

Sustainable Digital Transformation: The Role of Organisational Digital Culture

Yasser Omar ABDALLAH^{a,c,1}, Essam SHEHAB^{b,1} and Ahmed AL-ASHAAB^a

^a *Manufacturing Department, School of Aerospace, Transport & Manufacturing, Cranfield University, Cranfield, Bedford, UK*

^b *Mechanical and Aerospace Engineering Department, School of Engineering and Digital Sciences, Nazarbayev University, Nur-Sultan, Kazakhstan*

^c *Business Administration Department, Faculty of Commerce, Mansoura University, Mansoura, Egypt*

Abstract. Sustaining Digital Transformation processes is a significant challenge for all organisations, especially in the manufacturing sector. Undoubtedly, Digital Transformation (DT) is becoming increasingly crucial for successfully implementing manufacturing operations. This paper discusses Digital Culture's role in sustainable digital transformation projects by discussing the digital culture attributes that must be inside the organisation's top management level. These attributes are collaboration, innovation, accountability, transparency, customer-centricity, and human development. By identifying these attributes in a clear and incremental model, manufacturing organisations will be able to incorporate the digital culture factor in their digital transformation operations to ensure the sustainability of these operations.

Keywords. Digital Transformation, Sustainability, Digital Culture

1. Introduction

As a result of the exponential evolution of digital technologies and their use in various disciplines and industries, organisations are modifying their business models to achieve their goals. This transition will impact how businesses function internally, engage with consumers, and deliver the goods and services they produce. Indeed, the COVID-19 pandemic and its impact on the corporate sector have accelerated the pace of this transformation¹.

The manufacturing industry benefits significantly from the exponential rise of digital technology. However, failing to sustain the right business environment while implementing these technologies might lead to ineffective utilisation.

In the manufacturing business, DT is essential for organisations to remain competitive, as digitising corporate operations is the only way to maintain sustainability in today's competitive marketplaces. Moreover, as a result of the exponential growth of digital native manufacturing organisations, the rivalry has intensified, and manufacturing organisations are required to initiate digital transformation operations²

¹ Corresponding Author. essam.shehab@nu.edu.kz

In recent years, academic research has placed a significant emphasis on DT. However, there is disagreement concerning the term's meaning, context, and difficulties, especially in the industrial sector. There is no commonly accepted definition of DT, as the DT process will vary in scope and scale depending on the industry in which it is used (e.g., insurance sector, banking sector, or government sector)³. In addition, the literature analysis does not discuss this concept by incorporating the digital culture factor and the culture's transformation process. To fill this gap, this paper, as part of ongoing research, discusses clearly and incrementally the most critical digital culture attributes that help create the right business environment for sustainable digital transformation processes.

2. Sustainable Digital Transformation Pillars

All change practices and processes must have certain building blocks and motives to succeed. This is of great importance in the digital transformation processes with two arms, both technological and managerial, to be implemented successfully⁴. This research derived the need for four pillars incorporating digital culture to have a sustainable digital transformation implementation captured from the digital transformation framework⁵. These four pillars are Technological Infrastructure, Leadership Support, Strategic Alignment, and Technological Development. These pillars will encourage and motivate the development of digital culture and its attributes discussed in this paper.

2.1 Technological Infrastructure

Digital technologies are one of the most important indicators of the Digital Transformation process's success. According to the field of the organisation, several studies identify different technologies employed in the Digital Transformation process, and all of these technologies are connected to produce a more effective Digital Transformation process⁶.

Artificial intelligence and its numerous applications are one of the primary technologies that allow Digital Transformation in any organisation. With this technology and machine learning, equipment becomes more efficient and effective in its operations, as it has a greater awareness of the processes and the ability to self-learn and fix any issues that arise within the production processes.

The Internet of Things allows enterprises to connect the physical and digital worlds. It enables manufacturing companies to collect more data from machines and equipment, which aids in gaining a better understanding of production issues and how to address them more effectively for more productive operations.

Moreover, the digital environment's security is crucial to implementing digital transformation effectively. As previously stated, as daily cyber-attacks rise, cybersecurity technology is essential for all organisations. In order to make data more accessible and safer against digital attacks⁹, manufacturing organisations must have a solid cyberinfrastructure.

