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Digital Transformation and Operational Efficiency for SMEs in the Food Sector

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Abstract: **The aim of this work is to explore the impact of digital transformation strategies on SMEs operating in the food manufacturing sector in the UK. An empirical qualitative approach was followed with semi structured interviews with managers in the sector to evaluate the role of digital transformation in enhancing operational efficiency. Findings demonstrate that the main drivers of engaging in digital transformation strategies within SMEs in the food manufacturing sector have to do with the increase of their efficiency by reducing inputs and utilizing existing inputs more effectively, and at the same time enhance outputs. We also found that the barriers and challenges of realizing the full benefits of digital transformation were mainly practical. Evidence revealed issues with resource limitations, financial barriers and often the cost of investing in new technology, which curtail digital transformation ambitions. The study contributes to the existing body of knowledge and promotes the agenda for future research in the domain, while results can be considered by policy makers to promote the digital transformation adoption.**

Keywords: **Digital transformation, Operational efficiency, Small and Medium Enterprises.**

I. INTRODUCTION

Business environment today is a highly turbulent and unstable place with high level of uncertainty and complexity [1]. Companies can deal with some of the challenges by using information technology (IT), technological advancements, and innovations. Digital transformation, which is defined as a continuous process of replacing previously analogue processes with digital technology, is arguable one of the most effective instruments, through which business entities can improve their operations and processes and consequently gain a competitive advantage [2]. Existing body of literature indicates that organisations that employ digital transformation achieve better financial results and returns on assets, making them more profitable and competitive [3]. That said, the phenomenon of digital transformation and its effect on business has been mostly studied by professional experts and research centres, whereas contribution of academic researchers to this field of knowledge is somewhat limited [4].

From a practitioner's point of view, finding and adopting an effective strategy to conduct digital transformation to contribute to operational efficiency is a challenge [5]. Given that digital transformation is still an emerging field, there is a lack of empirical evidence on how companies could use it to improve their operational efficiency in terms of product quality, customer satisfaction, or process complexity [3]. This challenge is especially relevant to small and medium enterprises (SMEs), since their access to financial and human resources needed to undergo digital transformation is very limited as compared to larger organisations [1]. The knowledge gap provides an opportunity for further research, which can generate important practical and theoretical implications, as well as contribute to better understanding of digital transformation and its role in organisational performance and competitiveness. In turn, the relationship between digital transformation and operational efficiency could be established.

Following the above, this work explores how digital transformation contributes to operational efficiency with special focus on Small and Medium Enterprises in food manufacturing sector. The sector is selected as one of the most important ones for economic growth and much affected by digitalization of supply chain and financial sectors. For the study, a qualitative approach was followed via several semi-structured interviews with companies located in United Kingdom. Empirical evidence found that contrary to existing literature, barriers and challenges of realizing the full benefits of digital transformation were mainly practical, as the study revealed that SMEs struggle with resource limitations which curtail digital transformation ambitions. The majority of participants cited financial barriers, and often the cost concerned with investing in new technology in the first instance, and this is the key contribution of this work in the domain.

The structure of the work is as follows. Initially, some background on relevant research is highlighted along with theoretical models. In the subsequent sections the methodology and results are presented followed by discussion of the findings. Finally, the conclusion offers a summary along with some recommendations for policy makers.

II. BACKGROUND

Digital transformation implies the transformation of a firm's business processes, operations, products, structures, and management concepts with the aid of IT [6]. Even though digital transformation often means different things to different scholars, Matt et al. [7] offered a comprehensive conceptualisation of digital transformations. According to their framework, digital transformation leverages a firm's financial resources and aspects to change its structures and the way it delivers value via the use of technologies. Although the four-stage model of digital transformation demonstrates why business entities are interested in adopting new technologies, it has several limitations that should be stressed in this literature review. First, Matt et al. [7] noted that to make sure a digital transformation is successful, a company should closely align all four dimensions of the model. However, the framework overlooks the role of digital transformations in organisational efficiency. Moreover, not all digital transformations involve the financial aspect. For example, the open innovation concept largely omits this aspect and triggers change through collaboration rather than investment in technology and research and development (R&D) [8].

