

Impact of Digital Transformation on IA Companies

Rajeev Joshi

DBA Student at Swiss Scholl of Business management

Geneva Switzerland

raj12ju@gmail.com

Abstract

Industrial Automation companies or IA companies played a critical role in Industry 3.0 transformation of manufacturing and process industries. Between 1980 and 2000, IA companies like ABB, Emerson, Honeywell, Rockwell, Siemens, and Yokogawa dominated with several measurements and digital control systems. Introduction of new technologies like Internet of things (IOT), Big Data, Virtua and augmented reality and data science, the industry 4.0 concept has changed the expectation of manufacturing and process industry customers. Industries are looking beyond traditional control systems, and the field is experiencing new competition from data-driven companies and consultants like Accenture, IBM, and TCS. IA companies are under pressure of two-fold digital transformation; one is internal operation transformation and the second is to enable the transformation of manufacturing and process industries. This research will holistically study the impact of digital transformation on IA companies and suggest the action fields to remain competent in the market.

Keywords

Digital Transformation, Industry Automation Company (IA), Industry 4.0, IIOT, Qualitative Analysis.

1. Introduction

Digital transformation is making radical changes in the business processes, manufacturing industries and in social networking. Digital transformation is essential for the industries and businesses to remain competitive. Digital transformation provides opportunities and challenges to employees, organizations, and entire societies (Setia et al. 2013; Bharadwaj et al. 2013; Dabrowska et al. 2022). Utilization of software and tools like, cloud migration, digital twins, big data, machine learning and artificial intelligence (AI), and the Internet of Things (IoT) could lead to process and resource optimization and increased return on investment (ROI) for the business (Dabrowska et al. 2022).

Digital transformation is reshaping our work culture, and workplace (Marsh et al. 2021). As a result of revolving technology customer expectations and behaviors are changing (Manyika et al. 2013; Coad et al. 2021). Leaders need to create the business models with customer value creation and market capture in mind (Nambisan 2017; Song 2019; Lanzolla et al. 2020).

Digitalization is not a new concept for industrial automation companies; these companies started classical automation in 1970. Digital technology is continuously evolving in IA companies and at current focus is on developing the intelligent production process or “Industry 4.0” system (Horwart et al. 2018; Oesterreich and Teuteberg 2016; Brettel et al. 2014; Horwart et al. 2019)

In the industrial automation, ABB, Emerson, GE Automation, Honeywell, Siemens and Yokogawa, are considered big players. There are many other small and medium-sized automation companies. All these IA companies are impacted by digital transformation (Hess et al. 2016). IA companies require a strategy for internal transformation to improve productivity and enabler of customer (manufacturing companies) digital transformation to create a value proposition.

IA companies dominated Industry 3.0 era between 1980~2010 by supplying control automation to manufacturing companies. Distributed control systems (DCS), programmable logic controllers (PLC), supervisory control and data acquisition system (SCADA) and other systems helped process industries to optimize the work, increase productivity and flourish the business. Industry 4.0 (Piccarozzi et al. 2018), which started in early 2010 and digital transformation changed the trends and IA companies are challenged by new technologies. New technology trends like the Internet of

Things (IOT), Machine Learning, Artificial intelligence (AI), Big data analysis, Cloud migration, Robotic process automation (RPA) are disrupting entire manufacturing and business including the IA companies (Brien, Resnick and Avery 2018; Schaede 2020; Ramnarayan and Mehta 2020).

Digital transformation would have taken several years to take fast phase, but Covid-19 forced industry and business leaders to adopt the usage of digital technologies in much faster phases During Covid-19 (Jeff 2020). As per Twilio (2020) survey, as a result of Covid-19, 8-10 years of transformation implementation phase was reduced to a few weeks and months, and this is area is witnessing high investment.

Organizations perish if they fail to compete in the digital era. Rise of Amazon, Airbnb, and Uber is a good example of how companies can grow exponentially by leveraging digital transformation. Same time failure of Nokia in the smart mobile business and Kodak in the era of digital cameras are some of the example to demonstrate the impact of not leveraging emerging technologies. Transformation is vital for the survival and success of industries and businesses.

Digital Transformation is both an opportunity and challenges for IA companies and it may create both positive and negative impacts on the IA organization business. This research work will study the impact of digital transformation on IA companies and its business.