Additionally, Cloud Computing is one of the pillars of Digital Transformation. With agile apps and the requirement to access data at any time and from any location, the organisation must have a robust cloud system that allows workers to interact with it and provides access to the data they need to do business. Machine learning and IoT give voluminous volumes of information on all manufacturing events. Big data analytics helps deliver fantastic insights regarding these data and how to gather, analyse, and organise

these massive volumes of data to assist management in making the correct choices quickly and create new avenues for innovation⁷.

Robots are one of the modern technologies used by industrial companies to tackle complicated jobs, hence reducing worker fatigue and enhancing workplace health and safety standards. However, the production organisation must maintain the proper balance between robots and human labour to guarantee the agility of the processes and maximise the firm's machines.

ERP is a software package that enables the organisation to integrate its many divisions and transmit information in real-time and on a massive scale. Cloud ERP will be more efficient than conventional ERP software with a solid cloud system regarding data security and transmission speed.

2.2 Leadership Support

The leader is critical to Digital Transformation. Adapting their leadership style to the circumstances (Situational Leadership Style) is the optimal digital transformation project⁸. To be effective, a leader must possess the following characteristics: Being receptive to change demands an entrepreneurial mindset. Diversified Knowledge: By seeing what is occurring in other industries and determining what is effective and appropriate to their industry, one may acquire diverse knowledge. This must-win procedure defines success or failure and focuses on enhancing the company's performance in the marketplace. Possession and Accountability: People admire bravery and responsibility. Leaders and managers must accept ultimate responsibility for their team's performance to lead effectively.

2.3 Strategic Alignment

As previously stated, DT is a continuous process that must be integrated into a company's strategy. Top management should foster a digital transformation-friendly organisational culture and incentivise digital transformation practices.

Moreover, to have a sustainable digital transformation operation, the organisation's strategic direction should be aligned with all its partners in the supply chain. As digital transformation is not only about the manufacturing processes, it goes beyond that to include all of the company's internal operations as well as its connection with suppliers, distributors, and even customers⁹.

With this strategic connection, manufacturing organisations ensure that their efforts in this transformation are not wasted and help the whole ecosystem implement digital transformation initiatives successfully.

2.4 Technological Development

As stated earlier, digital transformation is about implementing the right digital technologies that suit the organisation's strategic direction and needs. It is about choosing the right technology for the organisation, not just the most advanced or most expensive technology.

Digital Transformation is a continuous process, and so is technological development, as long there are new advances in existing technology and the evolution of new technologies. That is why so many manufacturers

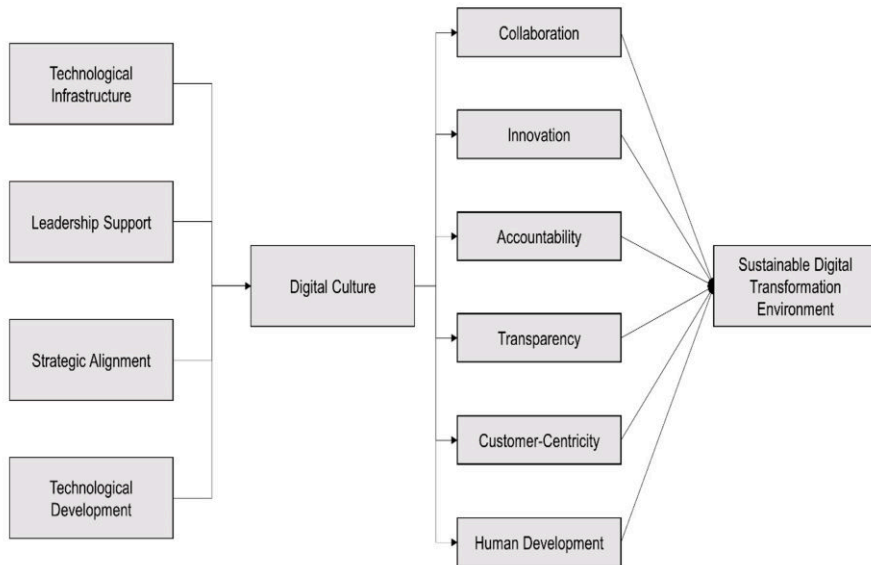


Figure 1. The Role of Digital Culture in Creating a Sustainable Digital Transformation

3. Digital Culture

The discussed elements as pillars of sustainable digital transformation cannot work without the proper business environments supporting this strongly changing projects¹⁰. This requires changing the organisational culture's norms and making it more adaptive and agile to change. In this section, the most important digital culture attributes are discussed according to the literature.

