Difficulties Faced by SMEs and Traditional Industries in Digital Intelligent Transformation Under the Background of Digital Intelligent Transformation and Suggestions

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Keywords: SMEs, Digital Intelligent, Transformation.

Abstract: Enterprise digital intelligence is far deeper than just a catchphrase; it is the actual application of information technology to completely reshape business development and management modes as well as the decision that businesses have to make to move from the industrial to the digital economies. This paper starts by discussing the challenges of digital intelligent transformation that small and medium-sized businesses and traditional industries must overcome. It next examines methods and strategies for optimizing the transformation while managing costs and talent. Lastly, it provides an overview of a workable enterprise digital intelligent transformation optimization plan in the context of digital intelligent transformation. This project's research examines the need for and benefits of digitally intelligent transformation, examines the cost conundrum that arises when small and medium-sized businesses and traditional industries undergo digital transformation, offers these businesses a post-transformation plan, weighs the pros and cons, and resolves current issues. In the evolving digital age, businesses overcome the current challenge and present useful optimization concepts and helpful recommendations.

1 INTRODUCTION

Over the last decade, digital transformation has emerged as a vital step for businesses to compete in today's digital environment and offering myriads of benefits including improved efficiency, reduced costs, and happy customers (Adams, 2004). The digital era has transformed aggressively the way businesses are operated, with a great contribution from the digital intelligence which dictates new and dynamic management models (Berman, 2022). The conversion is not merely an empty terminology but an influx of IT which completely redesigns the firm structure and opens up a new horizon for the enterprise development patterns. Small and medium-sized enterprises (SMEs) and traditional industries often encounter their chances in the process of digital intelligent transformation (Koumas, 2021). The main challenges are related to cost and talent constraints, which could lead to an ineffective adoption of digital intelligence strategies. Along with the hurdles brought by digital transformation are the benefits, which are unquestionable as well, and the time to uphold the business digital economy era has determined to be now.

The era of digital intelligence has transformed lives as the internet, customer support, smart production and big data become easier and more effective to use (Moreira , 2018). Digital intelligence approaches have also led to massive economic, time, and human savings, streamlined security and stability and strengthened management of the countries. Traditional business sectors are accelerating digital intelligent transformation process by transferring their primal stage of information to more advanced digital intelligent stage (Moreira , 2018; Ghosh , 2021; Berman, 2022). This transition allows businesses the opportunities to better engage their customers, increase output and be competitive in the modern technology. Digital intelligent transformation is an inevitable need, and firms must be aware of the challenges and opportunities that are associated to this transformation. By dealing with the challenges of cost and talent shortage and applying solutions such

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Chen, T.
Difficulties Faced by SMEs and Traditional Industries in Digital Intelligent Transformation under the Background of Digital Intelligent Transformation and Suggestions.
DOI: 10.5220/0012970600004508

In *Proceedings of the 1st International Conference on Engineering Management, Information Technology and Intelligence (EMITI 2024)*, pages 736-741
ISBN: 978-989-758-713-9

as data-led decision making, iterative system updating and talent development, SMEs and traditional industries will be able to successfully implement a digital transformation in their operations (Li, 2020). This research aims to conduct an analysis and study the significance and benefits of digital intelligent transformation, touch on the cost conundrum of digital transformation in SMEs and traditional industries, provide institutions with a plan after transformation, evaluate merits and demerits, and solve the existing issues. Through the evolution of digital era, enterprises can escape from the past impasse and provide concrete plans and efficient solutions.

2 THE BENEFITS OF DIGITAL INTELLIGENCE

2.1 Digital Intelligence and Supply Chain Efficiency

The role of digital intelligence is steadily growing in modern business, enabling companies to take advantage of different opportunities (Adams, 2004). There are several digital advantages in the supply chain. For example, the customers can be served faster and much better and there are cost savings deriving from automating some tasks and efficient use of hot stock inventory with the data provided by the real time collection and interpretation of the system of business. The intelligence of digital appraisals boosts supply chain effectiveness with the features of real-time data, process automation and basing on informed decisions (Mohsen, 2023). These result in declining economic and time costs, enhanced security, and growing profits. Digital intelligence in supply chain management empowers one to automatically perform tasks, analyze information and make data-driven choices. AI systems equipped with the ability to analyze massive data sets in real-time deliver information that allows the businesses to base their decisions on objective data and auto-optimize their supply chain processes (Mohsen, 2023). For example, Artificial intelligence (AI) can be employed to fine-tune delivery routes enabling the goods to be carried by the shortest and quickest routes. The use of the right transportation modes, delivery routes, and fuel consumption tracking ensure resources to fuel costs, energy, and emission reduction; hence, increasing the business efficiency.