The operational efficiency term is traditionally used to describe the extent to which a business entity can deliver its products and services with minimal waste and is often presented as a ratio between inputs and outputs [9]. Although this definition provides the reader with a good idea of what operational efficiency is, it omits any contextual factors, meaning its ability to explain the concept of operational efficiency in the context of the food manufacturing sector is limited. For example, this definition overlooks challenges that are unique to this sector, including the use of perishable raw materials and high emphasis on product turnover [10]. Given that delays in manufacturing and logistics processes can cause financial and reputational losses, food manufacturers' ability to quickly transform raw materials into commercial food products plays a crucial role in their operational efficiency [11]. It is also unclear from the definition above how food manufacturing organisations could improve their operational efficiency. In accordance with Alberca and Parte [12], there are two major ways to improve organisational efficiency. The first way, which is also called the 'same for less' approach, implies that a manufacturer needs to reduce its financial inputs while maintaining a high level of output. In turn, the second way of improving organisational efficiency suggests increasing outputs without increasing inputs. Given that Alberca and Parte [12] were focused on restaurants, the operations efficiency strategies suggested by the researchers are relevant to this study.

Even though the role of digital transformations in operational efficiency has been stressed by many business and management scholars, the existing empirical literature has so far failed to establish a clear and strong relationship between these two variables in the context of the food manufacturing industry [13], [10], [14]. As noted by Kapletia et al. [14], the use of so-called 'factories in a box' supported by IT and digital systems contributed to firms' operational efficiency. On the downside, the researchers did not apply their empirical findings to the food manufacturing sector. In turn, Garrone et al. [15] found that reducing waste in the food manufacturing process contributed to operational efficiency in terms of more effective reuse and redistribution of surplus food. Nonetheless, the researchers failed to highlight any relationship between operational efficiency and digital transformation strategies [15]. A more detailed review of the existing empirical literature on the link between these two variables is presented in the following section.

Operational efficiency could be measured using multiple metrics, including product quality, customer satisfaction, and labour and operational costs [17]. The role of digital transformation in services characteristics was examined by Romero et al. [18]. The researchers used five service characteristics (i.e., inseparability, inventory, intangibility, involvement, and inconsistency) to identify how the infusion of digital technologies affected service provider-customer interactions. Romero et al. [18] discovered that the extent to which an organisation used digital technologies in its service delivery processes

affected the aforementioned service characteristics. Similar outcomes were demonstrated by Iriqat and Jaradat [17] who reported that there was a positive correlation between digital transformation strategies and customer satisfaction. By following a digital transformation strategy, a company makes its products and services more convenient for consumers, which partly explains the empirical findings by Iriqat and Jaradat [17]. That being said, the researchers did not distinguish between various digital transformation strategies, which makes it unclear whether one strategy is more effective in adding to operational efficiency than another.

Cost reduction is another operation's efficiency-related outcome of digital transformation. Following Paolucci et al. [19], digital technologies contribute to a company's cost performance and, hence, allow for achieving a higher inputs-to-outputs ratio. As noted by Ismail et al. [13], the impact of digital transformation on operational efficiency is determined by what particular digital transformation strategy a company follows. For example, by adopting a business process re-engineering strategy, which involves radical changes to a firm's business processes, it is possible to achieve dramatic improvements in the most important measures of organisational performance, such as speed, service, and cost [20]. On the downside, less radical strategies, such as localised exploitation and internal integration, limit the role of IT to supporting functional requirements [14]. Thus, organisations that follow these digital transformation strategies limit their use of IT to transactional and informational benefits, including easier and faster access to information and enhanced employee productivity.

Digital transformation has been widely acknowledged to contribute to business entities' operational efficiency in various areas, starting from better customer relationships and more effective internal communication to reduced operational and labour costs and waste reduction [19], [21], [22]. However, the extent to which these links are evident in the food manufacturing sector remains largely unknown. The researcher attempts to narrow down this knowledge gap by examining the impact of various digital transformation strategies on the operational efficiency of food manufacturing companies.