3.1 Collaboration

Initially, the assembly line method planted the seeds of teamwork. However, with time, teams for highly specialised jobs replaced individuals performing highly specialised responsibilities. This led to the silo effect when teams worked within the parameters of their respective job descriptions¹¹.

We now see that this is a flawed system that inhibits learning, restricts the development of skill sets, and leads to much duplication of effort. Over the years, corporations have discovered that this mode of operation also discourages workers from raising questions and admitting ignorance. Consequently, workers are set up for failure when given more significant duties.

Organisations with mature digital cultures have undertaken innovative steps to address these anxieties and release their employees to cooperate. This made it possible for individuals to work together without fear. To empower individuals and foster an environment conducive to collaboration, organisations should adopt a flexible title system, if not eliminate employee titles.

3.2 Innovation

No doubt that open innovation practices are of crucial importance in any change management practices. Today's businesses are under increased pressure to reinvent themselves, expand their influence, and pave the way for future success. This can be achieved by recognising disruptors who drive good transformation, namely those that encourage an innovative culture to pave the road for a sustainable future. Moreover, adopting a future-centric perspective helps foster digital change¹².

Implementing a collection of accelerators could show more to being an augmented organisation than adopting a particular technology. It represents a significant change in how a business runs. In many instances, making sophisticated technical and organisational adjustments is also necessary. It involves creating an organisation that understands how to use technology, culture, and trends to maximise its potential.

3.3 Accountability

According to Forbes, Digital change increases the employees' sense of accountability. Employees are aware of the choices they may make and the needed justifications. This is closely related to an organisation's capacity to mix predicted and historical data analysis with design. This refers to an organisation's "instinct" — the manner in which it makes choices and adjusts to change¹³.

Moreover, our increased dependence on digital technologies to perform work tasks and daily communications inside the workday. There is an increasing demand for "digital regulations" as part of the rules and procedures in the organisation.

3.4 Transparency

To flourish in the digital era, the default setting for a company must be transparency. People are an organisation's most valuable resource. If every employee is not considered essential to the company's success, then the organisation has no business maintaining them. If, on the other hand, a firm considers every employee to be significant and valued, it must be upfront with its workers. Unfortunately, this is the perfect condition. Forty-two per cent of workers, according to research, are unaware of the organisation's vision, purpose, and values, much alone more helpful information¹⁴.

Transparency creates trust, improves employee engagement, fosters connections, raises productivity, and fosters creativity, to mention a few advantages. The degree of openness an organisation chooses to function is a matter of discretion. Organisations need to put some effort into fostering this sense of transparency, from Social Media Management platforms to live Q&A seminars for the employees.

3.5 Customer-Centricity

In the Digital Age, customer-centricity is the most crucial instrument for success. Unfortunately, the organisation's absence of a customer-centric culture is one of the most significant obstacles to implementing digital transformation processes successfully. In the past, the industrial era taught us that consumers would flock to us if we provided a superior product or service. In the post-covid era, this is no longer the case.

Customers are knowledgeable. At the very least, they are aware of what they DO NOT want. When developing a portfolio of goods and/or services, organisations must place an almost obsessive emphasis on the consumer. Amazon's customer-centricity rules serve as the ideal guidance in this regard¹⁵.

3.6. Human Development

For decades, research has discussed the need for learning and development to attract and retain high-potential, high-performing individuals. Organisations have created calendared schedules to enable their workers to learn as well. However, digital disruption impacts all aspects of business, including learning and development.

Human capital is the foundation of all organisational change initiatives. Digital Transformation necessitates the application of specialised capabilities in the organisation's personnel. Assessing the digital skills gap in the organisation is the first step in improving the organisation's human capital⁴.

Today, learning is not limited to taking a few courses each year that are relevant to your current position. The amount of knowledge that workers must possess has multiplied significantly. To be effective and make an impact in a world where the distinctions between jobs, teams, companies, and sectors are blurring, individuals must possess knowledge and skill sets that are exceptionally adaptable.

4. Conclusion

This paper proposes the most essential attributes of Digital Culture that help make an encouraging business environment for sustainable digital transformation processes. These attributes are Collaboration, Innovation, Accountability, Transparency, Customer-Centricity, and Human Development.

