

THE EFFECT OF DIGITAL TRANSFORMATION ON BUSINESS MODEL CANVAS OF SMEs FROM THE MANUFACTURING INDUSTRY

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Received 02 March 2022; accepted 21 March 2022

Abstract. The main aim of this paper is to analyze the effect of digital transformation on Business models (BMs) of small and medium sized enterprises (SMEs) operating in the manufacturing industry. Pre-pandemic and current state of digital transformation of SMEs' BMs is analyzed, using Business Model Canvas (BM Canvas). Survey conducted with eighteen SMEs serves as the base for the analysis, putting emphasis on SMEs BMs development and changes that happened after COVID-19 outbreak. Specifically, how each building block reacted to digital transformation. Findings show that changes in the building blocks are not proportional, with each building block achieving different percentual change of digital transformation, whereas the importance of specific blocks varies in the eyes of companies' management.

Keywords: digital transformation, Business models, Business Model Canvas, SME, manufacturing industry.

JEL Classification: L1, L21, M1.

Introduction

The COVID-19 pandemic has brought about years of change in the way small and medium-sized enterprises (SMEs) in all sectors and regions do their business activities (McKinsey&Company, 2021). The COVID-19 outbreak has generated serious health, economic and social risks (García-Sánchez & García-Sánchez, 2020). SMEs have experienced several challenges during the pandemic. Their response to this unexpected situation has influenced their resilience together with the chances to overcome this global health crisis. SMEs react accordingly and change their Business models (BMs) to adapt to the changing environment caused by pandemics (Gregurec et al., 2021). Nowadays, digital transformation of SMEs is an interesting, widely discussed and actual topic in the agenda of both scholars and practitioners (Cha et al., 2015; Li et al., 2018). SMEs are more and more willing to invest in digital technologies, exploring new possibilities, and changing their BM (Farrington & Alizadeh, 2017; Nambisan et al., 2017; Frishammar et al., 2018). Even though this trend is emerging, the authors of the paper investigate the effect of digital transformation on SMEs' nine building blocks of Business Model Canvas (BM Canvas).

The paper aims to investigate the effect of digital transformation on BM Canvas, exploring the level of digital transformation in each building block, while examining whether the level of digital transformation differs in each building block. This research paper serves as a pilot that will further investigate the digital transformation of SMEs in the manufacturing industry. Companies try to innovate continuously and thus improve their business model (Yun & Zhao, 2020). Innovation can be reached through the digital transformation of elements of the BM.

The BM Canvas by Osterwalder and Pigneur (2010) represents a conceptual framework used for this research. This research will contribute to the new knowledge and understanding, and investigate the possible effect of digital transformation on different SMEs' building blocks of the BM Canvas (Osterwalder & Pigneur, 2010).

1. Key literature reviews

Digitalization is currently the most significant force in the business and innovation area (Berger et al., 2021), and SMEs play a significant role in contemporary societies; nevertheless, SMEs are naturally more reluctant to

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the usage of digital channels and technologies (Barroso et al., 2019).

The term BM had his first appearance in 1957, in the academic paper written by Bellmann and Clark. Following this, numerous academic papers conducted by various authors (Osterwalder et al., 2005; Teece, 2010) focused on the topic of BM in their studies, while influential publications include those by Linder and Cantrell (2000), Osterwalder (2004), and Chesbrough (2006), among many others.

According to Baden-Fuller and Haefliger (2013), BM can be defined as a system solving the problem by recognizing the organization's customers, engaging with their needs and consequently satisfying them. BM is also defined as a method of earning income from the value provided to the customers (Baden-Fuller & Haefliger, 2013). Osterwalder & Pigneur (2010) describe BM as an abstract illustration of how an organization operates to achieve its strategic objectives, while defining nine main components – building blocks – for designing a BM.

BMs operating in the digital age have been transforming existing industries at a rapid pace (Yrjölä et al., 2020). Companies try to cope with the impacts of COVID-19 pandemic by pursuing the BM transformation using the support of digital technologies (Priyono et al., 2020).

