The Impact of Digital Transformation on the Organization's Response to the COVID-19 Challenge

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Abstract

COVID-19 is, first and foremost, a health and humanitarian crisis; moreover, it has had a detrimental effect on the performance of businesses worldwide. However, digitalization may be seen as a solution to this crisis for some companies. This process of using digital technologies to adapt to new market requirements is known as digital transformation. This process is normally taking years, but currently, some sources report years' worth of digital transformation in the space of just a few months. However, some firms digitized and automated many of their processes and some only the minimum required to continue to function during the pandemic, which is indicative of their degree of digital transformation. This study attempts to illustrate how the degree of digital transformation affected the impact of COVID-19 on firm performance. To do this, we collected data via survey. This data was then analyzed using factor analysis techniques and structural equation modelling. The results suggest that the degree of digital transformation facilitated the digital transition during the pandemic but did not show any signs of alleviating the negative impact of the COVID-19 pandemic on firm performance.

Introduction

During the year 2019, a pandemic developed globally, which affected all firms around the world. The Pandemic, Covid-19 virus, caused many countries to create new legislation and a social standard known by the term "the new standard" (Czifra & Molnár, 2020). This included strict lockdown measures under which society was restricted from freely moving and trading in person (Kharroubi & Saleh, 2020). This caused a lot of customer-facing businesses to lose

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all or most of their business. In an effort to regain business and to continue to generate revenue, firms around the globe had to adapt to the digital transformation business practices.

The Covid-19 pandemic has caused a disruptive business environmental change that forced companies to adopt digital technologies under extreme circumstances (Priyono et al., 2020). The pandemic had a severe consequence on the economy around the world. Not only does this have global and nationwide consequences for the economy, but all of society is also affected. This has led to dramatic changes in how business owners operate and how consumers behave (Donthu & Gustafsson, 2020).

Digital transformation is a top priority for struggling companies to try and continue business operations and generate revenue through the use of digital platforms (Gonzalo et al., 2020). The digital transformation and technology in a firm are believed to enable firms to transform business models quickly (Priyono et al., 2020). Although Covid helped to accelerate the digital transformation efforts in companies, it may not have helped to make the transformation process easier (Wade & Shan, 2020).

It is believed that digital transformation will help firms to improve business performance and efficiency and reach more customers, which will lead to better service delivery and higher revenue at the end of the financial year (Wade & Shan, 2020). Our aim with this research is to determine if the degree of digital transformation in a company would have an impact on the successful adaptation to "the new normal" under the Covid-19 restrictions and whether the degree of digital transformation at the start of the Covid-19 restrictions, gave the company an advantage over companies with a lesser or no degree of digital transformation. Although our findings did not produce concrete evidence that the degree of digital transformation before the pandemic had a positive impact on the adaptation to the new business environment, we have gathered sufficient evidence of a significant association between the degree of digital maturity before the pandemic and the digital transformation efforts during the pandemic.

Literature Review

Digital Transformation and Its Impact on Business Performance

Digital transformation, according to Markus & Rowe (2021), is not well theorized and is a multifaceted phenomenon in that it has different aspects/implications for different companies. The literature section will aim to define what digital transformation encompasses.

Hanelt et al. (2021) described digital transformation as an organizational change shaped because of the widespread diffusion of digital technologies. Ulas (2019) explained that digital transformation is the result when companies successfully transform their business models, describing it as forming new business practices. Mazzone (2014) elaborated that digital transformation can be described as the intentional and continuous digital evolution of a company's business methodology, both strategically and tactically. Clark (2018) concluded that digital transformation is the process of transformation that includes the change in process, people, and technology. Andriole (2020) stated that digital transformation focuses on altering the way businesses operate and serve customers through the change of process and strategy

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and the use of digital technologies. Seufert & Meier (2016) added that to successfully implement a digital transformation, we have to understand the behavior, preferences and choices of the consumers first.

Soto-Acosta (2020) says that it is possible to conclude that digital transformation is the transformation to how business is conducted, the change in the evolution of their business methodologies and strategy, and significant changes in the firm's business model, resulting in a change of their business processes, company culture and technology used, finally altering how the company operates and serve their customers.

