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Investigating the Digital Transformation Level Across Industrial Dimensions

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ABSTRACT

Digital transformation drives operational efficiency, customer interaction and innovation. Hence it is necessary for industries to adopt digitalization in order to remain in competition with the global world. Hence, the present study investigated the factors influencing digital transformation within the textile industry, focusing on the roles of industry type, size, and sustainability concerns within industry. Using multinomial logistic regression, the study analyzed data from a sample of 124 textile companies of Pakistan to assess the impact of these factors on different levels of digital transformation. The industry size consists of small, medium and large industries while type of enterprises comprises of spinning, weaving, dying and printing. The digital transformation is classified into four levels in the present study, referring to as traditional, limited, moderate and high. Our results demonstrated that industry type, size, and sustainability concerns significantly impact digital transformation within the textile sector and it was observed that moderate level of digital transformation was found in many industries followed by limited and traditional level where as high level of transformation was found to be lacking, which indicates a strong need for policy making and initiatives in this regard. This research contributes to our understanding of digital transformation dynamics in the textile sector and offers directions for future research in broader contexts.

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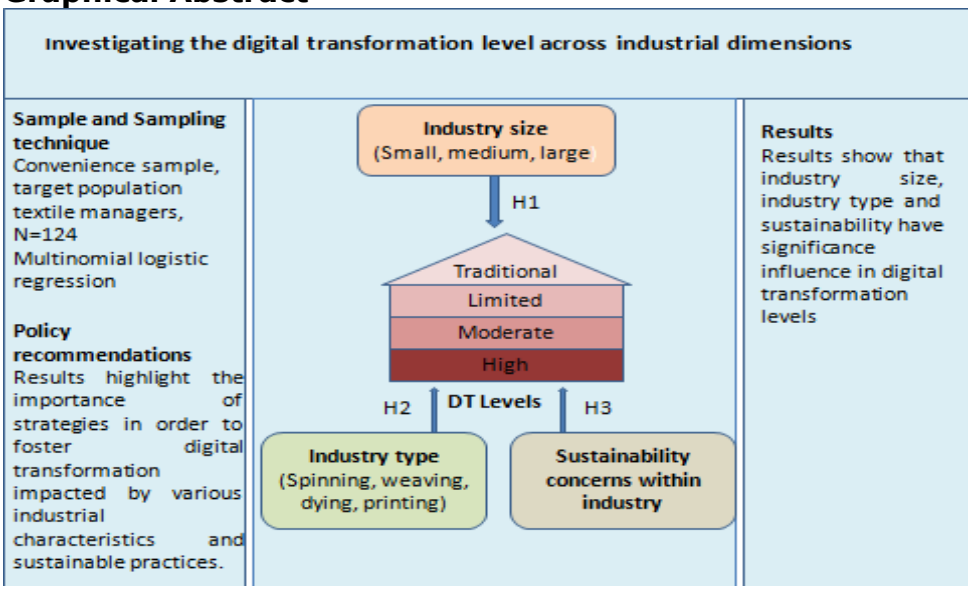
Graphical Abstract