This new digital era highlighted the importance of the terms such as digitalization and digital transformation. It is vital to distinguish between these two terms, even though current literature use these terms interchangeably, in some cases. Digitalization electricifies processes, and can be described as the encoding of analog information into a digital format (Ilcus, 2018). Some argue that with digitalization becoming commoditized, differentiation depends on the new practices it enables. In order to succeed, companies must master digitalization, which involves the socio-technical processes that accompany the process of digitalization (Sklyar et al., 2019).

On the contrary, digital transformation is described as a complex approach that includes company-wide change that requires the development of new BMs. These BMs are designed through the implementation of a new business logic to create and capture value (Soluk & Kammerlander, 2021; Verhoef et al., 2021).

Digital transformation represents a certain ability of an organization to successfully adapt and react to the development of technology at a rapid pace. The digital transformation of consumer markets forces companies to rethink, reshape and redesign their BMs (Fathi & Ghobakhloo, 2020). Osterwalder and Pigneur (2010) popular and widely adopted BM Canvas is used as a base, evaluating all nine building blocks – customer segments, value propositions, channels, customer relationships, revenue streams, key resource, key activities, key partnerships, cost structure – of the business model and analyzing its degree of digital transformation (Osterwalder & Pigneur, 2010).

A critical structure focusing on the achievement of digital transformation is a team of digital projects, nevertheless there is very little research on how they are created and developed (Guinan et al., 2019). Furthermore,

digital technologies are being adopted and furtherly used at a faster pace than previous waves of innovation (Bar-ykin et al., 2020). Innovation often tends to coincide with digital transformations, which provides companies with the opportunity to enter new markets and therefore offer their goods and services to the large scale of potential customers. It is possible to implement three specific mechanisms companies can benefit from: digital technologies, advanced skills and economies of scale. All three of them heavily influence the BMs of companies.

Digital technologies facilitate labor market information, which means that companies can hire the best trained and skilled people for specific tasks. Subsequently, new jobs are created for these tasks, leading to advantages on the labor market. Advanced skills lead to increased employee productivity, possibly leading to lower production costs and therefore increase the company's revenues. Economies of scale are created, favoring innovation, thereby enhancing the benefits of a strengthened digital economy (Galindo-Martín et al., 2019).

2. Methodology and research design

This paper aims to investigate the effect of digital transformation of SMEs' BMs through nine building blocks of BM Canvas, observing the degree of digital transformation pre-pandemic and its current state in the specific blocks. The analysis is based on the survey conducted with eighteen chosen SMEs, followed by semi-structured interviews with management representatives of SMEs. Emphasis is placed on analyzing companies' development and changes in digital transformation in times of pandemic through nine building blocks of BM Canvas, more specifically, how these building blocks react to digital transformation, and whether they react proportionally in each building block, or whether the level of digital transformation is rather different in each block.

The survey with the management of SMEs is focused on digital transformation of nine building blocks of BM Canvas. Management representatives of eighteen chosen SMEs from the manufacturing industry participated in the survey. The survey results then provide a base, analyzing the development and changes of BM Canvas of SME in the field of digital transformation.

The survey in the online form, supported by semi-structured online interviews with chosen companies and their representatives, has been conducted. Authors are looking for similarities and differences in their BMs and the extent to which different building blocks of their BMs changed thanks to the rapid pace of digital transformation that has been (in several cases) accelerated by the pandemic.

2.1. The degree of digital transformation of building blocks

It is crucial to set a relationship between the degree of digital transformation of SME and its interpretation within nine building blocks of BM Canvas. The

description is captured in text below. For the survey and semi-structured interviews with SME representatives, the three degrees of digital transformation for each building block were identified, and are described in detail to provide a unified framework for perceiving different degrees of digital transformation.

Relationship between the degree of digital transformation of SME and its interpretation within nine building blocks of BM Canvas:

LOW (0–40%): The building blocks are only partially digitally transformed, to a minimal extent, but rather not at all. Even this limited extent of digital transformation is only captured in some building blocks, not all of them. Basic and limited use of some digital tools, only for some building blocks. Building blocks remained almost entirely unchanged (Osterwalder & Pigneur, 2010). Therefore, Digital technologies are not frequently used. However, with existing awareness of the adoption of digital technologies within the manufacturing industry, SMEs are aware of digital transformation as such, and this phenomenon is happening (Garzoni et al., 2020).