Frankiewicz & Chamorro-Premuzic (2020) highlighted that digital transformation is more than just technology transfer and that it is addressing managerial and redesigning business processes while some argued that it is more about people or cultural evolution than it is about technology. Shaughnessy (2018) calls it a social phenomenon resulting in cultural changes. From this, we can conclude that digital transformation is also about the social and innovation and development of a company.

Schallmo, Williams & Boardman (2020) argued that the main objective of digital transformation is to obtain new information and use it to redesign old, rule-based processes in an organization. Tang (2021) characterized digital transformation as the use of information and communication technologies as well as mushrooming of new digital technologies to adopt and present a new form of transformation, leading to the conclusion that digital transformation is also the gathering of data and the use of that data in an organization to continuously evolve.

From the previous three conclusions, we can confirm the conclusion of Ashwell (2017) that digital transformation is a combined effort that includes Data, Digital Technologies, and People. İnel (2019) concluded that digital transformation has three focus areas known as customer experience, business models and operational process.

Mubarak et al. (2019) found that digital transformation has a positive impact on business performance. Nwankpa & Roumani (2016) stated that digital transformation has a positive influence on business performance and innovation. Llopis-Albert, Rubio & Valero (2021) concluded that digital transformation could help to improve productivity and competitiveness and increase the profit of firms. Chen et al. (2021) found that small service businesses improve their business growth and business performance through the use of digital transformation.

Chen, Jaw & Wu (2016) found that digital transformation could have a negative impact on industry benchmark information but that further investigation is required to confirm. Guzmán-Ortiz et al. (2020) found that although digital transformation has a significant effect on task performance that it has little or no effect on customer's service experience. Vial (2019) reviewed that the changes brought by digital transformation could have both positive and negative outcomes.

COVID-19 Outbreak and Its Impact on Business Performance

An outbreak of pneumonia was reported in the city of Wuhan, China, in December 2019. The virus was isolated and shown to be a novel coronavirus and was named SARS-CoV-2. This virus, also known as COVID-19, quickly spread worldwide, and a pandemic was declared by the World Health Organization on March 12, 2020. This pandemic has cost many human lives and has had huge financial repercussions (Ciotti et al., 2020).

Some industries have been affected more than others by the pandemic. Borders were closed, and all but essential travel was prohibited in many areas (Albers & Rundshagen, 2020).

According to UNESCO, the COVID-19 pandemic has forced most governments around the world to temporarily close educational institutions in order to contain the spread of the virus. This has impacted over 91% of the world's student population. (Tumwesige, 2020). A study on Chinese firms shows that COVID-19 had a negative effect on corporate performance in terms of production, operation, and sales (Shen et al., 2020).

With the onset of lockdowns, many companies moved to virtual workplaces. This presented new challenges in human resources. The pandemic also severely affected logistics, and many supply chains were disrupted, as this 2020 study shows (Singh et al. 2020). Another study has shown the financial impact on firms, a decrease in revenue, profitability and investment in all industries (Abedalqader et al., 2020).

The COVID-19 pandemic has brought uncertain times for businesses and has presented unique challenges that some companies have overcome, and some have not. Businesses with the willingness and resources to change their way of operating have managed to survive and even flourish (Almeida, Santos & Monteiro, 2020).

Digital Transformation and COVID-19

Meiler (2020) outlines the limitations of digital transformation during the pandemic, including the misunderstanding of the power of AI, inappropriate systems and digital divides. Savić (2020) states COVID has driven the digital transformation in many businesses at an unprecedented speed. Agostino, Arnaboldi & Lema (2021) conclude that the COVID situation highlights several underlining issues that are connected to digital transformation.

There is a lack of research concerning the role of digital transformation in mitigating the negative performance caused by the COVID-19 pandemic. Our research will address this role.