1. Introduction

The advent of the digital age has brought about a wave of transformation across industries worldwide, fundamentally altering business operations, supply chains, and customer interactions. This phenomenon, known as digital transformation that contains integration of digital technologies into all aspects of a business, It has fundamentally changed how companies operate and deliver value to customers (Meng, 2023). Digital transformation is not is a critical driver of innovation, efficiency, and competitiveness in the modern economy (Egala, Amoah, Bashiru Jibril, Opoku, & Bruce, 2024). Digital transformation is essential for industries which want to maintain a competitive edge in modern digital world. Digital technologies such as internet of thin. Technologies such as internet of things (IoT), Artificial intelligence (AI), big data analytics and cloud computing helps to optimize industrial processes, enhance productivity, and create more personalized experience (Yu, 2023). Digital technologies provide insights for better decision making and in this way it makes them able to shift to customer demands and changing market conditions more swiftly (Wu, Li, Liu, & Li, 2024). The pursuit of sustainable and United Nations Development goals (UN SDGs) is linked to the implementation of digital transformation within industrial sector because by integrating digital solutions such as automation, data analytics and IoT, enterprises will significantly reduce environmental footprint. These technologies enable optimized production processes by more efficient use of resources such as water and energy. For example, IoT devices can help to track real time energy consumption and machinery performance. In this way efficient maintenance and energy conservation can be achieved. Devices like IoT sensors help in proper maintenance and energy conservation by real time monitoring of energy consumption and machine performance. The outcomes of this processes are the promotion of resilient infrastructure and sustainable industrialization as highlighted by SDG 0 (Industry, innovation and infrastructure). These goals also align with SDG 12 (Responsible consumption and production) by making supply chain more transparent and traceable thus these ensure sustainable practices from raw materials to finished product (Abed, Rizk, Zaki, & Elshewey, 2024).

SMEs forms the backbone of this sector and it provides employment to millions and also uplifts the export revenues (Mubarak, Shaikh, Mubarik, Samo, & Mastoi, 2019). These units are comprised of traditional processes and limited technological innovations. They also face challenges such as high production cost and also face difficulty in compliance regulations (Bradač Hojnik & Huđek, 2023). This sector faces various challenges like outdated infrastructure, energy inefficiencies and intense global competition (Memon, Aziz, & Qayyum,

2020). In this context, digital transformation presents a critical opportunity for the textile sector in Pakistan. Adoption of digital technologies can help them in many ways like they can streamline their operations, enhancing supply chain transparency and improvement in product quality. Innovations such as automation, advanced manufacturing techniques, and smart textiles can drive productivity and sustainability, and hence Pakistan's textile industry would compete on a global scale (Imran, Hameed, & Haque, 2018). Digital transformation will enable both SMEs and large enterprises to streamline their supply chains, improving market responsiveness and bring out innovations in their product offerings (Eller, Alford, Kallmünzer, & Peters, 2020). Digital transformation in the textile sector can lead to significant cost savings, reduced waste, and more efficient resource utilization, and hence ultimately contributing to economic growth and stability (Rosário & Dias, 2022). If Pakistan's textile sector embraces digitalization, it will be expected to achieve greater efficiency, sustainability and improved global competition thus it will drive economic growth and standing out a pivotal position in international market (Imran et al., 2018). In Pakistan, there is lack of research regarding digital transformation in textile sector and linkage of various industrial dimension i.e. its type, size and sustainable practices within industry on the level of digital transformation. . So the present research aims to fulfill it. Some objectives of the present research are to analyze the impact of different types of textile sectors i.e. spinning, weaving, dying and printing on the adoption of digital transformation as it is vital to find out is there any variability in digital transformation across various type of textile enterprises , Secondly the impact of firm size on digital transformation, and lastly the impact of prioritization of sustainable industrial practices on digital transformation adoption.

2. Theoratical Framework and Hypothesis Development

The section is divided in two parts. First one is theoretical framework and other is hypothesis development

2.1. Theoretical Framework

Digital transformation has become a pivotal force driving modernization and innovation across various sectors. According to Rahman, Esa, and Ahmad (2024) digital transformation represents a fundamental shift in how organizations operate, leveraging advanced technologies to enhance efficiency, productivity, and competitiveness. The integration of digital tools such as artificial intelligence (AI), big data analytics, cloud computing, and the Internet of Things (IoT) will help businesses to manage their production processes more efficiency, along with enhancing customer experiences and business models. Egala et al. (2024) highlighted that digital transformation is essential for businesses to remain agile and responsive to rapid changes in market conditions and consumer expectations.