1.1 Research Objective

To Study the Impact of digital transformation on industry automation (IA) Companies.

1.2 Research Question

How digital transformation will impact IA business, its employees' work and customer experience?

2. Literature Review

Jeff (2020) explains the importance of digital transformation, to remain competitive, it is imperative for the industries and business to adopt the digital technologies and change their human resource mindset.

2.1 Definition of Digital Transformation.

As per Hess et al. (2015) digital transformation is a continuous process that leads to many significant changes in business models, products, and organization structures.

Digital transformation marks radical thinking about how organizations use their people, process, and technology resources to fundamental change their business operation (Westerman, Bonnet, and McAfee 2014). As per Ramnarayana and Mehta (2020) digital transformation is the journey of strategically planned organizational change. Ramnarayana and Mehta (2020) advocated for data-driven strategy, and development of a innovation culture and empower the team with technology and methods. Below Table 1, 2 and 3 show the scholar's definition of digital transformation.

Table 1. Scholars' Definitions of Digital Transformation (Kamila, 2019)

Author(s)	Definition
G. Westerman, A. McAfee <i>et al.</i> [2011]	"(...) the use of technology to radically improve the performance or reach of enterprises is becoming a hot topic for companies across the globe. Executives in all industries are using digital advances such as analytics, mobility, social media, and smart embedded devices and improving their use of traditional technologies such as ERP to change customer relationships, internal processes and value propositions (...)"
M. Fitzgerald <i>et al.</i> [2013]	"(...) use of new digital technologies, such as social media, mobile, analytics or embedded devices, in order to enable major business improvements like enhancing customer experience, streamlining operations or creating new business models (...)"
M. McDonald, A. Roswell-Jones [2012]	"(...) as such, the Digital Transformation goes beyond merely digitizing resources and results in value and revenues being created from digital assets (...)"
E. Stolterman, A. Fors [2004]	"(...) digital transformation is the changes that digital technology causes or influences in all aspects of human life (...)"
BMW [2015]	"(...) stands for the complete networking of all sectors of the economy and society, as well as the ability to collect relevant information, and to analyze and translate that information into actions. The changes bring advantages and opportunities, but they create completely new challenges (...)"
A. Martin [2008]	"(...) now commonly interpreted as such usage of Information and Communication Technology, when not trivial automation is performed, but fundamentally new capabilities are created in business, public government, and in people's and society life (...)"
D. Mazzone [2014]	"(...) is the deliberate and ongoing digital evolution of a company, business model, idea process, or methodology, both strategically and tactically (...)"
D. Bowersox <i>et al.</i> [2005]	"(...) process of reinventing a business to digitize operations and formulate extended supply chain relationships. The DBT leadership challenge is about reenergizing businesses that may already be successful to capture the full potential of information technology across the total supply chain (...)"

Digital Transformation from IA companies Perspective

Yokogawa (2021) in the E-book on digital transformation defines digital transformation using three phases: Digitization, Digitalization, and Digital Transformation (Figure 1).

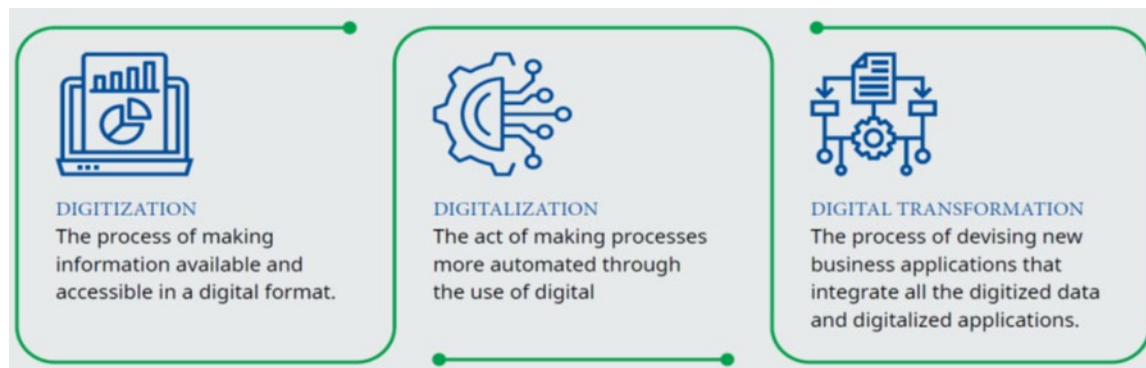


Figure 1. Digitization, Digitalization, and Digital Transformation for IA (Yokogawa 2021)

Digitization focuses on converting analog forms of information to digital; digitalization automated the process, whereas digital transformation is about devising new business applications and integrating digitalized data with the digital applications (Yokogawa 2021).