MEDIUM (41–70%): Some of the building blocks are at least partially digitally transformed. Digital transformation does not affect all building blocks; some remain in their original setting, and no digital tools, methods, and processes have been used. However, there is an attempt to adjust these building blocks and make them more digitally friendly (Osterwalder & Pigneur, 2010). Companies use online data storage to keep administrative and communication processes. There is an existing trust between a network of suppliers and partners for the usage of digital technologies. Management of change occurs through the collaboration between business functions and the supply chain (Garzoni et al., 2020).

HIGH (71–100%): Most or all building blocks of SMEs are entirely or almost entirely digitally transformed, using digital tools and procedures. If not wholly digitally transformed, there is an active and continuous attempt to digitally transform the building blocks that are not digitally transformed just yet-significant interest in the digital transformation of processes. Technologies are available mainly through digital solutions for production, distribution, and a more relevant impact on society regarding strategic and organizational decisions and solutions. Online data repositories use customized tools (blockchain, big data analysis). Digital technologies are adapted to business processes (Garzoni et al., 2020).

2.2. Digital transformation of building blocks

To interpret the results from conducting the survey and semi-structured interviews with representatives of SMEs in the manufacturing industry, three statistical characteristics were used for evaluation purposes. The mean (average), mode, and median. The mean (average) of a data set is found when adding all numbers in the data set. Then, numbers are divided by the number of values in the set. The median represents the middle value when a data set is ordered from least to most significant. The

mode represents the most often occurred number in a data set (Khan Academy, 2021).

3. Research findings/results

The following chapter presents the research results focused on similarities and differences in SMEs’ BM Canvas and how each block of their BMs changed thanks to the rapid pace of digital transformation. The results provide an overview of changes in the different building blocks of SMEs’ business model.

The authors investigated how the changes in the digital transformation of SMEs were reflected in individual building blocks of BM Canvas. Each building block is examined below, considering the level of digital transformation before pandemic, and current level of digital transformation. The average, Mode, and Median are incorporated as quantities comparing results.

3.1. Customer segment

Before the pandemic, the average rate of digital transformation was 31.67%. Now, the average rate is 56.61%, showing an increase of 24.94%. Before the pandemic, there were 3 Modes: 30%, 50%, and 60%. Currently, there are two Modes with values of 60% and 80%, whereas the value of the Mode has increased in some respects. Median increased by 30%, with the current level being 60%. The following Table 1 summarizes the mode, median, and average digitization rates.

Table 1. Summarizes the mode, median, and average digitization rates in the Customer segment block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	30%, 50%, 60%	60%, 80%	X
Median	30%	60%	30%
The average rate of digital transformation	31.7%	56.61%	24.94%

Companies representatives were also asked how significantly the pandemic affected individual blocks, whether low, medium or high. In the eyes of respondents, the Customer Segment was affected on the medium level of 55.5%. 27.8% of SMEs stated that the changes were on a low level, and 16.7% recorded high level changes. These numbers are shown in the following Figure 1.

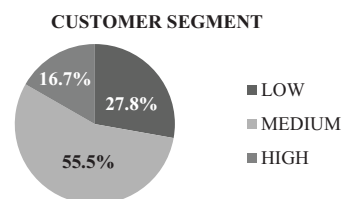


Figure 1. Digital transformation in the Customer segment block (source: created by authors)

The most significant changes occurred mainly in communication with customers (emails, phone, website, or social media). SMEs had to reduce physical contact that has not been an effective solution for them. Nevertheless, some SMEs also stated that customer segmentation has expanded, mainly due to the better online communication that raised awareness about their business and attracted new customers. SMEs also managed to develop ordering systems that they were lacking before. This is one of the positive changes, and SMEs will stick to the online ordering systems in the future.

The transition to electronic invoices is perceived in a rather controversial way. While it is effective in terms of speed, it also carries specific negatives in terms of return, when many companies suffer from overdue receivables, e.g. customers do not pay on time. Such problems existed before, but significantly increased due to the digital transformation. The reason might be a lack of customer funds, or even the fact they intentionally postpone payments, as they also have outstanding receivables.