Industries in today's world are recognizing the need for digital transformation for sustainable growth and innovation. There are significant advancements in manufacturing sector due to digital transformation as studied by (Wu et al., 2024). They emphasized that digital technologies enable manufacturers to improve operational efficiencies, reduce production costs and improvement in product quality. Similarly, Imran et al. (2018) discussed the impact of Industry 4.0 technologies on the production and service sectors in Pakistan especially in the context of textile and logistics industries. The adoption of AI, automation, and IoT in these areas has led to increase in productivity, better resource management and improvement in competition on a global scale.

The digital transformation journey varies significantly across small, medium, and large enterprises and each of them are facing unique challenges and opportunities. Small and medium-sized enterprise (SMEs) which form the backbone of many economies including Pakistan's textile industry is struggling with limited resources and outdates technologies. Another study conducted by Lola and Bakeev (2019) states that digital transformation helps

SME's to streamline operations, reduce costs, and to be more competitive by adopting affordable and scalable digital tools. In contrast, large enterprises are able to leverage advanced technologies such as artificial intelligence (AI), big data analytics, and the Internet of Things (IoT) to drive innovation and efficiency. Studies by Wu et al. (2024) emphasized that large enterprises can significantly benefit from digital transformation by making the production process more optimized, improving quality control, and achieving sustainability goals and hence, overall the adoption of digital technologies across enterprises of all sizes can lead to a more robust, efficient, and competitive industry hence they contribute to overall economic growth.

The textile industry one of the pillars of Pakistan's economy has the potential to benefit immensely from digital transformation. Memon et al. (2020) provided an analytical view of the rise and fall of Pakistan's textile industry and these highlight the critical need for modern technologies to overcome current challenges such as outdated infrastructure and global competition. Digital transformation in the textile sector means integration of advanced technologies to streamline operations, enhance supply chain transparency and improvement in product quality. Yu (2023) studied the prospects of industrial digital transformation and green innovation and the study emphasized how digital solutions can drive sustainable practices within industries. This is particularly relevant for the textile sector, where sustainability is becoming increasingly important. Digital transformation is crucial for every sector within the textile industries, with some studies specifically highlighting its effectiveness in the printing sector. A study carried out by Yilmaz and Cavus (2018) concluded that digital transformation has revolutionized the printing industries, these digital solutions offer high-quality, vibrant color options, are cost-effective, and they can be applied to various materials at the desired speed. Ku et al., 2020 highlighted the effectiveness of digital solutions in dying industries. It was observed that smart manufacturing leads to break down the information silos and it helps to meet the dynamic customer demands on time. Hence, each sector has its unique challenges and opportunities with regards to digital transformation.

Hence on the basis of above detailed insights from the literature review, which highlight that there may be specific variation in digital transformation across industry type, size and sustainability concerns within industry, following hypothesis are made.

- Firm size impact digital transformation within industry
- Sustainability concerns among stakeholders impacts digital transformation
- There is difference in digital transformation level across textile sectors.

A comprehensive discussion of each hypothesis is provided below

2.2. Hypothesis Development

2.2.1. Firm Size and Digital Transformation

Firm size plays a crucial role in the extent and success of digital transformation initiatives. Larger firms typically have more resources, including financial capacity, technical expertise, and infrastructure, to invest in advanced digital technologies. As noted by Wu et al. (2024), large enterprises can leverage technologies such as artificial intelligence (AI), big data analytics, and the Internet of Things (IoT) to drive significant efficiencies and innovations in their operations. In contrast, small and medium-sized enterprises (SMEs) often face problems in budget constraints and technical know-how and thus it can limit their ability to fully embrace digital transformation. However, digital transformation offers SMEs the potential to streamline operations, reduce costs, and increase in competitiveness by adopting affordable and scalable digital solutions. On the basis of these we have developed the following hypothesis

