

Post-Pandemic Digital Transformation: A Case Study from a Sustainability Perspective

Keyong Monty Guo

Ecole Supérieure de Commerce et de Marketing Istec Paris

khw753@outlook.com

Abstract

There would be unforeseeable challenges and obstacles coupled with Covid-19 effect, as every organization was moving towards digital transformation in the VUCA environment for being sustainable.

Companies realized value innovation through the transformation business model, adapted to changes in the environment, achieved the goal of sustainable growth. The organization had to promote the upgrading of factory equipment communication, remote operation, system interconnection, etc. to be digitalization, and exert great effort to construct a resilient and secure supply chain.

The purpose of this enquiry was through case study to explain how an organization should be self-adaptive to post-pandemic disruptive change and grow sustainably. I had both expanded success factors including leadership commitment, digital mindset change and culture cultivation, external stakeholder etc., and supported and extended existing theories. This research had significant implications for organizations to innovate value creation model, to be resilient through digital means in an uncertain environment.

Keyword

Sustainability, Digital Transformation, Value Creation, Business Model Innovation, Resilience, Business Process Management

Introduction

For 48,000,000 SMEs in China, transformation is not easy, another reason why it is difficult is that in the VUCA environment for being sustainable there will be unforeseeable challenges and obstacles coupled with Covid-19 effect. Since the COVID-19 broke out, the orders have plummeted, employee's movement have been restricted, factories cannot be opened, products cannot be delivered as originally planned, and various production and operation activities of customers are affected in all aspects, and the special macro environment forces enterprises to promote the transformation and upgrading of business models and business structures. All this will lead to more diversified, customized, automated, and collaborative production. The epidemic has also brought serious harm to globalization, and countries such as the United States and Japan have made it clear that the supply chain should be shortened and actively promote the localization of the supply chain.

Will it be another "Productivity Paradox, for if digital transformation does not take place, they are waiting to die, if they take on transformation, they will probably die sooner. As more investment had been made in information technology, worker productivity might go down instead of up, this had been an observation and research outcome (Brynjolfsson, E. 1993).

The purpose of this qualitative case study is to explore facing the Covid epidemic effect and anti-globalization and decoupling context what is the best-fit transformation initiative choice. This study will focus on China's manufacturing settings.

Research results could provide valuable insights to practitioners how to strengthen future competitive capabilities from a sustainability perspective. It also contributed to the digital transformation literature for new additions such as business model innovation, leadership commitment, digital mindset change and culture cultivation, knowledge sharing etc.

Literature Review

State of Art for Digital Transformation

Before industry 4.0 era, to maintain stability and continuity, organization would not rather adopt drastic transformative method for any organization change or disruptive technology breakthrough (Malhotra, N., & Hinings, C. B., 2015). After 2014, research focus had been shifted from single ICT system to organization-wide information system infrastructure. Led by Harvard Business Review, a method had been developed by Joe Peppard (2016) to mapping digital transformation initiative. Strategy category paid more attention on measurable dimensions with ethnography, mixed methods or case study have been used. Commercial, small production companies were typical research settings (Chanias, S., Myers, M. D., Hess, T., 2019).

For digital transformation execution, ethnography, case study etc. qualitative methods are the main. Rich DeJordy, Maureen Scully, Marc J. Ventresca, et al (2020) conducted on ecological bondage breakthrough. Bellantuono, N.; Nuzzi, A., Pontrandolfo, P. (2019) recommended apparent gaps which need to be filled are leadership commitment, culture development. For value innovation through the transformation, researchers take different perspectives, so no overarching framework that inform future theoretical and empirical studies can lead the research. Innovation process and organizing for innovation can be future theme (Amadou Sienou, Achim Karduck, Hervé Pingaud, 2006). More in-depth process studies of open innovation in other industry sectors or geo-graphical areas will be needed (Remneland

Wikhamn, B., Styhre, A., 2023).

Sustainability Theory

Risk is a state of uncertainty, it could affect a business organization's decision and processes. Typical examples are incorrect assessments, misjudgements, or unexpected changes. It is not only within its business scope, but could also spread across an ecosystem, leading to interdependencies between suppliers, customers, competitors, and the company itself (Sodhi, M.S., Son, B.-G, 2012; Guo, Y. 2011).

Risk management could be integrated into process management (Michael Rosemann, Michael Zur Muehlen, 2005; Amadou Sienou, Achim Karduck, Hervé Pingaud, 2006). The integration composed of four steps: identification, assessment, mitigation, and monitoring. In digital transformation era, risks could be presented as management and technology risks, and employee requalification, as well as internal resistance, as for technologies technical integration issues, data security threat, and legal and political risks etc (Sienou, A., Karduck, A., Pingaud, H., 2006; Hendrik S., et al. 2019).