2.2 Technological Trends and Driving factors.

In Industry 3.0 era, IA companies supported manufacturing and process industries through the monitoring and control system. Now these companies are using several technological trends in the digital transformation, like Cloud computing, remote engineering, remote factory acceptance test (FAT), big data, IIOT, Robotic process automation (RPA), Artificial intelligence (AI) and machine learning (ML). Using these technologies in addition to their legacy control system, IA companies are developing the strategy for internal transformation and external to support process and manufacturing companies to improve (Yokogawa 2021). As per consultancy company, Deloitte (2019) publication trends such as 12% average productivity gain from smart factories are driving transformation. Complimenting Yokogawa and Deloitte's view PWC in 2019 reports that 80% of managers believe digital change is

crucial for their future business process models. Ting (2021) emphasizes on operation technology (OT) and information technology (IT) convergence for digital transformation.

Yokogawa (2021) in the E-Book, provided details of digital transformation driving factors (Figure 2). Ageing workforces, fluctuating commodity prices, capex optimization, and transition of global energy are considered as market drivers for transformation. Technology drivers are Cloud, Big Data, AI, ML, and RPA.

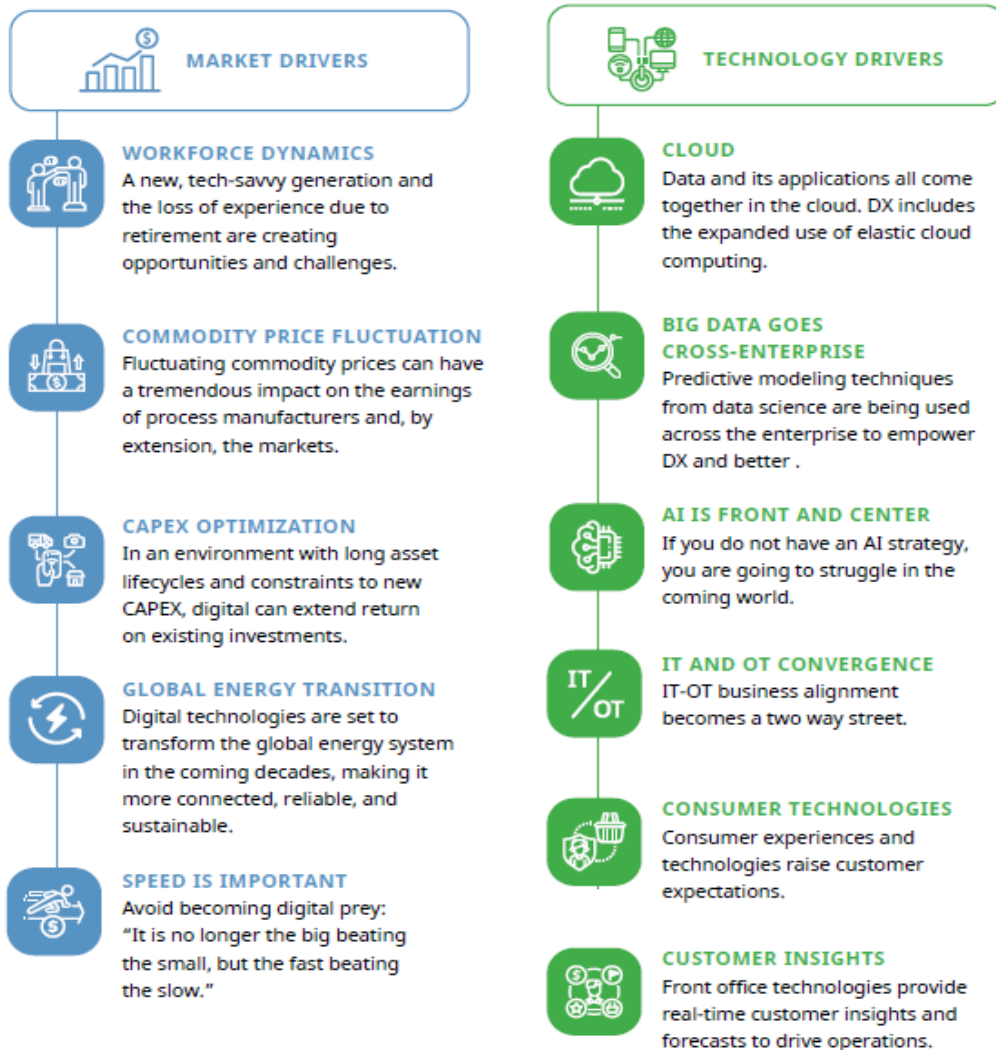


Figure 2. Drivers of Digital Transformation in Process and Manufacturing Industry (Yokogawa 2021)

2.3 Impact of Digital Transformation

Pierre Nanterme, the former Accenture CEO, once said, "Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000".