- H1: Firm size impacts digital transformation

2.2.2. Industry Type and digital transformation

The type of industry such as spinning, weaving, dyeing and printing significantly impact the approach and impact of digital transformation. Each segment of the textile industry has its own unique processes and technological needs that determine how digital transformation will be implemented. For instance, the spinning industry might focus on automation and advanced machinery to increase production efficiency, while the weaving sector would be more focused on digital technologies that improve pattern accuracy and fabric quality. Dyeing and printing industries would be more focused on digital solutions that enable accuracy in color matching and reduce environmental footprints through more efficient use of dyes and chemicals. According to Egala et al. (2024), the specific technological requirements and innovation potential within each textile segment determine how digital transformation strategies are developed and executed. On the basis of these we have developed the following hypothesis

- H2: The type of industry significantly influences the implementation and effectiveness of digital transformation

2.2.3. Sustainability concern and digital transformation

Sustainability concerns are driving forces in many industries including textiles. The growing emphasis on sustainable practices is pushing companies to adopt digital technologies that reduce environmental impact and enhance resource efficiency. For example, digital tools can optimize energy use, minimize waste, and enable more sustainable supply chain management. The alignment with the United Nations Sustainable Development Goals (UN SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production), underscores the importance of integrating sustainability into digital transformation efforts (Wu et al., 2024). As highlighted by Feng, Wang, Song, and Liu (2022) digital transformation not only helps in achieving operational efficiency but also plays a pivotal role in promoting green innovation and sustainable industrial practices, thereby addressing the environmental challenges faced by the textile industry. On the basis of these we have developed the following hypothesis

- H3: Sustainability concerns within industrial practices significantly impact digital transformation

2.2.4. Digital transformation levels

In order to capture the digital transformation in industries, four levels were introduced. In previous studies, researchers used different levels in order to capture the level of digital transformation in various sectors. Matt, Hess, and Benlian (2015) classified digital transformation into four levels in order to assess the implementation and use of digital technologies in respective sectors. Westerman, Bonnet, and McAfee (2014) also represents digital maturity in four stages reflecting different level of progress in digital transformation. For the present study, classification similar to Westerman et al. (2014) was adopted. The stages of digital transformation are explained below.

1) Traditional

Organizations at this stage have limited digital capabilities and leadership. They are just beginning to explore the potential of digital technologies.

2) Limited

These organizations have adopted some digital initiatives, but their efforts are not coordinated or strategically aligned. They focus more on implementing basic digital tools rather than pursuing comprehensive digital strategies.

3) Moderate

These organizations take a more deliberate approach to digital transformation. They have stronger governance and alignment, but may still lack some agility and innovation in their digital efforts.

4) High

Organizations at this stage excel in both digital and leadership capabilities. They have a clear vision for digital transformation and effectively integrate digital technologies across their operations.

3. Research Methodology

This section is divided into following subsections

3.1. Research Instrument

First of all, a questionnaire was developed in order to craft research framework for the validation of hypothesis and conceptual framework. In this study survey research method was employed. Constructs identified through the literature review were used to develop a questionnaire and then the items were incorporated that represented the constructs within the proposed framework. The questionnaire then underwent a pretesting phase with industrial experts who were stakeholders in the textile sector. Following this, it was subjected to pilot testing by industrial managers. This process aimed to ensure that respondents would not encounter ambiguity or uncertainty when completing the questionnaire and that they would be able to understand the measures effectively

3.2. Data Collection Strategy

A convenience sampling approach was used as a data collection strategy. The advantages of this type of sampling approach are that it is practical and cost effective method, particularly when time and resources are limited. However, it also has some limitations i.e. lack of representativeness because the sample is less likely to present whole population and biasness may occur. We have chosen this approach due to limitation in availability of time and resources. Directors and various management levels from textile industries in Punjab province, Pakistan, were targeted. Industries varying in size i.e. small, medium and large were contacted through telephone calls and personal interviews. Initially, 150 industries interested in or likely to adopt digital technologies were targeted, we received 139 responses. Participants were informed that the study was purely academic and assured of strict anonymity and confidentiality. To boost the response rate, guidelines were provided, as suggested by Chidlow, Ghauri, Yeniyurt, and Cavusgil (2015). Out of the 139 responses, 15 were invalid and were excluded from further analysis. Thus, we began our analysis with 124 usable and valid responses. . Some previous studies have also used the similar sample size like a study carried out by Sardar, Mohsin, Memon, Ramzan, and Sharif (2022), they used a sample size of 122 textiles industries of Pakistan. Hence, the selected sample size aligns with the previous studies.