3.2. Value propositions

The level of digital transformation in the value propositions building block was 47.39% before the pandemic. The current rate is 53.89%, representing an increase of 6.5%. The Mode before the pandemic was 40%. Currently, there are two modes with values of 50% and 60%. The Median was 44%, during the pandemic increased by 11% to 55%. These values are shown in the following Table 2.

Table 2. Summarizes the mode, median, and average digitization rates in the Value propositions block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	40%	50%, 60%	X
Median	44%	55%	11%
The average rate of digital transformation	47.39%	53.89%	6.5%

Within Value Propositions, 50% of SMEs evaluate changes in digital transformation at a medium level, 38.9% of SMEs state that the level of changes were low, and 11.1% described the level of changes as high. The following Figure 2 shows the values.

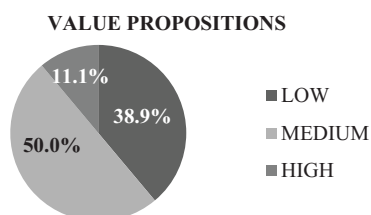


Figure 2. Digital transformation in the Value propositions block (source: created by authors)

Based on the results, the value proposition of SMEs was not significantly affected by the pandemic. The most common change was captured in expanding the range of products as well as adjusting their prices. However, the customer segment adapted to new prices, and understood the increase. Conversely, some SMEs had to lower prices to get out of the crisis, as they did not want to lose customers, as some of the customers lost their profits and focused on survival. The value proposition was also increased by the block of distribution channels, when due to digital transformation, it was necessary to reflect the prices for distribution in the value proposition.

3.3. Channels

The average level of digital transformation before the pandemic was 36.83%. The current average level is 71.72%, representing almost a double increase in the average level of digital transformation of 34.89%. The median increased to 75%. The Mode before the pandemic was only 15%. Currently, there are three modes: 75%, 80%, and 90% (Table 3).

Table 3. Summarizes the mode, median, and average digitization rates in the Channels block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	15%	75%, 80%, 90%	X
Median	40%	75%	35%
The average rate of digital transformation	36.83 %	71.72%	34.89%

In total, 50% of SMEs stated that this block was significantly affected (high) in terms of digital transformation. 44.4% of SMEs claim that the impact was on a medium level, and only 5.6% say that there were no changes or minimal changes in terms of digital transformation applied within this building block (Figure 3).

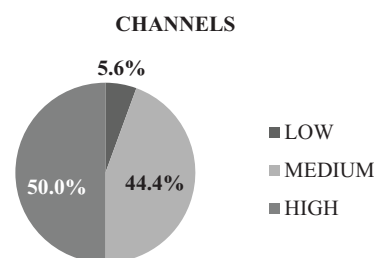


Figure 3. Digital transformation in the Channels block (source: created by authors)

Distribution channels record the highest increase in the level of digital transformation, thus being the most affected building block in terms of digital transformation. Digital transformation is mainly visible in the distribution of the product to end customers. Due to the limitations of personal meetings and personal deliveries, many

areas had to be addressed and digitally transformed. The SMEs concluded new contracts with courier companies. Some SMEs focused on “contactless” delivery. All communication regarding delivery took place “remotely” – by phone, e-mail, etc. Some SMEs (about 2/3 of respondents) state that as soon as the pandemic subsides, even if they keep the digitally transformed distribution partially, they aim to return to personal delivery, and contact with customers. Thus, customers can view and select products on site, choose materials, etc. SMEs also want to see the quality of material from suppliers in person, so they aim to return to personal distributions.

3.4. Customer relationships

The average level of digital transformation of customer relationship building blocks was 41.94% before the pandemic, currently increased by 22.34%. The Median was 45%, and the mode was 60%. The median currently increased by 25%, and is 70%. The mode is currently at 90% (Table 4).

Table 4. Summarizes the mode, median, and average digitization rates in the Customer Relationships block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	60%	90%	X
Median	45%	70%	25%
The average rate of digital transformation	41.94%	64.24%	22.34%

Furthermore, 66.6% of companies state that the pandemic had a moderate effect on digital transformation in this block. 27.8% say that the impact was significant, and 5.6% talk about minimal or non-existent impact (Figure 4).