As part of ongoing research, future reach includes categorisation and ranking of the importance of these digital culture attributes and the role of digital leadership attributes in successfully implementing digital transformation.

The findings and challenges involved in this research offer a solid foundation for future research. Digital Transformation is a concept with immense potential impact on the manufacturing industry. It provides avenues for businesses to ascend the value chain and capitalise on value-added business operations.

Acknowledgements

The authors would like to thank Cranfield University and The Egyptian Government for funding this research under the umbrella of the Ministry of Higher Education grants program for PhD students.

References

- [1] Jones MD, Hutcheson S, Camba JD. Past, present, and future barriers to digital transformation in manufacturing: A review. *Journal of Manufacturing Systems*. 2021.
- [2] Urban W, Łukaszewicz K, Krawczyk-Dembicka E. Application of industry 4.0 to the product development process in project-type production. *Energies*. 2020;13(21).

- [3] Abdallah YO, Shehab E, Al-Ashaab A. Understanding digital transformation in the manufacturing industry: a systematic literature review and future trends. *Product Management & Development*. 2021;19(1):e20200021.
- [4] Gaffley G, Pelsler TG. Developing a digital transformation model to enhance the strategy development process for leadership in the South African manufacturing sector. *South African Journal of Business Management*. 2021;52(1):1–12.
- [5] Abdallah YO, Shehab E, Al-Ashaab A. Towards managing digital transformation in manufacturing industry: Theoretical framework. *Advances in Transdisciplinary Engineering*. 2021;15:21–26.
- [6] Ahmad A, Alshurideh MT, Al Kurdi BH, Salloum SA. Factors Impacts Organization Digital Transformation and Organization Decision Making During Covid19 Pandemic. *Studies in Systems, Decision and Control*. 2021;334:95–106.
- [7] Butt J. A strategic roadmap for the manufacturing industry to implement industry 4.0. *Designs*. 2020;4(2):1–31.
- [8] Tekic Z, Koroteev D. From disruptively digital to proudly analog: A holistic typology of digital transformation strategies. *Business Horizons*. 2019;62(6):683–693.
- [9] Paryanto P, Indrawan H, Cahyo N, Simaremare A, Aisyah S. Challenges toward industry 4.0: A case study of power plants in Indonesia. *Proceeding - 2nd International Conference on Technology and Policy in Electric Power and Energy, ICT-PEP 2020*. 2020;3:272–276.
- [10] Stoianova O, Lezina T, Ivanova V. *Corporate Culture : Impact on Companies'*. Springer International Publishing; 2020.
- [11] Luthra S, Kumar A, Zavadskas EK, Mangla SK, Garza-Reyes JA. Industry 4.0 as an enabler of sustainability diffusion in supply chain: an analysis of influential strength of drivers in an emerging economy. *International Journal of Production Research*. 2020;58(5):1505–1521.
- [12] Ardito L, Petruzzelli AM, Panniello U, Garavelli AC. Towards Industry 4.0: Mapping digital technologies for supply chain management-marketing integration. *Business Process Management J.* 2019;25(2):323–346.
- [13] Lazzeretti L, Oliva S, Innocenti N, Capone F. Rethinking culture and creativity in the digital transformation. *European Planning Studies*. 2022;0(0):1–9.
- [14] Bravo J, Aquino J, Alarcón R, Germán N. *Model of Sustainable Digital Transformation Focused on Organisational and Technological Culture for Academic Management in Public Higher Education*. Springer International Publishing; 2021.
- [15] Nafchi MZ, Mohelská H. Organizational Culture as an Indication of Readiness. *Information*. 2020;11(174).



DSSPACE

<https://dspace.org/>

Sustainable digital transformation: the role of organisational digital culture

Abdallah, Yasser Omar; Shehab, Essam; Al-Ashaab, Ahmed

2022-11-30

IOS Press

<https://doi.org/10.3233/ATDE220566>

Abdallah YO, Shehab E, Al-Ashaab A. (2022) Sustainable digital transformation: the role of organisational digital culture. In: Advances in Manufacturing Technology XXXV. Proceedings of the 19th International Conference on Manufacturing Research, Incorporating the 36th National Conference on Manufacturing Research (ICMR 2022), 6-8 September 2022, Derby, UK. Advances in Transdisciplinary Engineering: Volume 25, pp. 60-66