Table 1
Demographic Profile of Respondents

Participants	F	Industry type	F	Size	F
Director	8	Spinn in	30	1-250 (small)	19
Top Management	59	Weaving	19	>250-500 (medium)	36
Middle management	57	Dying	40	>500 (Large)	69
		Printing	35		
Total	124	Total	124	Total	124

The detail of industries is provided in the table. A vast majority of respondents belongs to dying sector, followed by printing, spinning and weaving. The sample majorly consisted of large number of industries, followed by medium and small.

3.3. Data analysis technique

For the present study, multinomial logistic regression is used. Multinomial logistic regression analysis is one of the analysis techniques employed to examine relationships between independent and dependent variables when the dependent variable includes three or more categories (Hosmer Jr, Lemeshow, & Sturdivant, 2013). In this study, the dependent variable comprises four categories. Therefore, multinomial logistic regression was used in the analysis. The model was formed as follows

$$\log((P(Y=j)/(P(Y=High))) = \beta oj + \beta 1j * Industry\ type + \beta 2j * Industry\ size + \beta 3j * Sustainability \quad (1)$$

Where, Y is the dependent variable (level of digital transformation) and j represents various levels (Traditional, limited, moderate) compared to the base category high.

4. Results and Discussion

This section covers the result of the study. First of all, in order to check the overall relation of the data model fit information is used. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are model selection criteria used to evaluate the goodness-of-fit of statistical models. AIC and BIC both balance the trade-off between model complexity and goodness-of-fit by penalizing models with a higher number of parameters (Burnham & Anderson, 2004). In this analysis, the distribution reveals that the probability of the model chi-square (197.120) was less than the level of significance of 0.05 (i.e. $p<0.05$). The null hypothesis that there was no difference between the model without independent variables and the model with independent variables was rejected and it shows the presence of significant relationship between dependent and independent variables in the model.

Table 2
Model Fit Information

	Model Fitting Information					
	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	271.826	280.286	265.826			
Final	128.706	213.314	68.706	197.120	27	0.000

Another important measure to check the accuracy of the multinomial logit model is the goodness of fit. A value closer to 1 indicates a good fit measure. The result indicates an excellent fit model in which both the Pearson chi-square and deviance statistics yielding significance values of 1.00. This suggests that our model accurately captures the relationship between the level of digital transformation and the independent variables i.e. type of industry,

size of industry, and sustainability concern. Hence, the reliability and validity of our findings are strongly supported.

Table 3
Goodness of Fit

Goodness-of-Fit	Chi-Square	Df	Sig.
Pearson	35.752	87	1.000
Deviance	32.461	87	1.000

The likelihood ratio test (LRT) was used to assess the significance of the independent variables i.e. type of industry, size of industry, and sustainability concern in our multinomial logistic regression model. This test compared models with and without each predictor and the results indicated that all predictors significantly contributed to the model as significance values are less than 0.05. This confirms that including these variables significantly improves the model's fit, validating their importance in explaining the levels of digital transformation. Consequently, the robustness and reliability of our model are strongly supported by these findings.

