

Assignment 01
Advanced Industry 4.0 (ACPA7000)

**The New Business Models Enabled with New Industry 4.0
Technologies**

Submitted to:

Dr. Mahesh Kannath

by:

Yasir Joya
(Bangor University)

06/05/2023

Contents

Abstract:	3
1. Introduction:	3
1.1. Business model for Industry 4.0.....	3
2. Conclusions:	7
3. Recommendations:	7
4. References	7

Abstract:

Advanced industry 4.0 can create significant growth opportunities for many organizations while appear challenging to new businesses and SMEs. In order for them to succeed one may need revisiting the business models of SMEs and how that may fit to the digital technologies and impacts their function. This study aims to identify the key elements of business model of the advanced industry 4.0 and its impact on the SMEs function and value creation. Relevant literature has been sourced and included to identify primary impact areas encompassing customers, organization and its financial structure. The key business models components are identified from the published findings consisting of value proposition, value creation and value capture and their impact on the business plan has been highlighted.

1. Introduction:

The wide scale adoption of Industry 4.0 technologies requires that end user expectations are met in terms of personalized smart products and services, which does not come without significant challenges. It is required to mine into this for deeper understanding and informed decision making holistically by SMEs, businesses and consumers and formulating a new business model 4.0 concept as may deem necessary for industry 4.0 implementation. It is aimed to iterate possible solutions via potential involvement of new industry 4.0 technologies such as communication channels, big data, cloud computing, 5G communication, smart factory, and virtual reality in a holistic approach to address circular economy, reducing cost, enhancing productivity, and improving customer experience. Although established businesses and larger industry potentially enjoy great deal of benefit adopting the industry 4.0 components, SMEs are expected to be the largest beneficiary being a key player in the global supply chain (Safar, et al., 2018; Robu, 2013).

SMEs contribute a great deal to the global economy and growth through gross domestic product though. They face significant challenge in strategic planning and implementation of new and emerging technologies especially associated with the industry 4.0. This is because of the set priorities, limited capacity and flexibility to time constraints for production changes, lack of skills and capital investments. This is where business model is crucial and plays a key role to create value, generate revenue and deliver long term economic impact. There has been a consensus by the research community that a new technology will hardly succeed without provision of a good business model. Contrasting to the larger organization, SMEs lag when it comes to the adoption of the new technologies in the realm of industry 4.0. A considerable challenge to the embracing new technologies is observed from the cost vs real benefit analysis of Industry 4.0. SME lack clarity on this subject due to limited skills and know how to understand how these technologies will impact their business in the long term.

1.1. Business model for Industry 4.0

The concept of industry 4.0 is about the digital transformation of the society encompassing the social, industrial, and technological changes which could not be possible within the 3rd

industrial revolution (Grabowska & Saniuk, 2022). The fourth industrial revolution brings about new business concepts such as the open business model where enterprise, market and consumer are interconnected and freely interact and shape how the product or processes are developed within and outside the organization. The relationship between the businesses and customers are directly involved in the value creation and financial processes. With intelligent monitoring and decision making, enterprises and their entire value chain networks will be able to control and optimize their operations in real time. Studies indicate that through industry 4.0 future business trends will involve customer experiences as a key element, creating the potential to transform almost any sector in between the two players (Arnold, et al., 2016). As a result, companies will have to define their strategies and business models in a completely different way, not concerning traditional market competitors but the emerging consumer ecosystems (Cavalcante, et al., 2011).

More flexible, efficient, and adaptable production systems are desired to meet the emerging and future manufacturing challenges. Through modern IT solutions, industry 4.0 impacts the complete value chain starting from raw materials, supplies up to the consumer, enabling personalized products for a diverse customer needs. Advanced ICT allow production to be precisely tailored to customer expectations, reducing waste, which helps maintaining low costs, high quality and process efficiency. In order to implement I4.0 technologies to wider chain of enterprises, the impact on the business model is required to be elucidated, which is explained hereafter.

A business model (BM) is an “organisation’s approach to generating revenue at a reasonable cost, and incorporates assumptions about how it will both create and capture value” (Gambardella & McGahan, 2010; Soondka & Smuts, 2021; Osterwalder & Pigneur, 2010). Figure 1 illustrates how the core value of the product/process is defined and controlled by the seven key elements (or upto nine in some cases) constituting the BM. As shown in the Figure,

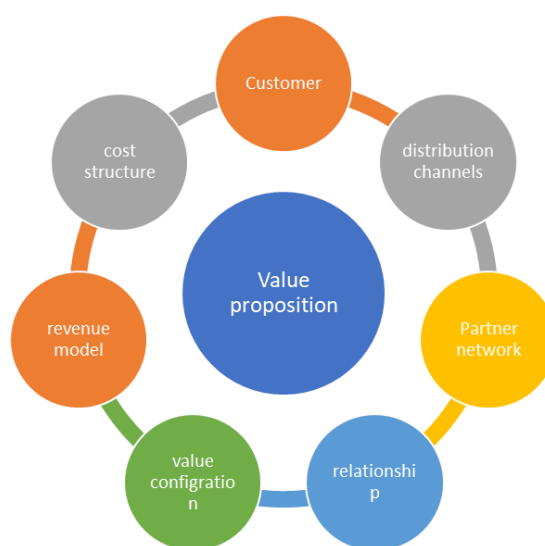


Figure 1. Schematic chart showing some of the key elements of Osterwalder business model

the centre consists of the value proposition, which describes all services and products that add value for a certain customer segment and in turn receive the value proposition. The value configuration describes the activities a company must perform to create the value proposition and run the entire BM.