An organization, a societal citizen, has a responsibility to improve ESR/ESG performance and report to the whole society (Velte, P. 2023). The economic, environmental, and social flows of value must be created, delivered, and captured in a global-level value network (Dellermann, D.; Fliaster, A.; Kolloch, M., 2017; Sodhi, M.S., Son, B.-G, 2012; Guo, Y. 2011). To maintain sustainability, a strong and cohesive organizational culture must be taken into consideration in the future studies (Assoratgoon, W., and Kantabutra, S., 2023).

The Process Theory

The process theory was advanced by Van de Ven and Poole (1995). "Process theory provides a complementary, dynamic perspective on IS phenomena by explaining how independent and dependent variables are linked in terms of event sequences" Frank Radeke posited (2010). The process theory could explain process change and development, clearly show the relationship between input and output (Tobias Lorey, Paul Ralph, and Michael Felderer, 2022). Process theory model composed of process activities, causal factors, and outcome (Frank Radeke 2010; Tobias Lorey, Paul Ralph, and Michael Felderer, 2022).

Business model innovation and corresponding sub-processes. To be sustainable, an organization must take all stakeholders' needs and interests into consideration, including society, environment, etc. To make connections between diverse elements and their model, an organization must go beyond work (Daniela Andreini, Cristina Bettinelli, Nocolai J. Foss, 2022).

The search shows key transformation success factors are top management, culture. Innovation must be both made at processes and sub-processes level. To maintain sustainable development, external stakeholders must be included. I intend to fill this gap.

The previous study settings had not been in China and most of research not in manufacturing industry. What's more, as an intelligent manufacturing leading country, my study outcomes will have genuine implications.

The research question is, therefore: what is the best -fit business model and how to maintain sustainable by a symbiosis relationship with external stakeholders in companies undergoing digital transformation in post pandemic context?

To address this question, this paper first establishes the theoretical framework as follows:

Proposition 1: Only the upgrading of factory equipment communication, remote operation, system interconnection and compatible, etc. could make digitalisation reliable.

Proposition 2: Value creation process restructuring, and business model innovation could grow their organization to meet their sustainability visions.

Proposition 3: Being sustainable, an organization need to reorganize and stabilize the supply chain and improve the supply chain resilience.

Methods

This exploratory study employs two embedded cases design to explain the relationship how best sustainable outcomes come from risk mitigated and adaptable inputs. Pressed by hyper-competition from rivals, the subject companies launched a transformation strategy to maintain its continual sustainable competitiveness. One case is a Shanghai Stock Exchange listed Chinese manufacturer (henceforth called A), the other, a wholly American-invested electroplated precision connector maker (henceforth called B).

A case study "is an empirical method that investigates a contemporary phenomenon ... in depth and within its real-world context" (Yin, 2017, p. 15). As there is limited research on a manufactory setting, double-case design would "represent a significant contribution to knowledge and theory building by confirming, challenging, or extending the theory" developed in the literature through comparative analysis in other industries (Yin, 2014, p. 51). This study follows the replication logic (Yin 2014, 2017, p. 91).

The 1st stage is observations. An observational instrument has been developed as part of the case study protocol to assess the occurrence of certain types of behaviours during certain periods of time in the screened companies. This involves observations of meetings, sidewalk activities, factory work, and the like. Less formally, direct observations might be made throughout fieldwork, including those occasions during which other evidence, such as those from interviews, are being collected. Two observers are to be used for increasing the reliability of observational evidence. This formal and casual observation shall be considered as "initial research about the organization that would provide information to guide subsequent action" (Cummings & Worley, 2009, p. 24).

The 2nd stage is case studies. Questionnaire shall be administered as a screening instrument to both leaders and employees to assess perceptions of transformation and sustainability. The results shall be used to inform the interview protocols, and which led to the identification of a research proposition. The case interviews were conducted with ten participants representing different organization levels: leadership, management, workers, and staff. The three leaders represented the topmost level of leadership (primary unit of analysis). Each leader represented an organization department (embedded units of analysis). The departments were creative, client service, operations, design, and engineering. Two participants shall be interviewed from each department, one at the management level, and one staff member (embedded units of analysis), except for the operation department, represented by one manager, one staff plus two operators. Research questions were then discussed during interviews with the top management team. Based on these research questions, two questionnaires were designed and distributed to managers of each main department of the two companies. One-day research intervention in each of the companies had been executed. The CEOs gathered the department managers and relevant staff and employees. During the full

day, attendants were invited to talk about what they had learned in the processes, the twists, and turns regarding the success factors and issues initially raised by the top management teams through a focus group. The open discussions were recorded and transcribed. NVivo software was used to analyse, code, and thematically structure the transcripts.