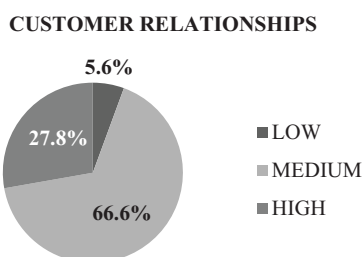


Figure 4. Digital transformation in the Customer Relationships block (source: created by authors)

According to the SME, the relationship with customers improved mainly since they could communicate more with customers in the online space, and they took full advantage of it. In addition, some SMEs have also begun to pay attention to social networks, where customer relationships have improved significantly as a result. In other words, relationships with customers were mainly affected by the fact that personal communication was

significantly limited by regulations. Therefore, customers only had the option of online communication with SMEs. Customers appreciated digital transformation of ordering systems, and better online communication (more regular communication on social media, web/e-shop updates). As with distribution channels, especially the smaller companies relied on personal communication, so they want to be in personal contact with customers. However, this does not mean that they will give up the digital transformation efforts in this block. For some SMEs, these changes have helped gain new customers.

The question is how companies will apply these changes after the end of the pandemic, and whether they will use hybrid communication in both online and offline form. SMEs want to get back to personal communication, and personal relationships with customers. However, they would like to keep up with the current online communication, and ordering through online ordering systems.

3.5. Revenue streams

Within this building block, the average level of digital transformation before the pandemic was 45.11%. The Median was 48.5%, and mode was 50%. The average rate increased to 61.17%, which is by 16.06%. The current mode is 75%, and the median is 60%, which is an increase of 11.5% (Table 5).

Table 5. Summarizes the mode, median, and average digitization rates in the Revenue Streams block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	50%	75%	X
Median	48.5%	60%	11.5%
The average rate of digital transformation	45.11%	61.17%	16.06%

Furtherly, 44.4% of SMEs stated that this block was affected moderately, and 38.9% stated that it was not affected, or affected only minimally. Only 16.7% of companies report that digital transformation has significantly affected this block (Figure 5).

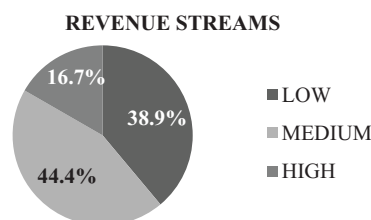


Figure 5. Digital transformation in the Revenue Streams block (source: created by authors)

In this block, SMEs shared different opinions. Some SMEs stated their main revenue stream was a paying

customer in a store, but during a pandemic it turned into an e-shop customer. Others claim that they were not affected in any way within this building block. Some SMEs tried to acquire new segmentation, as it also affected their income / profits. What all companies agree on is that cash transactions were minimal, unlike those online. Although the expansion of segmentation sounds positive, it is not very beneficial for companies, as it has negatively affected the existing one. So even though digital transformation was present, it was not on a very high level, and consequently not very efficient.

Companies primarily perceive the use of the data box as a change. Certain products that brought companies new revenue also changed. Most SMEs also claim that due to the pandemic, resources had to be focused on online banking, as the measures did not allow personal contact, and they could not receive any cash.

3.6. Key resources

The average rate of digital transformation for Key Resources before the pandemic was 43.5%. The Median before the pandemic was 40%, and mode was 30%. Currently, the median is 60%, increasing by 20%. There are currently two modes: 60% and 80% (Table 6).

Table 6. Summarizes the mode, median, and average digitization rates in the Key Resources block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	30%	60%, 80%	X
Median	40%	60%	20%
The average rate of digital transformation	43.5%	57.78%	14.28%

Moreover, 38.9% of SMEs state that digital transformation affected this building block to a minimal extent, or not at all. However, the same percentage reported a moderate level of digital transformation in this block. 22.2% of SMEs claim that this block was significantly affected (Figure 6).

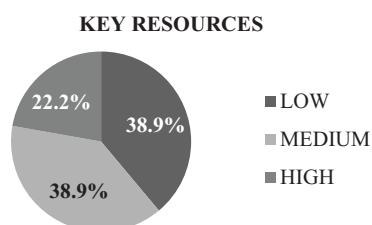


Figure 6. Digital transformation in the Key Resources block (source: created by authors)

Major changes in the SMEs occurred mainly within the structure of communication in orders, when everything was transferred from the classic physical contact of creating a product order to an online order. The SMEs

state that the main factor here was the modification of e-shop pages and websites. More than half of the SMEs claim that they had to train employees for these changes.