Research Methodology

Overview of the Proposed Conceptual Framework

We proposed that digital transformation has played a role in how businesses have responded to the COVID-19 pandemic and that the pandemic, in turn, has influenced digital transformation. For this, it was necessary to find out how the COVID-19 pandemic affected the different aspects of business, including finance, logistics. It was also required to know at

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what stage in the digital transformation process firms were at before the pandemic hit, whether they started this process before or only after, and how many company processes were automated before and after the onset of COVID-19 measures. Also deemed essential was to find out if the COVID-19 pandemic sped up the digital transformation process and if the result of digital transformation alleviated any negative effects caused by the pandemic.
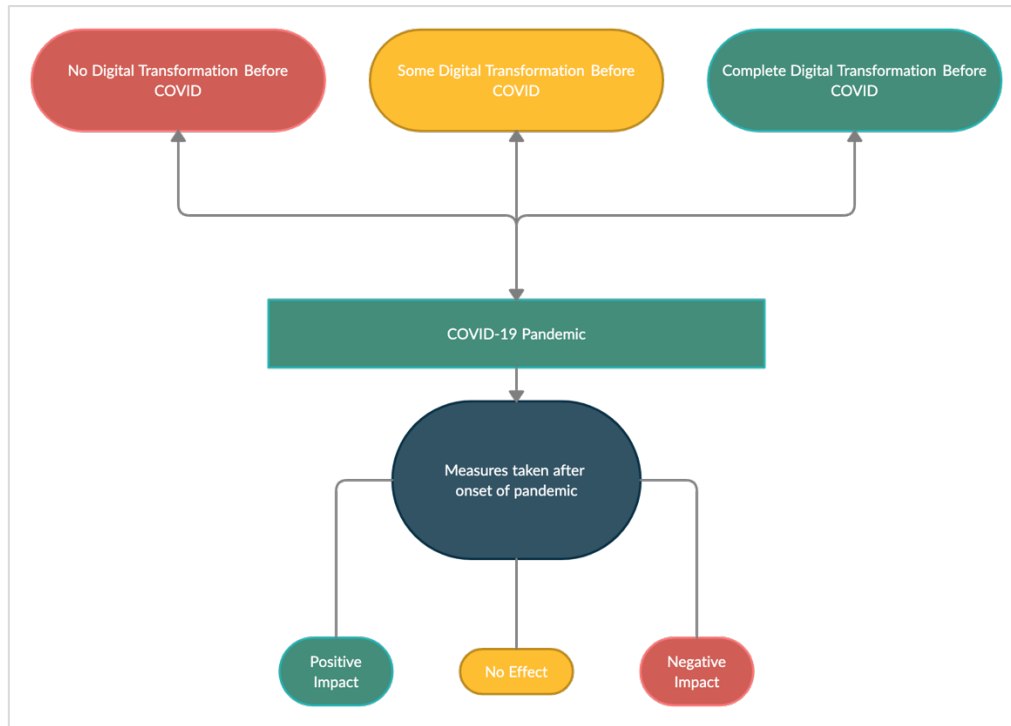

Figure 1: Conceptual Framework

Development of Instrument and Data Collection

The study adopted a survey research design and was distributed via social media platforms; thus, voluntary sampling was used. The data capturing design was quantitative to allow for descriptive and inferential analysis. We selected an exploratory design suitable for research in areas where "little is known" and therefore used it to generate new research questions that can be explored further in future research. We have used the questionnaire from Deloitte to structure our digital transformation questions. The survey was around two main themes: the degree of digital transformation in a company and the impact of covid 19. The survey was the first pilot tested to confirm that the questions were understood before being distributed to collect the data used for this paper. We used a pilot sample of 10 respondents and checked the instrument for internal consistency with Cronbach's alpha, which for the pilot sample was 0.85. After the data from 68 respondents were collected, data analysis was executed using Principal Component Analysis (PCA) to reduce dimensions of variables and the Structural Equation Modelling (SEM) method for estimating the relationships between a latent dependent variable and one or more unobserved independent variables. The software we used for the statistical analysis included SPSS, SmartPLS and MS Excel. We also used the bootstrapping technique to reduce the problem of small sample size; five hundred resamples were done during the procedure.