As mentioned earlier the implications of the Industry 4.0 in Business Model Innovation (BMI) a framework based on Osterwalder's Business Model (BMO) definition and the theories describing Innovation levels has been developed. Four ways have been identified to apply digital transition in manufacturing firms according to the degree of innovation involved. This goes all the way from incremental innovation whereby modifying just a few elements of the business model to the radical innovation where transformation of all key elements of the business models takes into effect (Figure 2).

Take for example the internal and external process optimization, which represent an incremental innovation that optimizes the actual business without involving big changes. This could be the first step for traditional manufacturing companies to embrace the Industry 4.0 without addressing high risks. The potential impacts on each component of the BM as listed from Ibarra et al (Ibarra, et al., 2018) review is detailed as follows.

1.1.1 Value Creation:

Product and resources traceability: This applies to all stages from raw materials to the manufactured product or service by intervention of the BMI leading to more efficient production, quality control, inventory management and logistics. The sense of the customer confidence is elevated by the digital product track and trace function which value adds to the product line. The machine-to-machine connectivity allows interconnectivity between the internal processes to the supply chain from external links. This facilitates real time control of the resources making the processes more efficient and cost effective. The faster communication through 4G/5G enables flexibility to data communication and knowledge share by employee work from anywhere anytime.

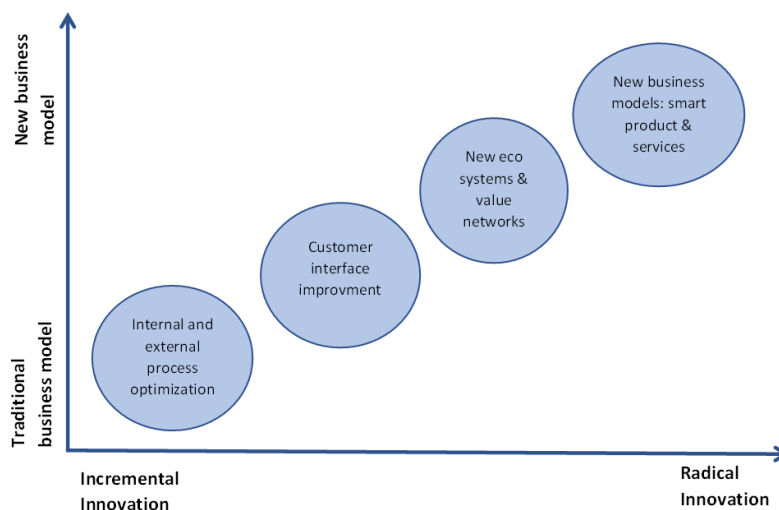


Figure 2. Chart showing four ways to conduct digital transformation in manufacturing companies, adapted from (Ibarra, et al., 2018)

1.1.2 Value Delivery

This involves improved flexibility to the manufacturer by individualized mass production, customization of delivered products and services to the wide variety of consumer base.

1.1.3 Value Capture

The optimization of the product cost is vital for market competitiveness and boosting sales. More efficient processes and resource utilization makes it easier in achieving this goal.

Another digital transformation through incremental innovation is focussed on the value delivery for customer interface improvement. Development of emerging technologies such as Cloud Computing, Big Data, Virtual Reality etc. have introduced innovative ways to interaction and feedback from a wider customer base enabling better understanding of end user needs and potential business improvements for greater customer satisfaction. Value delivery through Big Data supported by the cloud computing have created knowledge base of customer needs in real time based on the social networks, predictive and personalized marketing tools. In addition, value creation and value capture has been enabled by the management of new sales touchpoints, data collection, monitoring, cost savings and dynamic pricing and online payments respectively (Ibarra, et al., 2018).

The next model on the chart New Ecosystems and Value Networks proposes a radical innovation of the BM_encompasses value creation through connection between business to partner infrastructure. This involves real time information sharing including production, inventories, sales etc. Potential increase in the value capture due to cost reduction for all stake holder, and value delivery through access to new customers segments and broader product range offering is anticipated (Ibarra, et al., 2018).

The final BM through radical innovation is envisaged through Smart products and services which in contrast to the previous cases, proposes a completely new BM based on new technologies focused on Big Data, Cloud Computing, and Embedded System allows to offer innovative smart goods and services. This BM approach value delivery through introducing smart products that collects information continuously from the customers and the environment, can perform predictive maintenance, self-upgrades and ordering spare parts etc. to avoid potential delays and unnecessary production lead times. Similarly, to capture ad create the value in the product or service, new physical and human resources, new revue streams such as dynamic pricing and pay-per-use etc. are required. Figure 3 reiterates the three key aspects of business model discussed here i.e. value proposition, creation and capture proposed by Clauss (Clauss, 2017).