Table 4
Likelihood test ratio

Effect	Likelihood Ratio Tests Model Fitting Criteria			Likelihood Ratio Tests		
	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	128.706	213.314	68.706[a]	0.000	0	
Type of enterprise	127.665	186.891	85.665	16.959	9	0.049
Firm size	189.950	257.267	141.580	72.874	6	0.000
attitude about sustainability	150.797	201.562	114.797	46.092	12	0.000

Result in Table 5 compares multiple groups. It gives results of each regression of coefficient, whereas the previous table 4 shows overall significance of the model. The table has three rows namely traditional, limited and moderate level of digital transformation. Each of these categories contrasts high level of digital transformation, since we have designed high level of digital transformation as base category. The odd ratio is denoted by β coefficient, is represented as Exp(β). Odds ratios (OR) provide insights into the relationship between independent variables (industry type, industry size, and emphasis on sustainable practices) and the levels of digital transformation (Traditional, Limited, Moderate, High). The exp β for each independent variable indicates how the odds of being in a specific level of digital transformation change with a one-unit change in that variable. For the purpose of interpretation of odd ratio we can say that if the confidence interval for an odd ratios spans from a to b, it would imply that there is a 95 percent level of confidence that the true odds ratio lies within this interval, provided that there is no bias present.

Referring to the values that are significant in the results, within the category of industry type, the odd ratio of spinning industry to fall in traditional level of digital transformation vs high level is 168.04 times than that of the printing industry. The printing industry is taken as base category. For the dying sector the odd ratio of falling into traditional category as compared with high digital transformation category is 22.538 as compared to printing industry. For the firm size and sustainability concern none of the individual coefficient was found to be significant.

Table 5
Results of coefficients from Multinomial logit regression

		B	SE	Wald	df	Sig	Exp(B)	CI Upper	Lower
Limited	Intercept	-43.31	6549.7	.000	1	.995			
	ToE-spinning	5.124	1.977	6.71	1	.010	168.04	6.502	4343.66
	Weaving	3.249	2.682	1.46	1	.226	25.775	.313	2125.08
	Dying	3.115	1.842	2.86	1	.091	22.538	1.089	466.328
	Printing	0[b]			0				
	FS-Small	54.86	9086.82	.000	1	.995	6.705E+23	.000	.[c]
	Medium	53.18	6397.94	.000	1	.993	1.247E+23	.000	.[c]
	Large	0[b]			0				
	Sustainability-Strongly Disagree	-16.815	.000		1	.	4.98E-8	4.98E-8	4.98E-8
	Disagree	42.159	7680.38	.000	1	.996	2.03E+18	.000	.[c]
	Neutral	20.62	5655.51	.000	1	.997	9077	.000	.[c]
	Agreed	.633	7023.37	.000	1	1.0	1.833	.000	.[c]
	Strongly Agreed	0[b]			0				
Moderate	Intercept	-5.97	2.15	7.66	1	.006			
	ToE-spinning	4.39	1.644	7.14	1	.008	81.031		
	Weaving	1.30	2.267	.332	1	.564	3.692		
	Dying	2.41	1.476	2.679	1	.100	11.200		
	Printing	0b			0				
	FS-Small	36.30	8464.96	.000	1	.997	5.873E+15	.000	.[c]
	Medium	35.24	5478.96	.000	1	.995	2.028E+15	.000	.[c]
	Large	0b			0				
	Sustainability-Strongly Disagree	-14.84	3447.91	.000	1	.997	3.567E-7	.000	.[c]
	Disagree	22.80	5196.47	.000	1	.996	797564225	.000	.[c]
	Neutral	3.22	2.09	2.372	1	.124	25.076	.803	782.84
	Agreed	.537	1.874	.082	1	.774	1.711	.078	37.336
	Strongly Agreed	0[b]			0				
	Intercept	-1.054	.669			.115			
	ToE-spinning	1.585	.926			.087	4.878		
	Weaving	.018	.881			.983	1.019		
	Dying	1.778	.747			.017	5.917		
	Printing	0[b]	.		0				
	FS-Small	13.794	11922.3	.000	1	.999	978656.54	.000	.[c]
	Medium	29.62	5478.96	.000	1	.996	7.334E+12	.000	.[c]
	Large	0[b]			0				
	Sustainability-Strongly Disagree	-32.538	.000	.	1		7.392E-15	7.392E-15	7.392E-15
	Disagree	19.129	5196.47	.000	1	.997	202958600	.000	.[c]
	Neutral	1.086	.992	1.199	1	.274	2.962	.580	15.139
	Agreed	.840	.663	1.605	1	.205	2.316	.778	6.88
	Strongly Agreed	0[b]			0				