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Data Analysis and Results

Descriptive Statistics of the Sample

The sample contains 68 observations, which are responses to the questionnaire obtained from respondents online using a volunteer sampling process. The modal group of respondents, 37%, are from Thailand, with representation from 18 other countries of operation. The largest group of respondents also represented the education industry, 28%, other industries included hospitality, trade, manufacturing, transportation, and others. 86% of respondents represented for-profit businesses. The respondents were either employees or managerial level officers at their respective companies.
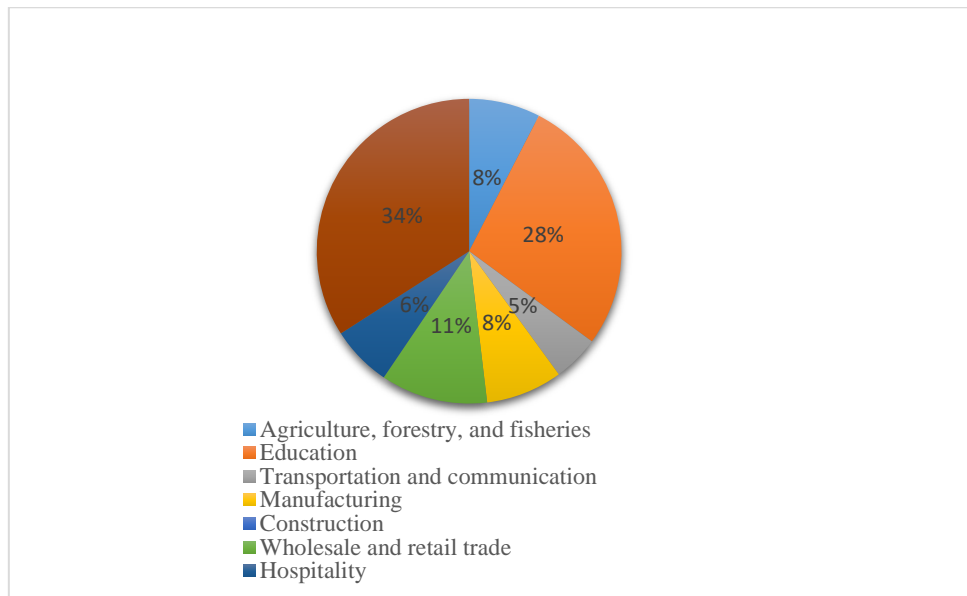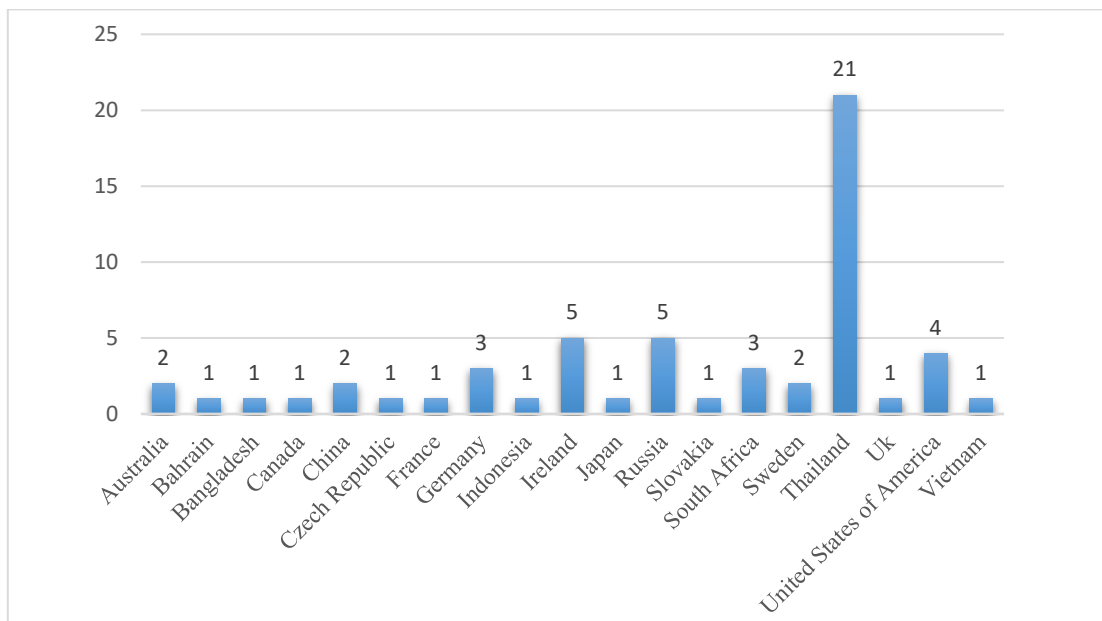