Automated vehicles are rightly among the key technological developments that result in better supply chain efficiency (Reed, 2021). In particular, autonomous long haul trucks have the potential to revolutionize the efficiency of supply chains, especially through the widespread labor shortage of today. For instance, the autonomous semi-truck company TuSimple ran a groundbreaking test with a driverless tractor-trailer that finished its 80-miles route with zero human intervention. Autonomous vehicles are predicted to have such a beneficial effect on emissions as the AI in vehicles can accurately calculate auto fuel consumption and, thus, minimize it (Reed, 2021). Moreover, one of the latest innovations in delivery is drone deliveries that can effortlessly do what human delivery people otherwise do (Boysen, 2018). Drones with automation are able to fly from local distribution centers to chosen destination points, taking the air route without roads and traffic interfering in the process (Boysen, 2018). This can change the effectiveness of supply chain in the very last mile dramatically if it is realized, shortening the delivery times and thus making customers more satisfied.

2.2 Digital Intelligence Strategy

Digital Intelligence Strategy is a holistic method that incorporates modern technologies such as AI, machine learning and big data analytics to enhance performance by optimizing business processes and improving decision-making. Digital intelligence strategy reduces economic cost, time cost and human cost at the same time; it makes security, stability and efficiency and strengthens management (Ashwell, 2017). AI is one of the technologies that are transforming digital innovation by making it possible for companies to gather and analyze big data, automate processes, and come up with smart decisions. In particular, AI is recently driving the new type of digital innovation into Human Resource Management (HRM) through opening the new fronts for collection and analysis of data while being compliant with the General Data Protection Regulation (GDPR), lowering biases, and bringing forth the accurate recommendations (Trocin, et al., 2021). AI technology has three main features that are essential to digital innovation: storage, analytics, and recommendation. These elements harmonize and lead to a tailored regulation which is designed for spurring in innovations of the digital sphere. Besides crucial players like top management, AI developers, and HR employees, a smooth utilization and implementation of AI technology is guaranteed. The top management actors leads the implementation and recognition of AI based technology, by performing strategic planning

and domination of specific directions to reach the decisions made (Marnewick and Marnewick, 2021， Ghosh et al. 2021) suggest that traditional industries are gradually implementing digital intelligent transformation techniques, progressing from basic digitization to more sophisticated digital intelligence. Businesses have the ability to better satisfy consumer needs, increase efficiency, and maintain their competitiveness in the digital age due to this transformation. For example, digital innovation and AI-supported digital advancement processes have implications for managing massive amounts of data (Trocin et al., 2021). This implies that information gathering along with data analysis are the two primary stages that businesses pursue. Data gathering is the process of potentially obtaining data from various sources in a variety of formats while adhering to security and privacy laws. Data analysis is the process of creating objective methods for data that is supported by evidence. Digital intelligence strategy is a critical component of digital innovation, enabling organizations to collect and analyze vast amounts of data, automate processes, and make informed decisions (Ashwell, 2017). For instance, AI y is a key enabler of digital innovation, providing organizations with the necessary conditions and opportunities to act, while actors decide the type of information to collect, when to process it, and based on which criteria.

3 PROBLEMS IN THE TRANSFORMATION PROCESS

3.1 Cost Challenges

Digital transformation provides a plethora of advantages but it as well poses some challenges and organizations need to address them in order to ensure seamless implementation (Deloitte, 2015). Digital transformation is a priority for companies aiming at productivity improvement, operational efficiencies and the provision of customers' experiences. However, the cost of digital transformation can range considerably on the businesses that invest depending on their size, industry, and objectives. The main reason for the cost problems in digital transformation is that it can be a serious obstacle for an organization (Zhong, 2019). Technology expenditures, including investments in network equipment, servers, software licenses, and network infrastructural upgrades, will take a heavy toll on budgets. It is usually not affordable to them because it often involves complete setting up of digital solutions, which these companies are unable to implement given their limited resources. The ten key developments driving the cost of digital change fall into three categories namely; poor adoption practices, lack of buy-in from stakeholders and lack of engagement (Ovington, 2024). These elements may materially affect the outcome of digitalization which is the primary reason for an organization to take into account them when preparing their transformations or any change initiatives.