III. DATA AND METHODS

As the aim of the study was to uncover and explore operational efficiency under digital transformation, qualitative approach was utilized and semi-structured interviews with managers of food manufacturing SMEs in UK was selected as approach for primary data collection. This approach allowed to study several current digital transformation strategies used by food manufacturers in UK. The sampling approach was purposive, as participants should have some experience and involvement with operational efficiency, including digital transformation, to collect valuable data. It was also important that the SMEs under study were not employing than 250 employees. The company sample was selected from UK Food and Drink Federation extensive list of food manufacturing SMEs in the UK. A total of thirty invitations were sent to managers via the company official contacts and seven responded and participated. Interviews were conducted via phone interviews and video conferencing with average duration between 20 and 30 minutes. The questions were formed from the leading research question: what are the main digital transformation strategies improving the operational efficiency of food manufacturing small and medium sized in the UK. The semi-structured questions ranged within opportunities pursued by digital transformation, critical drivers for digital transformation and the challenges encountered in digital transformation. The interviews were recorded and transcribed and thematic analysis was selected using NVivo for the data analysis.

Some limitations of the study include sampling and generalization. Self-selective sampling includes the inability to generalize. Considering how research subjects volunteer to take part in the research, it is highly likely that self-selection bias may be present in the sample. The fact that each participant has offered to be part of the research may express how they have an intrinsic bias. This bias could cause the sample to be unrepresentative or overestimate a specific finding from the investigation. Moreover, every participant that took part in this study lives in the UK, at least at the time that the research was carried out. This is important to note, as the results of this study are not be generalizable to people living in other countries.

IV. RESULTS

In this section we present the key findings from the thematic analysis of the transcripts with some key excerpts from interviewees indicated by interviewee number. The main dimensions that emerged from the analysis were the following:

- Drivers for transformation.
- Managerial Implications.
- Opportunities for digital transformation.
- Limitations and challenges.

Participants two and seven acknowledge that the strategies implemented were due to internal drivers for digital transformation, that the development of these digital transformations maintains an efficient operational system with the development of IT solutions, and that RD development constitutes a strong force in implementing technologies in strength for production excellence and capabilities, while also being a significant force in developing products in force for operational efficiency and innovative technologies.

“Reason why we have adapted the technologies is due to safety reasons, digital solutions embedded our business to be flexible with our production systems helping us control the food safety.”(interviewee 2) -Diary products)

“Main drivers was equipment optimization and become more sustainable within our production”.(interviewee 7)- Organic Juicer)

A further reason for the measures of digital transformation strategies used was to maintain a competitive advantage and avoid falling behind rivals, who are leading the market due to digital solutions. SMEs find it challenging to stay in the business due to their competitors, thus digital strategies is a way to remain competitive in the market although it can be expensive.

“We haven't fulfilled that many implementations of digitalization in our firm compared with our competitors; we are working on getting started as it's considerably high-priced to modify the operating system to further technological aspects. However, we have adapted a simple machine tool that helps us controls the production line's efficiency, the machine allows us to develop our products in shorter time.”(Interviewee 1) – Micro bakery).

Managers acknowledge the importance of their role within delivering new resolutions in their operational system and the complexity and change of digital environment for British food manufacturing SMEs. Managerial decisions were made around encouraging the right mindset and helping employees to adapt swiftly to change. Cultural shift was encountered by the managers around digital transformation. Several organizational decisions are mentioned.

“There is a strong pressure from our company to keep up with new trends, most importantly its my duty to support and assist for my employees”. (Interview 7)-Organic juicer).

“I am trying to encourage all employees to experiment and create new ideas to increase productivity.(Interview 4)- Jam producer).

Regarding the opportunities for digital transformation in food manufacturing SMEs, the respondents identified significant benefits, the first of which was the higher efficiency of their operation; secondly, several interviewees said that they were capable of meeting their customers' need faster. Although the primary opportunities were similar to each other, interviewee's advantages differed towards their business objectives.

“It was successful that the speed of our production was high then using hand labour from the artisans, we still have employees in our factory. Still, the total volume of the output raised about 25% of our products and produced quicker”.(Interviewee 1)-Micro-bakery)

“Our production increased, and the operating is much easier with the R&D; luckily, there weren’t failures that affected our operation’s. The processes was more comfortable than I thought, but learning to use the machines, including some time, necessitated our employees to adapt to the new system.” “The digital solutions (temperature controller devices) has enabled our business to be more flexible within our production, assisting us in controlling food safety and store our products in the right environment”(interviewee 2)-Diary products)

There is evidence that the food manufacturing SMEs in the sector encountered constraints with their efforts to implement digital transformation in their operations due to financial constraints and the difficulty in getting appropriate staff and expertise. However, the external intervention highlighted among participants as constraining SMEs' digitalisation on operational systems is adequate mainly paucity of support.