Figure 2: Respondents' Primary Industry of Operation

Figure 3: Respondents' Country of Operation

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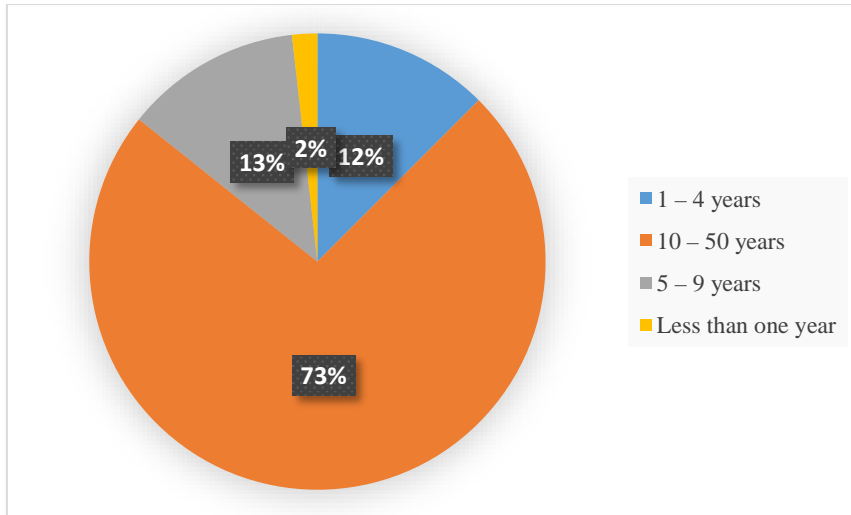*Int. J. Mgmt. Hum. Sci. 2021; 5(4): 16-30*

Figure 4: Companies' Age

Table 1 summarizes the variables collected from the scale, the questions were based on a Likert 5-point scale and asked respondents' agreement/disagreement with suggested statements, and the extent of the impact Covid-19 had on various operations. The variable "COVID" was obtained from the official statistical sources and represented the number of covid cases per million of the population in total and will serve as the proxy for Covid pandemic gravity in the respondents' countries (Ashraf, 2020).

Table 1: Variables

Variable Name	Description	Type
Profit	Whether for-profit/nonprofit organization	Qualitative
Revenue	Revenue of the organization in its last fiscal year	Qualitative
Headcount	Organization's total employee headcount	Qualitative
Age	How long the organization has been in business	Qualitative
Position	The position in the organization of the surveyed person	Qualitative
Country	The organization's country of operations	Qualitative
Industry	The organization's primary industry	Qualitative
IMPACT1	The overall impact of Cov-19 on business	Quantitative
IMPACT2	Cov-19 impact on financial performance	Quantitative
IMPACT3	Cov-19 impact on customer demand	Quantitative
IMPACT4	Cov-19 impact on logistics	Quantitative
IMPACT5	Cov-19 impact on employees	Quantitative
DT1	The organization was using digital documents before Cov-19	Quantitative

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DT2	The organization stopped using printed documents after Cov-19	Quantitative
DT3	The organization started using automated business processes only after Cov-19	Quantitative
DT4	The organization used digital technology to monitor company performance before Cov-19.	Quantitative
DT5	The organization started using digital technology to monitor company performance only after Cov-19 started.	Quantitative
COVIDDT	How much Cov-19 contributed to digital transformation	Quantitative
DAVID	How much did digital transformation help performance during Cov-19	Quantitative
DT_before	Identifier of digital transformation before Cov-19 (a sum of variables DT1, DT4 and DT6)	Quantitative
IMPACT	The total impact of Cov-19 on performance (a sum of variables IMPACT1, IMPACT2, IMPACT3, IMPACT4, IMPACT5)	Quantitative

The responses were coded on the ordinal and interval scales and produced the following results as described in Table 2.

Table 2: Descriptive Statistics of Quantitative Variables (N = 68)

	Minimum	**Maximum**	**Mean**	**Std. Deviation**
Profit	0	1	0.88	0.325
Revenue	0	4	2.26	1.356
Headcount	1	4	3.29	1.037
Age	1	4	3.57	0.759
IMPACT1	-2	2	-0.71	1.222
IMPACT2	-2	2	-0.59	1.307
IMPACT3	-2	2	-0.56	1.365
IMPACT4	-2	2	-0.74	1.167
IMPACT5	-2	2	-0.60	0.964
DT1	-2	2	0.25	1.342
DT2	-2	2	-0.06	1.370
DTstep2	-4	4	0.19	2.214
DT3	-2	2	-0.38	1.361
DT4	-2	2	0.46	1.227
DT5	-2	2	-0.26	1.367