3.7. Key activities

Key Activities had a 43.78% rate of digital transformation before the pandemic. Mode and median were both 40%. The average digital transformation rate increased to 75.39%, which is an increase of 31.61%. Currently, the median and mode are at 80%, representing an increase of 40% (Table 7).

Table 7. Summarizes the mode, median, and average digitization rates in the Key Activities block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	40%	80%	X
Median	40%	80%	40%
The average rate of digital transformation	43.78%	75.39%	36.61%

Furtherly, 44.4% of SMEs think that the level of digital transformation was high, 33.3% claim the level is medium, and 22.2% argue that their main activities have not been digitally transformed, or have been digitally transformed on a minimal level (Figure 7).

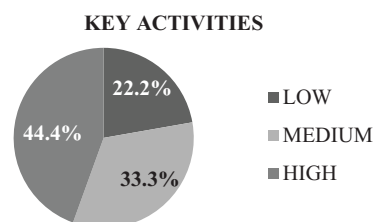


Figure 7. Digital transformation in the Key Activities block (source: created by authors)

The main activities recorded the most significant changes. SMEs had to fully adjust communication with customers, with most having to create or update online platforms – social networks, websites, e-shops. Additional services to the manufactured products as well as marketing, in general, have also developed.

3.8. Key partnerships

The average digital transformation rate for Key Partnerships building block before the pandemic was 38.39%. The pre-pandemic modes were 30%, 50%, and 60%. The median was 33.5%. The average value of digital transformation increased to 53.5%, which is by 15.11%. The mode is now 50%, and the median increased by 19%, to 52.5% (Table 8).

Furthermore, 61.1% of the surveyed SMEs stated that the pandemic affected this block at a low level, whereas 27.8% SMEs then state that this block was affected

moderately, and 11.1% say that it was affected on a high level (Figure 8).

Table 8. Summarizes the mode, median, and average digitization rates in the Key Partnerships block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	20%, 50%, 60%	50%	X
Median	33.5%	52.5%	19%
The average rate of digital transformation	38.39%	53.5%	15.11%

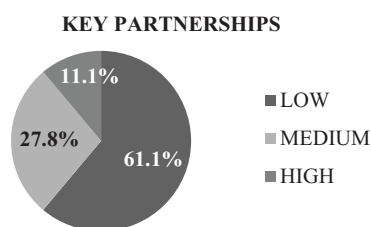


Figure 8. Digital transformation in the Key Partnerships block (source: created by authors)

There were not too many changes reflected in this building block. However, the SMEs said that perhaps the most fundamental change was establishing new business relationships with courier services. New partnerships have also developed, mainly with external companies operating in the field of IT, logistics, and online marketing communication. Nevertheless, SMEs would like to get back to the communication in person as much as possible, when the situation fully allows it.

3.9. Cost structure

In the Cost Structure building block, the average rate of digital transformation before the pandemic was 40.56%. The median and mode were both 50%. The average value of digital transformation increased to 60.17%, i.e., by 19.61%. The pre-pandemic mode was 40%, and the median was 42.5%. Currently, the mode is 80%, and the median is 60% (Table 9).

Table 9. Summarizes the mode, median, and average digitization rates in the Cost Structure block (source: created by authors)

	Before pandemic	Now	The increase (%)
Mode	40%	80%	X
Median	42.5%	60%	17.5%
The average rate of digital transformation	40.56%	60.17%	19.61%

Furthermore, 61.1% of SMEs report medium level of digital transformation on this building block. 22.2% claim low level of digital transformation, and 16.7% state

the high level of digital transformation in this block (Figure 9).

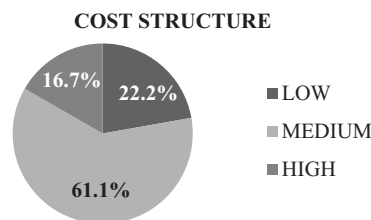


Figure 9. Digital transformation in the Cost Structure block (source: created by authors)

According to most SMEs, digital transformation in this area was mainly caused by the transition to online platforms, which increased costs. As a result, it was necessary to purchase more modern IT equipment. As a result, prices from suppliers were also raised. Most of the invoices were paid online, SMEs created electronic invoices, and started to use data boxes. The most investments were made in the website, and e-shop updates, social networks, ordering systems, and distribution.