“Our primary limitation was money; it was rather expensive for us to obtain these equipment’s.”(Interviewee 5)-Vegan protein-bar).

“Nevertheless, it took time, firstly due to financial reasons and the limits pandemic created, we had to wait a long time for the equipment.”(Interviewee 2)-Diary products).

“I feel our restriction was the time it took for our stuff to respond to the changes; it took some time to learn the new abilities required for the machinery.”(interviewee 6)-Vegan chocolate).

V. DISCUSSION

The most significant unanticipated finding of this study drawn from the empirical evidence is the extent to which resource challenges and limitations hold back digital transformation efforts. In the literature there is relatively little discussion of the extent to which practical barriers hinder effective digital transformation. The theoretical frameworks tend to focus on typologies of digital transformation, seemingly rather naïvely assuming that organisations have the resources necessary to conduct these transformation efforts relatively easily [23]. In fact, when exploring the barriers to digital transformation in UK SMEs in the food manufacturing sector, the greatest challenge was that of limited financial resources. In plain terms, businesses either did not have the money to invest in costly systems, or they did not have the money and time to support their implementation. The specific barrier of cost was mentioned in the majority of interviews, something which does not appear to be discussed or addressed in any substantive way in the empirical literature. Another major challenge identified by participants was that they faced difficulties in training staff to use the new equipment effectively. Whilst in some areas of literature specific to IT implementations, resistance to technology and change is covered [24], the existing literature tends to suggest that employees are being wilful in their refusal to engage because they are resisting change [25]. Instead, in this research, it appeared to be the case that employees were simply struggling to pick up new approaches alongside their existing workload when they were already overwhelmed. The small businesses in this study were finding that they were facing a perfect storm of challenges and simply did not have the time and resources to devote to training employees more thoroughly even though they needed it. The result was a much more laborious digital transformation than might otherwise have been the case, and it is tentatively suggested that this situation represents at least a partial explanation for some of the practical barriers to digital transformation and a failure to fully realise some of the anticipated efficiency benefits.

VI. CONCLUSION

The aim of this research was to investigate the impact of digital transformation strategies on SMEs operating in the food manufacturing sector in the UK. We used qualitative approach and semi structured interviews with managers who have intimate knowledge of the sector to evaluate the role of digital transformation in enhancing operational efficiency. Findings of the study revealed that the main drivers of engaging in digital transformation strategies within SMEs in the food manufacturing sector in the UK is because new technology had emerged and organizations can typically increase their efficiency by reducing inputs and utilizing existing inputs more effectively, outputs could be either maintained or enhanced. We also found that the barriers and challenges of realizing the full benefits of digital transformation were in fact practical. Evidence revealed that SMEs struggle with resource limitations, financial barriers and often the cost of investing in new technology, which curtail digital transformation ambitions. This is the main contribution of the study and sets the ground for further studies in the domain.

REFERENCES

[1] Gill, M. and Van Boskirk, S. (2016) The Digital Maturity Model 4.0, Cambridge: Forrester Research.

[2] Alshurideh, M., Al Kurdi, B. and Salloum, S. (2020) 'Digital transformation and organizational operational decision making: A systematic review', In International Conference on Advanced Intelligent Systems and Informatics, Cham: Springer (pp. 708-719).

[3] Ivančić, L., Vukšić, V. and Spremić, M. (2019) 'Mastering the digital transformation process: Business practices and lessons learned', Technology Innovation Management Review, 9 (2), pp. 35-49

[4] Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P. and McAfee, A. (2011) Digital Transformation: A Road-Map for Billion-Dollar Organizations, Paris: Capgemini Consulting

[5] Konur, S., Lan, Y., Thakker, D., Morkyani, G., Polovina, N. and Sharp, J. (2021) 'Towards design and implementation of Industry 4.0 for food manufacturing', Neural Computing and Applications, 19 (1), pp. 1-13.