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COVIDDT	1	4	2.76	0.866
DTCOVID	1	4	2.25	0.853
DT_before	-3	8	2.49	2.842
Dtbin	0	1	0.69	0.465
IMPACT	-10	10	-3.06	5.223
COVID	68	164469	51662.57	42502.936

The model we are using to analyze the interaction between digital transformation and the perceived Covid impact has to be based on unobserved variables of impact, firm controls and other unidentified groupings; moreover, we need to use bootstrapping procedure to alleviate the problem of small sample size (Goodhue, Lewis & Thompson, 2006), so the suggested method is the partial least squares structural equation model (PLS-SEM). However, first, we will reduce the sample dimensions using the principal component analysis procedure (PCA) (Yeh et al., 2010).
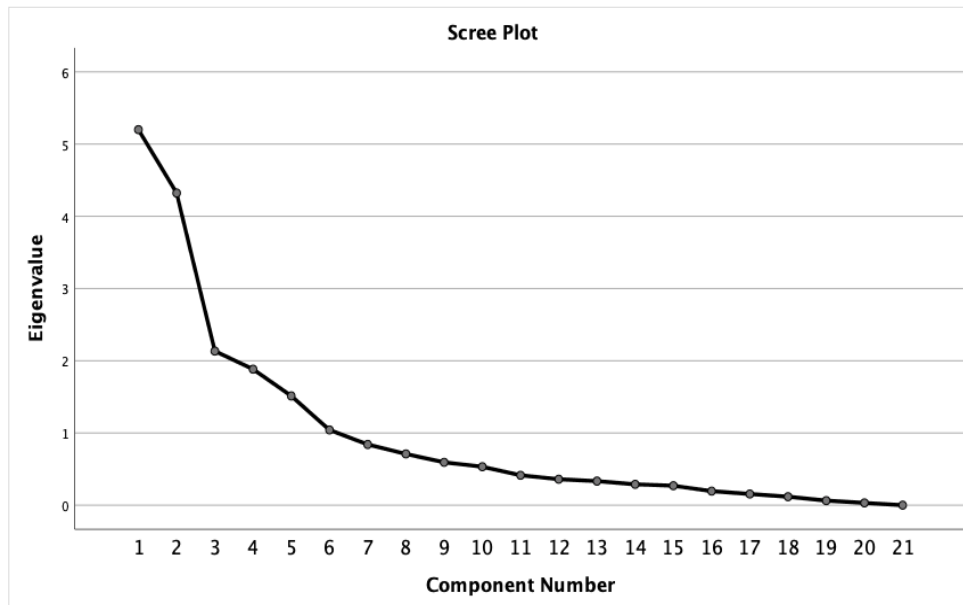

Figure 5: Scree Plot

To reduce the dimensions of variables and derive factors for the SEM, we conducted a PCA of all variables. The analysis has identified six principal components with eigenvalues above 1.0 (Figure 5). The grouped factors are presented in Table 3, the rotated component matrix. We can clearly observe six main components, the first three of which have distinctly higher eigenvalues; these are components describing the perceived impact of the Covid-19 pandemic, digital transformation before and digital transformation after the pandemic started. The rest of the factors do not clearly converge into principal components and logically are just firm controls.

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Table 3: Rotated Component Matrix