History records, and data gathered by investigators were validated triangularly. Database contains all cases material, such as the raw data (e.g., recordings, transcripts, and documents) and derived reports were created. A case study database was sought to make the data available for independent inspection and, thus, enhance its reliability (Yin 2014, 2017).

Data analysis took place by first analysing the data on a single case basis (within-case analysis). The output of this step was used for the iterative development of theory across cases (cross-case analysis) (Yin 2014, 2017; Eisenhardt 1989). Within-case analysis could identify events, causes and consequences on a single case basis and results in specific case process story. These could be used as input for cross-case analysis methods, which was sought to identify process patterns across all the cases, the causes that shape these patterns, and the consequences caused by these patterns. The resulting preliminary process theory should be compared to extant literature (Eisenhardt 1989) to derive the final process theory. The cross-case analysis step resulted in a preliminary process theory. The author would emphasize the comparison of the emergent theory with extant literature (Eisenhardt 1989). Similar findings led to stronger internal validity, wider generalizability, and a higher conceptual level. Conflicting findings indicated the limits of the theory (Eisenhardt 1989).

Findings

Understanding and addressing DT related business problems is still ongoing.

Conclusions and Expected Contributions

Understanding and addressing DT related business problems is still ongoing.

The theoretical innovation lies in that firstly, I have added success factors such as leadership commitment, digital experience and skills, data analytics, digital mindset, cultivation of digital culture, knowledge sharing, risks mitigation. Secondly, business process assessment and risk management integrated into business model innovation process. Finally, I validated, supported the process theory, sustainability theory in Chinese manufacturing scenarios.

Practically, this research will provide a precedence optimization for smooth organization change and digital transformation strategy. Mindset change, culture of organization learning and collaboration, value-creation business processes must be re-innovated, organization governance must be restructured looking at the future sustainability. Next, leadership commitment need be guaranteed, digital experience, compatible technologies, data analytics skills and knowledge directly decided the initiative success. Dislocated people's job guarantees, and on-the-job training could motivate and engage people's involvement.

In conclusion, I introduced a framework to deploy digital transformation initiative focusing sustainability in the new normal of post Covid and globalization uncertainty.

References

- Appio, F.P., Frattini, F., Messeni Petruzzelli, A., Neirotti, P. (2020). Digital transformation and innovation management: a synthesis of existing research and an agenda for future studies. *Journal of Product Innovation Management*, forthcoming. DOI: 10.1111/jpim.12562
- Amadou Sienou, Achim Karduck, Hervé Pingaud (2006) Towards a Framework for Integrating Risk and Business Process Management. *12th IFAC/IFIP/IFORS/IEEE/IMS Symposium Information Control Problems in Manufacturing* May 17-19 2006, Saint-Etienne, France.
- Aramja, A., Kamach, O., & Elmeziiane, R. (2021) Companies' perception toward manufacturing execution systems. *International Journal of Electrical and Computer Engineering*. 11(4), 3347.
- Assoratgoon, W., & Kantabutra, S. (2023). Toward a sustainability organizational culture model. *Journal of Cleaner Production*, 136666.
- Brynjolfsson, E. (1993). The productivity paradox of information technology. *Communications of the ACM*, 36(12), 66-77.
- Chanias, S., Myers, M. D., & Hess, T. (2019) Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. *The Journal of Strategic Information Systems*. 28(1), 17-33.
- Daniela Andreini, Cristina Bettinelli, Nicolai J. Foss. (2022) Business model innovation: a review of the process-based literature. *Journal of Management and Governance*. 26:1089-1121. <https://doi.org/10.1007/s109970-021-09590-w>.
- Dellermann, D.; Fliaster, A.; Kolloch, M. (2017) Innovation risk in digital business models: The German energy sector. *J. Bus. Strategy*. 38, 35–43.
- DeJordy, R., Scully, M., Ventresca, M. J., & Creed, W. D. (2020). Inhabited ecosystems: Propelling transformative social change between and through organizations. *Administrative Science Quarterly*, 65(4), 931-971.
- Eisenhardt, K.M. (1989) Building theories from case study research.
- Guo, Y. (2012) Research on Knowledge-Oriented Supply Chain Risk Management System Model. *JMS*. 2011, 2.
- Gurbaxani, V., & Dunkle, D. (2019). Gearing up for successful digital transformation. *MIS Q. Executive*. 18(3), 6.
- Hendrik S. Birkel, Johannes W. Veile, Julian M. Müller, et al. (2019) Development of a Risk Framework for Industry 4.0 in the Context of Sustainability for Established Manufacturers. *Sustainability*. 11, 384.
- Kretschmer, T., & Khashabi, P. (2020) Digital transformation and organization design: An integrated approach. *California Management Review*. 62(4), 86-104.