Particularly for SMEs, which typically experience a structural shortage of financial resources, it is imperative to comprehend the straight-forward financial consequences of Open Innovation policies (Costa, 2023). Such costs include developing internal skills for monitoring the outside world, locating reliable outside data sources, putting internal asset protection plans into action, and the possible expenses associated with potential losses of competitiveness brought on by the spread of important proprietary information (Costa, 2023). In addition, there is also the problem of deciding if the transmutation will be really bringing along all those benefits as promised which are enough to justify the invested money both the initial and the ongoing. Enterprises have to measure the profitability of the digital transformation projects in comparison to the anticipated results as well as keep the financial expenditure in line with the expected outcomes. The assessment or evaluation process is not a simple matter and goes beyond the direct costs involved, also incorporating indirect factors like the productivity improvement, customer satisfaction, and competitive advantages.

3.2 Talent Challenges

Talent scarcity and an innovative search for new models make it a difficult task for companies in their digital transformation process. The majority of SME entrepreneurs conduct marketing of their business online through digitalization (Nawawi 2024). The primary goal is still the traditional transactions, so the internet transactions are the alternative to expand their options and get additional income. The speedy rate of technological evolution necessitates institutions to have access to proficient qualified individuals that can navigate the complex digital landscapes and lead to innovations. Nevertheless, scarcity of such talents indeed presents the challenges, especially in the areas of machine learning, data analytics and cybersecurity.

In addition, the scarcity and its corresponding cost is a factor that makes it harder for the organizations,

especially SMEs due to their lack of resources and the fact that they have a backlog in digitalisation of their corporate processes. To acquiring and retaining the professionals with specialized expertise in new emerging technologies which is often referred to as the digital talent gap by various stakeholders (Sommer, 2023). The competition among companies for high-quality job seekers get fiercer, which leads to talent shortage and hike in recruitment costs. Furthermore, the need for new business approaches and digital channels requires a skill set with technical abilities and creativity, strategic thinking, and adaptability.

4 SOLUTIONS TO ADDRESS CHALLENGES

4.1 Use of Data for Strategic Insights

Data can be utilized by organizations for detecting areas of improvement, reduction of costs and operations efficiency due to better informed decision-making (Vassakis, 2018). Data analytics increases the ability of SMEs to detect relationships, consider tendencies, and to determine some ratios that cannot be immediately observed by the traditional methods. Subsequently, the conventional business will become endowed with a capacity to make more meticulous decisions, spend money wisely, and implement strategies whose core purpose is to lead to the growth and innovation of their industries. In a digital economy transformation, data analysis can be a valuable for organizations when there are decisions such as if the technology investments will give out maximum return (Vassakis et al., 2018). Capacity to implement historical data charts provides the same case predictive analytics the power to predict future trends, enabling organizations be proactive in meeting client needs, stock level and supply chain efficiency. Other than that, data analytics used to identify and then to fix the inefficiencies, to save resources, to finally better the performance of the organization (Vassakis, 2018). The companies use the data analytics for competitive advantage necessitates having a proper budget to buy software tools, technologies, and a good workforce. These include creating a data-oriented culture that values data driven decision making, allocating funds for data analytics platforms and tools, and equipping the workforce with the skills and ability to dissect and interpret data.

4.2 Iterative System Updates

Developing iterative system updates is paramount to keep abreast with the agility and flexibility emerging in digital ecosystem (Li, 2011; Altın, 2017). Constantly changing systems increase ability of employees to adapt faster, improve their skills, and boost overall productivity. Implementing iterative updates allows companies to get ahead of emerging technologies, to have a solution to a wide range of challenges and to optimize and provide responsiveness for their digital infrastructure based on the dynamically changing organizational conditions. System iterative updates include regularly updating software, hardware, as well as digital infrastructure components to integrate functions, bug fixes, and performance improvement (Li, 2011). SMEs and traditional businesses can minimize the disruption of their system updates and lessen the risk of system failures functionality using an iterative approach so that their digital infrastructure remains up-to-date and secure. Similarly, iterative upgrades allow organizations to address user requirements and collect feedback to further improve the system. Through regular solicitation of feedback from users, SMEs are able to identify areas of their digital infrastructure to improve, focus on feature development, and make sure that they meet their users' expectations. One of the ways of ensuring an iterative system among organizations is to create processes and procedures that will streamline the updates. It also entails formulation of a change management framework, which covers the allocation of roles and duties, and the setting up of communication channels to inform users about inevitable adjustments and updates. This implies that SMEs implement the mechanisms that ensure their transactional systems work correctly are secure and can be tweaked based on their individual needs.