Rotated Component Matrix						
	Component					
	1		3	4	5	6
IMPACT2	0.923	-0.031	-0.117	-0.011	-0.028	0.106
IMPACT1	0.920	0.070	-0.081	0.101	-0.039	0.137
IMPACT3	0.894	-0.094	-0.050	0.030	0.018	0.154
IMPACT	0.812	-0.036	-0.052	0.169	0.019	0.125
IMPACT5	0.766	-0.025	-0.080	-0.022	-0.018	-0.026
IMPACT4	0.760	0.076	-0.123	-0.114	0.087	-0.166
DT_before	0.032	0.955	-0.004	0.063	-0.004	0.040
DT1	0.045	0.884	0.049	0.018	-0.091	-0.093
Dtbin	0.011	0.820	0.143	0.144	0.114	0.126
DT4	-0.143	0.817	-0.016	0.078	0.048	0.208
DTstep2	0.021	0.777	0.423	0.064	-0.081	-0.328
DAVID	-0.057	-0.059	0.799	0.163	-0.071	0.002
COVIDDT	-0.121	0.005	0.741	0.369	-0.150	-0.106
DT3	-0.216	0.192	0.657	-0.186	0.130	0.282
DT5	-0.222	0.208	0.643	-0.306	0.218	-0.092
DT2	-0.010	0.390	0.636	0.085	-0.042	-0.438
Age	-0.005	0.203	0.054	0.865	0.022	0.175
Headcount	0.094	0.106	0.099	0.819	0.196	-0.162
Profit	-0.033	-0.035	0.000	-0.057	0.917	0.009
Revenue	0.087	0.038	-0.018	0.329	0.816	-0.151
COVID	0.321	0.143	-0.049	0.031	-0.158	0.757
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization. [a]						
a. Rotation converged in 7 iterations.						

Model Assessment

Initially, we had six latent variables to use in PCM; however, after the selection, we omitted the firm control variables, as they were not significant, and the finalized path model contains four main components, which are the variables of interest: DT-After (Digital Transformation variable composed of factors indicating that the firm started the DT-process only after the pandemic began), DT-Before (Digital Transformation variable composed of factors indicating that the firm had started the DT-process before the pandemic), COVID which is an observed variable COVID, and IMPACT, which is composed of all IMPACT factors.

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The SEM model had one thousand bootstrap runs and presented results as described in Fig. 6. Path coefficients are presented in Table 4. The model values indicated the strong relationship between the latent variable DT-After and IMPACT, but no significant moderating effect of DT-Before, neither a direct effect of DT-efforts before the pandemic on the perceived impact.
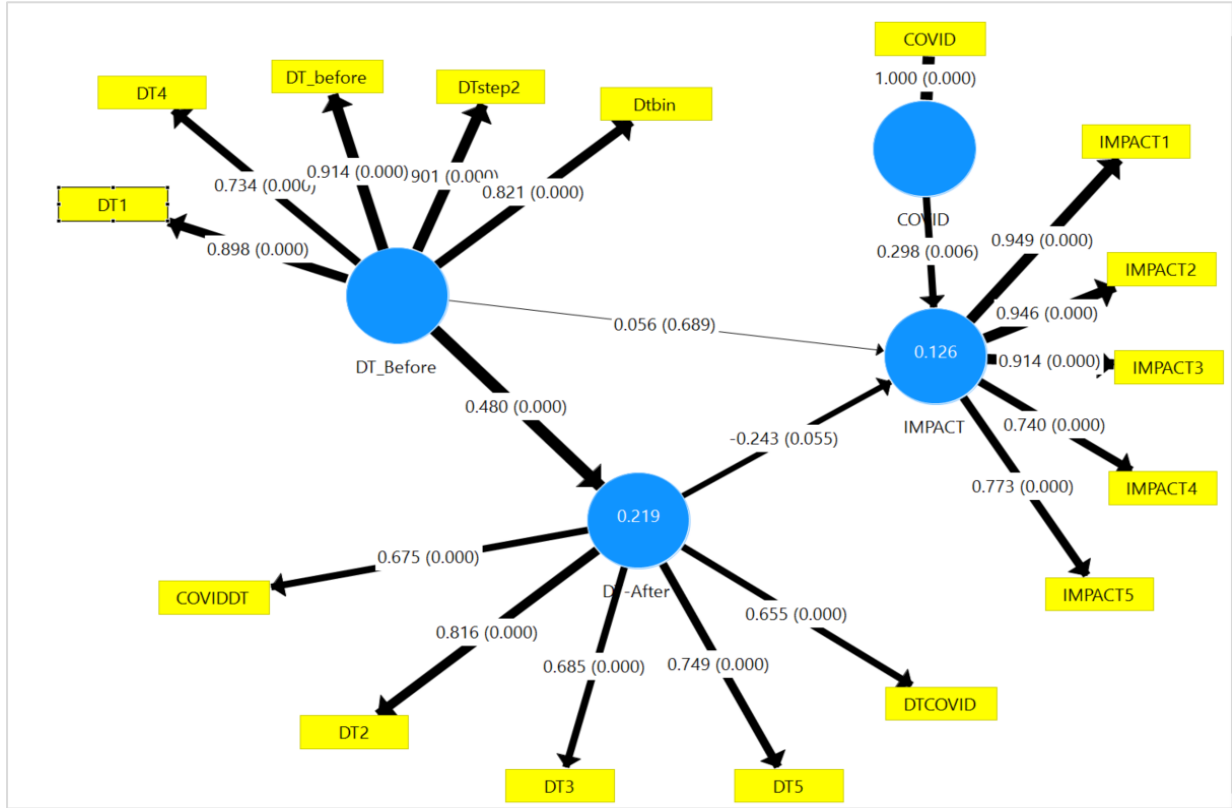