Liebrecht, C., Kandler, M., Lang, M., Schaumann, S., Stricker, N., Wuest, T., & Lanza, G. (2021) Decision support for the implementation of Industry 4.0 methods: Toolbox, Assessment, and Implementation Sequences for Industry 4.0. *Journal of Manufacturing Systems*. 58, 412-430.

Lin Y, & Zhang XJ. (2022) Influencing factors of different stages of digital transformation in manufacturing enterprises - A multi-case study based on grounded theory 「制造企业数字化转型不同阶段的影响因素--基于扎根理论的多案例研究」. *China Science and Technology Forum*. 3(6), 123-132.

Michael Rosemann & Michael zur Muehlen, 2005. Integrating Risks in Business Process Models, *Association for Information Systems AIS Electronic Library (AISeL) ACIS 2005 Proceedings Australasian (ACIS)* December 2005.

Monod, E., Khalil, S., Joyce, E., Bonnet, M., Korotkova, N., & Koster, A. (2021) The Return on Digital Transformation: A Holistic Performance System Based on Hidden Cost Theory for Bringing Value Back to Digital Transformation Consulting. *In AOM MC division conference*.

Ng, H. Y., Tan, P. S., & Lim, Y. G. (2018) Methodology for digitalization-a conceptual model. *In 2018 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)* (pp. 1269-1273).

Paul Ellwood, Ceri Williams, John Michael Egan. 2020. Crossing the valley of death: Five underlying innovation processes. *Technovation*. Volume 1109, 2022,102162 ISSN0166-4972. <https://doi.org/10.1016/j.technovation.2020.102162>

Peppard, J. (2016). A tool to map your next digital initiative. *Harvard Business Review*, Berlin.

Radeke, Frank. (2010) How To Rigorously Develop Process Theory Using Case Research. *ECIS 2010 Proceedings*. 79.

Remneland Wikhamn, B., & Styhre, A. (2023). Open innovation ecosystem organizing from a process view: a longitudinal study in the making of an innovation hub. *R&D Management*, 53(1), 24-42.

Schneider, P., & Sting, F. J. (2020) Employees' perspectives on digitalization-induced change: Exploring frames of industry 4.0. *Academy of Management Discoveries*. 6(3), 406-435.

Sienou, A., Karduck, A., & Pingaud, H. (2006) Towards a framework for integrating risk and business process management. *IFAC Proceedings Volumes*. 39(3), 647-652.

Sodhi, M.S.; Son, B.-G.; Tang, C.S. (2012) Researchers' Perspectives on Supply Chain Risk Management. *Prod. Oper. Manag.* 21, 1–13.

Stentoft, J., Adsbøll Wickstrøm, K., Philipsen, K., & Haug, A. (2021) Drivers and barriers for Industry 4.0 readiness and practice: empirical evidence from small and medium-sized manufacturers. *Production Planning & Control*. 32(10), 811-828.

Steve Evans, Doroteya Vladimirova, Maria Holgado, et al. (2017) Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Bus. Strat. Env.* (2017).

Tobias Lorey, Paul Ralph, and Michael Felderer. (2022) Social Science Theories in Software Engineering Research. In *44th International Conference on Software Engineering (ICSE '22)*, May 21–29, 2022, Pittsburgh, PA, USA. ACM, New York, NY, USA, 12 pages.

Van de Ven, A.H., Poole, M.S. (1995) Explaining Development and Change in Organizations. *Academy of Management Review*. 20, 510-540.

Velte, P. (2023) Which institutional investors drive corporate sustainability? A systematic literature review. *Business Strategy and the Environment*. 32(1), 42–71.

Wang, J., Xu, C., Zhang, J., & Zhong, R. (2022) Big data analytics for intelligent manufacturing systems: A review. *Journal of Manufacturing Systems*. 62, 738-752.

Wiech, M., Boffelli, A., Elbe, C., Carminati, P., Friedli, T., & Kalchschmidt, M. (2022) Implementation of big data analytics and Manufacturing Execution Systems: an empirical analysis in German-speaking countries. *Production Planning & Control*. 33(2-3), 261-276.

Xiao Wang and Yi-Hui Christine Huang. (2020) Uncovering the Role of Strategic Orientation in Translating Communication Strategies to Organizational Performance: An Analysis of Practitioners From Two Chinese Societies. *International Journal of Business Communication*.1-26.

Yeow, A., Soh, C., & Hansen, R. (2018) Aligning with new digital strategy: A dynamic capabilities approach. *The Journal of Strategic Information Systems*. 27(1), 43-58.

Yin, R.K. (2017) Case Study Research and Applications: Design and Methods.