4.3 Addressing Information Silos

There are two ingredients which make all the difference: effectively getting rid of data islands and making sure the data is shared among all partners. Successful dismantlement of the walls, with the development of a team work culture that is characterized by effectiveness in terms of communication, decisions and operations, should be the result of the following recommendations (Fox, 2021, Bouwer, 2021). Through cross-department and function data sharing, these organizations can eliminate duplications, enhance the data accuracy and generate synergies producing cost cuts and enhanced

performance. The drawback of information silo is a set of intercorrelated behavior performed by individuals who experience a kind of border between the units and, therefore, do not share information (Bouwer, 2021). This can be achieved by introducing platforms for information sharing, setting multi-professional teams, and by fostering a culture of collaboration and transparency. SMEs and traditional businesses can leverage data silos by anchoring in their decision-making processes, avoiding redundancy in assignments, improving efficiencies in operational processes. One of the weakest points of SMEs is the data on their customers that they do not have the opportunity to use for quality strategies and thus the consumers' satisfaction is getting lower. Likewise, sharing customer information cross-departmentally can help SMEs understand more their clients' needs and their likes and so the departments can present the best solution. SMEs can reduce information silos by developing well-defined data sharing policies and procedures to identify and assign roles and responsibilities as well as avenues for collaborations and information exchanges between employees. Indeed, they will make certain that the process of digital infrastructure is focused on the joint circulation of information and collaboration and ensure their achievement of the digital transformation objectives.

4.4 Resource Optimization Through Digitalization

The consumption of resources such as energy, manpower and time is reduced under the digitalization. Digital transformation involves elimination of resource wastage such as energy, manpower and time by application of optimal utilization techniques (Brüggemann , 2020). Through digitalization, computerization, repetitive tasks automation, and technology utilization, organizations can decrease resource consumption, improve the productivity, and make their operations more streamlined. Digitalization enables more efficient allocation of resources that reduces waste and enables organization to function leaner and more sustainably (Brüggemann, 2020). The utilization of digitalization in resource optimization includes the implementation of technology that eliminates the manual processes from the system, reduces paper-based workflows, and streamlines operations (Topić, 2020). Thus, SMEs and traditional be able to cut down on resource consumption including energy, manpower and time, therefore, improving efficiency and sustainability of operations. Digitalization also empowers companies utilizing data and analytics to achieve optimal resource use. For instance, SMEs can use the energy consumption data to identify energy efficiency tips that can significantly reduce cost with minimal negative environmental impacts.

5 CONCLUSION

In summary, digital intelligent transformation is a fundamental aspect of the current corporate operation models. Enterprise digital intelligence is not only an empty slogan, but the real use of information technology to fundamentally transform enterprise management mode, is the innovation and transformation of the enterprise development. This is the inevitable choice for the enterprise to evolve from the industrial economy era to the digital economy era. Building from the case of digital transformation dilemma which affects SMEs and traditional industries seeded in the wake of digitalization, the paper explores the methods and strategies of optimization of transformation as well as cost cutting and shortage of workforce and finally presents the realistic digital transformation optimization scheme for enterprises under the backdrop of digitalization. The cost and talent issues can be targeted through data-driven planning, system iterations and talent development. As a result, SME and traditional companies can achieve seamless transition into digital age. Research exploring the long-term effects is needed as well as providing expertise for small and medium enterprises and traditional sectors. Hence, SMEs and traditional businesses can better assure that their digital transition activities would be successful in creating opportunities of growing and come up with innovation in the virtual world.

REFERENCES

Altın, B., Willems, J., Oomen, T., Barton, K. 2017. Iterative Learning Control of Iteration-Varying Systems via Robust Update Laws with Experimental Implementation. *Control Engineering Practice*, 62, 36–45.

