Table 8. *Time of application of digital technology platforms vs. increase in the quality of company relations*

Question 13. To what extent do digital technology platforms increase the quality and intensity of relations established by a company?	**Question 2. Please specify how long digital technology platforms have been used in the company where you currently perform your professional duties.**			
	up to 3 years		**over 3 years**	
	N	**%**	**N**	**%**
very much	21	36.2	23	37.1
to a large extent	22	37.9	24	38.7
neither to a great nor small extent	5	8.6	6	9.7
to a small extent	0	0.0	2	3.2
to a very small extent	3	5.2	3	4.8
I have no opinion on this	7	12.1	4	6.5
Mann-Whitney's Intergroup Comparison Test	ni.			
Test of significance of relationships between Pearson chi-square variables and Cramer's V contingency coefficient	ni.			

Source: *Own creation.*

Both groups of the surveyed enterprises adopt the same position regarding the large or very large impact of the use of digital technology platforms on the increase in the quality and intensity of relationships established by companies. In this case, there are no statistically significant differences between the groups. Another issue that was raised during the research concerns the creation of innovative business models based on DTP, taking into account the various types of surveyed enterprises. Data on this issue is presented in Table 9.

Table 9. *Company size vs. creating innovative business models.*

Question 12. Do you agree with the statement that digital technology platforms enable the creation and development of innovative business models?	**Size of the enterprise**							
	micro		**small**		**medium**		**large**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
I strongly agree	10	83.3	18	64.3	15	36.6	19	48.7
I rather agree	1	8.3	5	17.9	24	58.5	15	38.5
I neither agree nor disagree	1	8.3	5	17.9	1	2.4	5	12.8
I rather disagree	0	0.0	0	0.0	1	2.4	0	0.0
I strongly disagree	0	0.0	0	0.0	0	0.0	0	0.0
H Kruskal-Wallis intergroup comparison test	ni.							
Test of significance of relationships between Pearson chi-square variables and Cramer's V contingency coefficient	ni.							

Source: *Own creation.*

All enterprises, irrespective of the size of their employment, are almost 100% similar when it is stated that digital technology platforms enable the creation and development of innovative business models.

Another aspect examined concerns the relations of the enterprise with the environment, taking into account the size of the surveyed enterprises. This aspect is covered by the data in Table 10.

Table 10. *Enterprise size vs. relations of the enterprise with the environment.*

Question 13. To what extent do digital technology platforms increase the quality and intensity of relations established by a company?	**Size of the enterprise**							
	micro		**small**		**medium**		**large**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
very much	4	33.3	10	35.7	15	36.6	15	38.5
to a large extent	5	41.7	11	39.3	16	39.0	14	35.9
neither to a great nor small extent	2	16.7	3	10.7	5	12.2	1	2.6
to a small extent	0	0.0	2	7.1	0	0.0	0	0.0
to a very small extent	0	0.0	0	0.0	5	12.2	1	2.6
H Kruskal-Wallis intergroup comparison test	ni.							
Test of significance of relationships between Pearson chi-square variables and Cramer's V contingency coefficient	ni.							

Source: *Own creation.*

All enterprises, regardless of the size of employment, indicate that the use of digital technology platforms - to a "very large" or "large" extent - influences the increase in the quality and intensity of relations they establish with other entities in the environment. There are no significant differences in this respect between the studied groups.

4. Conclusion

In the summary of the article, the results of our research prove that the use of digital technology platforms creates the basis for building and developing innovative business models. In this respect, the respondents' opinions are consistent, and neither the duration of the DTP application nor the size of the enterprise matter in this respect.

Furthermore, it should be emphasized that digital technology platforms significantly impact the quality and intensity of relationships established by enterprises with various stakeholders. This also applies to customers (i.e., consumers). This aspect should be considered one of the primary factors contributing to the co-creation of modern, innovation-based business models by consumers. DTP undoubtedly plays a significant role in this process.

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