The digital transformation has a wide-ranging impact on the business environment, creating opportunities and challenges. Inter-related trends such as e-commerce, big data, machine learning and artificial intelligence (AI), and the Internet of Things (IoT) could lead to large productivity gains for the economy (Andrew 2018).

As a result of too much automation and transformation initiation, modern networks in businesses today – especially large enterprises – will likely end up using firewalls, routers, and switches from multiple vendors, along with a

combination of cloud platforms and services, increasing complexity security challenge facing IT teams (IsBuzz 2019).

Newman (2018), is cautious about transformation initiation failure. Before transformation, industry leaders should also be aware of failed initiative which may result in loss of time, revenues, and productivity. He further advocates for data-driven processes and a correct vision of transformation. Below Figure 3 details some of the impacts

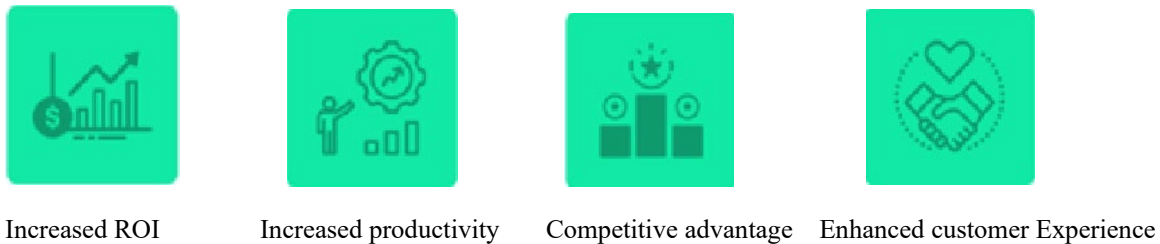


Figure 3. Impact of Digital Transformation (Lizard Global.com)

As per Kane et al. (2016) just using technology is not sufficient for the success of digital transformation; creating digital mindset is critical factor. As per Ramnarayan and Mehta (2020), paying attention and creating requisite capabilities (people); reshaping processes to link people with strategy, and using digital technologies like IoT, AI, and Cloud will enable the transformation.

3. Research Framework

The researcher used qualitative analysis to analyze the digital transformation’s impact on IA companies. Impact is studied on three main areas: Business, customer experience, and internal impact (productivity and employee experience), refer to Figure 4.

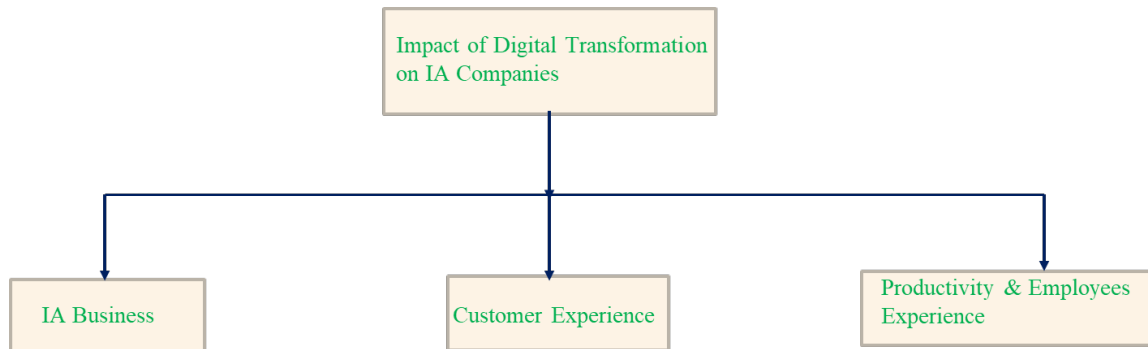


Figure 4. Research Framework (Own development)