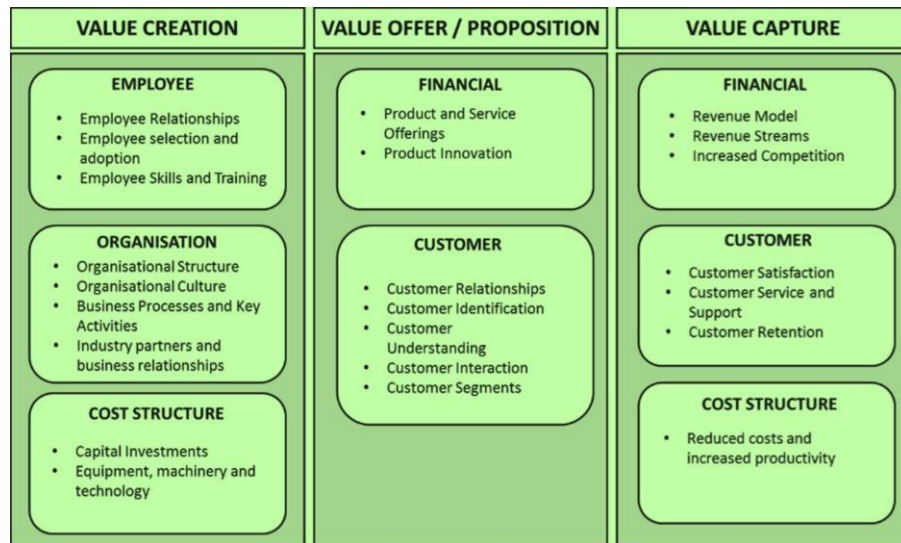


Figure 3. Diagram showing how Industry 4.0 BM impacts on SMEs (Soondka & Smuts, 2021)

2. Conclusions:

- The report summarises the potential business models which can be implemented in the industry 4.0 framework while differentiating the BM innovations it may bring
- The impact of industry 4.0 technologies on the traditional BM and pathways for the innovations into the BMs are discussed addressing some new challenges
- Four potential routes are identified according to the level of innovation sought, driving the digital transformation of the manufacturing processes.
- New sources of value creation, delivery and capture have been identified value adding to the current procedures and practices in the traditional BMs
- Last but not the least, new BM comprising intelligent systems: self-controlling objects, products and services with smart features for track and trace have been described.

3. Recommendations:

- It is needed to continue further research on the topic to provide a deeper understanding of the BM innovation for digital transformation of manufacturing companies as per the industry 4.0 guidelines.
- The term “value” is needed to be redefined and analysed in the new manufacturing ecosystem to cater for the emerging needs of the industry 4.0 operation and practice.
- Further data collection, through surveys, interviews etc., from SMEs on the opportunities and challenges of the industry 4.0 should be encouraged to improve the confidence of new manufacturers and to set informed policies and goals.

4. References

Arnold, C., Kiel, D. & Voigt, K.-I., 2016. *How Industry 4.0 changes business models in different manufacturing industries*. Porto, Portugal, 27th ISPIM Innovation Conference.

- Cavalcante, S., Kesting, P. & Ulhøi, J., 2011. Business model dynamics and innovation:(re) establishing the missing linkages. *Management Decisions*, 49(8), p. 1327.
- Clauss, T., 2017. Measuring business model innovation: conceptualization, scale development, and proof of performance. *R&D Management*, 47(3), pp. 385-403.
- Gambardella, A. & McGahan, A. M., 2010. Business-model innovation: General purpose technologies and their implications for industry structure. *Long range planning*, 43(2-3), pp. 262-271.
- Grabowska, S. & Saniuk, S., 2022. Business Models in the Industry 4.0 Environment—Results of Web of Science Bibliometric Analysis. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), p. 19.
- Ibarra, D., Ganzarain, J. & Igartua, J. I., 2018. Business model innovation through Industry 4.0: A review. *Procedia Manufacturing*, Volume 22, pp. 4-10.
- Osterwalder, A. & Pigneur, Y., 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. NJ: Wiley.
- Robu, M., 2013. The dynamic and importance of SMEs in economy. *The USV annals of economics and public administration*, 13(7), pp. 84-89.
- Safar, L., Sopko, J., Bednar, S. & Poklemba, R., 2018. Concept of SME business model for industry 4.0 environment. *Tem Journal*, 7(3), p. 626.
- Soondka, A. & Smuts, H., 2021. The Impact of Industry 4.0 on the Business Models of Small and Medium Enterprises: A Systematic Literature Review. In: D. Dennehy, et al. eds. *Responsible AI and Analytics for an Ethical and Inclusive Digitized Society. I3E 2021. Lecture Notes in Computer Science*. s.l.:Springer, Cham, p. 356–367.