[6] Essuman, D., Boso, N. and Annan, J. (2020) 'Operational resilience, disruption, and efficiency: Conceptual and empirical analyses', International Journal of Production Economics, 229 (1), pp. 1-14.

[7] Matt, C., Hess, T. and Benlian, A. (2015) 'Digital transformation strategies', Business & Information Systems Engineering, 57 (5), pp. 339-343.

[8] Dell'Era, C., Di Minin, A., Ferrigno, G., Frattini, F., Landoni, P. and Verganti, R. (2020) 'Value capture in open innovation processes with radical circles: A qualitative analysis of firms' collaborations with Slow Food, Memphis, and Free Software Foundation', Technological Forecasting and Social Change, 158 (1), pp. 1-14.

[9] Garzoni, A., De Turi, I., Secundo, G. and Del Vecchio, P. (2020) 'Fostering digital transformation of SMEs: A four levels approach', Management Decision, 58 (8), pp. 1443-1562.

[10] Psomas, E., Dimitrantzou, C., Vouzas, F. and Bouranta, N. (2018) 'Cost of quality measurement in food manufacturing companies: the Greek case', International Journal of Productivity and Performance Management, 67 (9), pp. 1882-1900.

[11] Kotarba, M. (2018) 'Digital transformation of business models', Foundations of Management, 10 (1), pp. 123-142.

[12] Alberca, P. and Parte, L. (2018) 'Operational efficiency evaluation of restaurant firms', International Journal of Contemporary Hospitality Management, 30 (3), pp. 1959-1977.

[13] Ismail, M.H., Khater, M. and Zaki, M., 2017. Digital business transformation and strategy: What do we know so far. Cambridge Service Alliance, 10, pp.1-35.

[14] Kapletia, D., Phillips, W., Medcalf, N., Makatsoris, H., McMahon, C. and Rich, N. (2019) 'Redistributed manufacturing–challenges for operations management', Production Planning & Control, 30 (1), pp. 1-14.

[15] Garrone, P., Melacini, M., Perego, A. and Sert, S. (2016) 'Reducing food waste in food manufacturing companies', Journal of Cleaner Production, 137 (1), pp. 1076-1085.

[16] Guba, E., 1981. Criteria for assessing the trustworthiness of naturalistic inquiries. ECTJ, pp. 29(2).

[17] Iriqat, R. and Jaradat, A. (2021) 'The impact of digital transformation strategy on customer satisfaction in the Palestinian telecom industry', International Journal of Business Excellence, 24 (2), pp. 169-186.

[18] Romero, D., Gaiardelli, P., Pezzotta, G. and Cavalieri, S. (2019) 'The impact of digital technologies on services characteristics: Towards digital servitization', IFIP International Conference on Advances in Production Management Systems, pp. 493-501.

[19] Paolucci, E., Pessot, E. and Ricci, R. (2021) 'The interplay between digital transformation and governance mechanisms in supply chains: evidence from the Italian automotive industry', International Journal of Operations & Production Management, [online] Available at: https://www.emerald.com/insight/content/doi/10.1108/IJOPM-09-2020-0672/full/html [Accessed on 23 July 2021].

[20] Cheng, Q., Goh, B. and Kim, J. (2018) 'Internal control and operational efficiency', Contemporary Accounting Research, 35 (2), pp. 1102-1139.

[21] Halawa, F., Dauod, H., Lee, I., Li, Y., Yoon, S. and Chung, S. (2020) 'Introduction of a real time location system to enhance the warehouse safety and operational efficiency', International Journal of Production Economics, 224 (1), pp. 1-14.

[22] Woo, S., Lai, P., Chen, Y. and Yang, C. (2019) 'Meta-frontier function approach to operational efficiency for shipping companies', Maritime Policy & Management, 46 (5), pp. 529-544.

[23] Andriole, S. (2017) 'Five myths about digital transformation', MIT Sloan Management Review, 58 (3), pp. 1-15.

[24] Sainger, G., 2018. Leadership in digital age: A study on the role of leader in this era of digital transformation. International Journal on Leadership, 6(1), p.1.

[25] Frick, N.R., Mirbabaie, M., Stieglitz, S. and Salomon, J., 2021. Maneuvering through the stormy seas of digital transformation: the impact of empowering leadership on the AI readiness of enterprises. Journal of Decision Systems, pp.1-24.