Figure 6: Structural Equation Model

Figure 6 demonstrates the SE-model for the concept, performed in the software Smart PLS-SEM and with 1,000 bootstrapping iterations; thickness of the connecting lines signifies the significance of the association and the value in the middle of the line indicates the path coefficient.

Table 4: Path Coefficients for the SEM Model

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
DT_Before -> IMPACT	0.0560	0.0541	0.1384	0.4047	0.6858
DT-After -> IMPACT	-0.2428	-0.2511	0.1194	2.0330	0.0423*
COVID -> IMPACT	0.2983	0.3107	0.1003	2.9741	0.0030**
DT_Before -> DT-After	0.4803	0.5059	0.0914	5.2523	0.0000***

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The negative value of the path coefficient between the latent variable DT-After and IMPACT indicates a negative association or a more negative impact on performance if the organization only started the DT-efforts after the start of the crisis (the relationship is significant, indicated by the p-value of 0.0423. The most significant relationship is between the variables DT_Before and DT_After; the association is positively indicated by the positive value of the path coefficient, low p-value (0.000), and rather strong (path coefficient = 0.4803). We checked for the presence of a moderating effect of DT_before on the relationship between COVID and IMPACT but did not find a significant effect, nor have we found a direct impact (p-value = 0.6858).

Discussion

The model can be interpreted the following way: the variable DT-After is in a negative association with the variable IMPACT, which means that firms that started the digital transformation efforts after the pandemic began, in general, tended to have more negative covid impact values on their business processes. The path model values indicate the largest negative impact on variables IMPACT 1,2, and 3, representing the overall impact, financial performance, and customer demand. Notably, firm control variables did not have any significant association with this relationship, so we conclude that firms of all sizes and industry affiliations were affected in the same way.

The variable DT-Before, however, had no significant moderating effect on the relationship between COVID and IMPACT, and the relationship demonstrated a positive association between the gravity of pandemic in the country and the impact on the business, but in such a way that in the countries with graver Covid conditions the negative impact was not so pronounced as in the countries with fewer covid cases. The explanation rests in the effect of the anti-covid measures taken by the government; the stricter the measures, the worse the effect on the business activity, but at the same time, the fewer Covid cases per million, hence less gravity.

The variable of interest DT-Before is in an interplay with the variable DT-After, quite logically indicating, also in support of previous research (Wade & Shan, 2020), that firms with a higher degree of digital transformation before the pandemic tend to have a higher degree of digital transformation after the pandemic began, which means that digital maturity facilitated the transition to a higher level of transformation forced by the pandemic, however as we found it was not immediately associated with the firm performance.

Conclusion

Our results contradict (Wade & Shan, 2020) in the way that we did not find significant evidence that organizations with a higher degree of digital transformation before the pandemic perform better; however, we support them in the statement that organizations with a higher degree of digital maturity found themselves better adapting to the requirements of digital transformation during the crisis.

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There are some limitations to online questionnaires. Questions may not always be answered honestly. There may be differences between the researchers' and the respondents' interpretation of certain questions. In some cases, questions may be too complicated or too vague. Respondents sometimes opt to complete a questionnaire without fully reading the questions or pondering their answers, which can affect validity. Financial constraints hindered the sample size of the survey.

As possible future research, a longitudinal study on the same subject over five years around the COVID-19 pandemic would yield interesting results. Also, of interest would be to explore whether firms continued with their digital transformation efforts after the pandemic ends or whether they will opt to retain traditional methods of operation.

Conflict of Interest

The authors declare that they have no conflict of interest.

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