Adams, N. B. 2004. Digital Intelligence Fostered by Technology. *Journal of Technology Studies*, 30(2), 93–97.

Ardolino, M., Rapaccini, M., Saccani, N., Gaiardelli, P., Crespi, G., Ruggeri, C. 2017. The role of digital technologies for the service transformation of industrial companies. *International Journal of Production Research*, 56(6), 2116–2132.

Ashwell, M. L. 2017. The digital transformation of intelligence analysis. *Journal of Financial Crime*, 24(3), 393–411.

Berman, S. J. 2022. Digital transformation: opportunities to create new business models. *Strategy Leadership*, 40(2), 16–24.

Bouwer, R., Pasquini, L., Baudoin, M.-A. 2021. Breaking down the silos: Building resilience through cohesive and collaborative social networks. *Environmental Development,* 100646.

Boysen, N., Briskorn, D., Fedtke, S., Schwerdfeger, S. 2018. Drone delivery from trucks: Drone scheduling for given truck routes. *Networks*, 72(4), 506–527.

Brüggemann, H., Stempin, S., Meier, J.-M. 2020. Consideration of digitalization for the purpose of resource efficiency in a learning factory. *Procedia Manufacturing,* 45, 140–145.

Costa, A., Crupi, A., De Marco, C. E., Di Minin, A. 2023. SMEs and open innovation: Challenges and costs of engagement. Technological *Forecasting and Social Change*, 194, 122731.

Deloitte. 2015. Industry 4.0: Challenges and solutions for the digital transformation and use of exponential technologies*. Deloitte.*

Fox, A. M. 2021. Information flow and situational awareness when transitioning into higher education Pain points and possibilities across silos. Ntnuopen.ntnu.no.

Ghosh, S., Hughes, M., Hodgkinson, I., Hughes, P. 2021. Digital transformation of industrial businesses: A dynamic capability approach. *Technovation,* 113, 102414.

Koumas, M., Dossou, P.E., Didier, J.-Y. 2021. Digital Transformation of Small and Medium Sized Enterprises Production Manufacturing. *Journal of Software Engineering and Applications,* 14(12), 607–630.

Li, F. 2020. The Digital Transformation of Business Models in the Creative industries: a Holistic Framework and Emerging Trends. *Technovation*, 92-93(2), 102012.

Li, W.-M., Hong, J.-Z. 2011. New iterative method for model updating based on model reduction. *Mechanical Systems and Signal Processing*, 25(1), 180–192.

Marnewick, C., & Marnewick, A. 2021. Digital intelligence: A must-have for project managers. *Project Leadership and Society,* 2.

Moreira, F., Ferreira, M., Seruca, I. 2018. Enterprise 4.0 – the emerging digital transformed enterprise? *Procedia Computer Science,* 138.

Nawawi, N. 2024. Unlocking Digital Talent in Indonesia's Micro, Small, and Medium Enterprises: Issues and Challenges. 29–43.

Ovington, T. 2024. Understanding the cost of digital transformation. https://www.walkme.com/blog/digital-transformation-cost/.

Reed, S., Campbell, A. M., Thomas, B. W. 2021. The Value of Autonomous Vehicles for Last-Mile Deliveries in Urban Environments. *Management Science,* 68(1).

Sommer, L. 2023. The digital talent trap of the SME sector: a make-or-buy solution approach. *Intelektinė Ekonomika,* 17(1), 8–29.

Trocin, C., Hovland, I. V., Mikalef, P., & Dremel, C. 2021. How Artificial Intelligence affords digital innovation: A cross-case analysis of Scandinavian companies. *Technological Forecasting and Social Change,* 173, 121081.

Tommy, C., 2021. Supply Chain Management Performance. *Journal of Service Science and Management,* 16(01), 44–58

Topić, M., Biedermann, H. 2020. Increasing Resource Efficiency Through Digitalization – Chances and Challenges for Manufacturing Industries. *Lecture Notes on Multidisciplinary Industrial Engineering*.

Vassakis, K., Petrakis, E., Kopanakis, I. 2018. Big Data Analytics: Applications, *Prospects and Challenges. Mobile Big Data,* 10, 3–20.

Zhong, R. Y., Xu, X., Klotz, E., Newman, S. T. 2019. Intelligent Manufacturing in the Context of Industry 4.0: *A Review. Engineering,* 3(5), 616–630.