Similarly for the category of limited digital transformation, with in the c industry type the odd ratio of spinning industries to fall in limited level of digital transformation as compared to high level is 4.87 than that of printing industries. For the dying sector, the odd ratio of being in limited level of digital transformation as compared to high is 5.917 times than that of printing industries.

The table shows result of predicted accuracy of the model. The percentage correctness is displayed in the last column which is 84, 69.7, 71.8 and 73.4 percentages respectively for

each category. Hence it is shows model reliably distinguishes between different levels of digital transformation based on the independent variables.

Table 6
Prediction results

Classification					
			Predicted		
Observed	Traditional	Limited	Moderate	High	Percent Correct
Traditional	21	4	0	0	84.0%
Limited	8	23	2	0	69.7%
Moderate	0	2	28	9	71.8%
High	0	1	7	19	70.4%
Overall Percentage	23.4%	24.2%	29.8%	22.6%	73.4%

5. Conclusion and policy recommendations

This study shows that the type and size of an industry, as well as sustainability concerns, significantly affect its level of digital transformation. Using multinomial logistic regression, we have identified that these factors have significant influence on level of digital transformation. Although many individual coefficients are not statistically significant but overall model is significant which suggest that these factors collectively impact digital transformation within industries. These results highlight the importance of strategies in order to foster digital transformation impacted by various industrial characteristics and sustainable practices.

On the basis of these, policy makers are given various suggestions. It is evident that small industries find more challenges in digital transformation. Hence, these areas should be more focused. They could be given various incentives and support programmes like financing and training. Sustainable initiatives should be taken within industries. Sustainable awareness programs and incentives for adopting environmentally friendly technologies and processes can drive both sustainability and digital transformation. Giving those industries rewards who adopt sustainable practices in the form of financial incentives or tax breaks could help. Customized support should be provided to various sectors i.e. spinning, weaving, dying and printing within textile industries depending on the unique needs of every sector.

5.1. Limitations and Future research

This study has several limitations that should be highlighted. First of all, the research is cross-sectional in nature, which restricts the ability to study variables over time. Secondly, the sample size could be expanded and additional industries from all over the Pakistan should be included, the present study focused on textile industries of Punjab, Pakistan. . Thirdly, the insignificance of many individual coefficients suggests that larger samples or different variables might yield more significant predictors. Additionally, the study focuses solely on the textile sector; future research should include other leading sectors of Pakistan to provide a broader perspective on digital transformation.

Future research should aim to overcome the limitations identified in this study. Longitudinal studies would be beneficial to understand the causal relationships between the variables and how digital transformation evolves over time. The sample size should be expanded by including other leading sectors such as agriculture, manufacturing, and services would enhance the generalization of the findings. Moreover, additional variables can be included such as technological infrastructure, market dynamics, and government policies. These could provide deeper understanding of factors driving digital transformation. Finally, qualitative research methods such as interviews and case studies could complement the quantitative findings and offer a more comprehensive understanding of the digital transformation process.

Author's Contribution:
Masooma Zahra: Conceptualization, Methodology, Software, Roles/Writing – original draft, Software, Formal analysis, Data curation, Resources, Visualization.
Syed Asif Ali Naqvi: Supervision, Conceptualization, Project administration, Writing – review and editing, Roles/Writing – original draft, Resources.
Sofia Anwar: Conceptualization, Roles/Writing original draft, Writing – review & editing, Validation.
Abdul Majeed Nadeem: Conceptualization, Writing – review & editing, Validation
Bilal Hussain: Conceptualization, Project administration, Writing – review and editing, Roles/Writing – original draft

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