3.10. The evaluation of the significance of each building block of BM Canvas

To conclude the research, SMEs were asked to evaluate each building block based on its significance for the company. SMEs evaluated on a scale of 1–5 when the number 1 was the least significant, the number 5 was the most significant. The following table summarizes the average significance of the individual blocks, their average rate of digital transformation before and during the COVID-19 pandemic, and shows the percentage increase in the average rate of digital transformation.

Table 10. Conclusions on the level of digital transformation in the individual building blocks of the BM Canvas (source: created by authors)

	The Average Significance	The average rate of digital transformation (%)		The increase (%)
		Before pandemic	Now	
Customer Segments	4.30	31.67	56.61	24.94
Value Propositions	3.00	47.39	53.89	6.50
Channels	2.78	36.83	71.72	34.89
Customer Relationships	4.06	41.94	64.28	22.34
Revenue Streams	3.33	45.11	61.17	16.06
Key Resources	3.06	43.50	57.78	14.28
Key Activities	3.28	43.78	75.39	31.61
Key Partnerships	3.28	38.39	53.50	15.11
Cost Structure	3.44	40.56	60.17	19.61
The Total Average	3.39	41.02	61.61	20.59

The highest value is marked in grey, the lowest in black. Based on the results displayed in Table 10, the most significant building block for SMEs in the eyes of their management is the Customer Segment building block with the value of 4.3. Nevertheless, this building block does not have the highest increase of digital transformation. On the contrary, the lowest significance possesses Channels with the value of 2.78. Before the pandemic, the highest rate of digital transformation was recorded at Value propositions, with the average rate of 47.39%. In contrast, the lowest rate was captured at Customer Segments with a 31.67% average rate of digital transformation. Currently, the highest rate is displayed at Key Activities with 75.39%, and lowest rate is 53.5% in Key Partnerships. Considering the percentage increase of digital transformation, the highest raise was captured in Channels with an increase of 34.89%. On the contrary, the lowest increase records Value Propositions which amounted only 6.5%.

Considering the importance of each building block within BM Canvas, the total average is 3.39%, with 5 being the most important block, and 1 the least important block. However, the above average value is only displayed in three blocks: Customer Segments, Customer Relationships, and Cost Structure. The other six building blocks are below average. Consequently, customers and relationships towards customers are significant factors for SMEs. The total average rate of digital transformation pre-pandemic was 41.2%, with the current total average being 61.61%, representing an increase of 20.59%.

Conclusions

Findings show significant changes in several aspects of the BMs models of SMEs. Based on the survey, and follow-up semi-structured interview, the authors observed similarities and differences in terms of changes of different building blocks of BMs that arise due to the different scope of implemented tools and processes of digital transformation within SMEs. The level of digital transformation certainly differs in the individual building blocks of the BM Canvas of SMEs. While some building blocks were not significantly affected by the COVID-19 pandemic, and SMEs did not experience the need to apply digital tools, measures, and processes for these blocks, other building blocks experienced a high increase in the rate of digital transformation, accelerated by the COVID-19 pandemic. The total average increase of digital transformation is 20.59%, with Channels recording the highest increase of the level of digital transformation of 34.89%. Nevertheless, in contrast, Channels were also rated as the least important aspect in the eyes of respondents, with an average significance of 2.78. Further, SMEs evaluated the level of digital transformation in each of their building blocks, whereas the outcomes vary not only for each company, but also within different building blocks of one company. To conclude, the authors state that the level of digital transformation differs in the individual building blocks of the BM Canvas.

Research limitations

This paper faces research limitations. A relatively small sample (eighteen) of companies from the manufacturing industry participated in the survey. Moreover, even though the data were anonymous, authors found companies reluctant to share specific internal information, which might affect the overall outcome.

Funding

This paper was supported by the Specific project “Strategic development of the company and business approaches in the context of environmental development” [FP-S-22-7924].

Disclosure statement

Authors declare that they do not have any competing financial, professional, or personal interests from other parties.

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