4. Research Method

The impact of digital transformation is about the experience and perspective of the organization’s top executives and its employees; hence qualitative and interview methods will be most appropriate. Qualitative research is an effective model that occurs in a natural setting that enables the researcher to develop a level of detail from being highly involved in the actual experiences (Creswell 2003). Below Figure 5 illustrate the steps involved in the qualitative analysis process. Data collected from research articles, publications, and textbooks on digital transformation, and journals formed the secondary source of data (Müller et al. 2014).

The researcher interviewed six executives working in different IA companies. These companies have either implemented or in the process of implementing digital transformation. Researcher further used the content analysis technique to identify the keywords and impacts. Journals and books formed the secondary source of data.

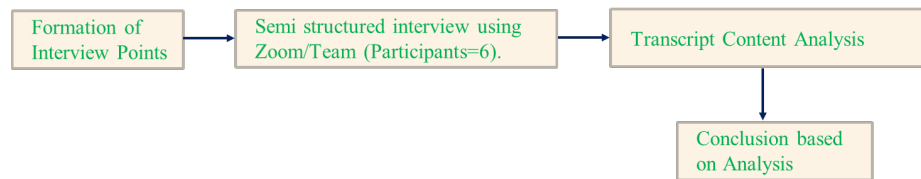


Figure 5. Qualitative Research analysis process (Based on Kanadli 2017)

5. Analysis

The interview was conducted with a prior appointment and recorded with participant consent. Interview transcript was used for content analysis for the keywords.

Participants Profile:

Participants Experience	Count
>25 Years	2
15-20 Years	2
>10 Years	2

Table 2. Participants Profile

Participants Role/Position:

Participants Position	Count	Keyword
Chief Executive	1	CEO1
Chief Digital Officer	1	CDO1
Vice President Customer Relationship	2	VPCX1, VPCX2
Director Operations	2	OD1, OD2

Table 3. Participants position

Six people were interviewed; two were above 25-year experience two were between 15-20 Years and two were between 10-15 years' of experience. One participant was CEO, one was CDO (Chief digital officer) two were vice presidents and two were operation directors.

As per CEO1 Digital transformation will have a tremendous impact on the entire business chain of IA companies. He advocated for early adaptation of new technologies and changing the mindset of the resources. He was confident that his company could soon become completely transformed and enable its customer for Digital Transformation.

CDO1 echoed similar views; he even took the example of Washington post and Nokia and explained how companies would perish if transformation is not adopted. As per CDO IA will open new areas like IIOT, Cloud migration, AI (Artificial Intelligence) and Digital twin business to IA companies. It also emphasized that IA companies already has expertise on process control and good in Level 1 and Level 2 automation and can be further leverage knowledge to Level 3 and Level 4 automation and enhance customer experience.

VPCX1 and VPCX2 appear little worried about increasing customer expectation and challenges posed by competitors and IT/Consulting giants like Accenture, IBM, and TCS, etc. Both Operation directors (OD1 and OD2) were confident that DX will optimize the operation cost and increase productivity; there was some concern about the skill gap which needed to be managed. The interview transcript was used for the content analysis, and the summary of the discussion and findings are summarized in the below Table 4.

Table 4. Summary of the Interview insights from professionals

Participants	Keywords	Insights

CEO1 CDO1	ROI, New Business Horizons, Strategy	Will Open New Business Areas in IIOT, AI, ML, Digital Twins. Enable customer experience and profit. Will Increase ROI for IA companies.
VPCX1 VPCX2	Customer Expectation, Market Competition.	Due to new Digital technology and increased awareness has increased customer expectation and are more demanding. Entry of IT giants into the automation domain has increased competition. IT companies are more aggressive in digital technologies.
OD1, OD2	Process optimization, Cost reduction, employee skill gap and employee training.	Digital Transformation will help in workflow and process optimization and reduce operation cost. Concern was regarding the required skill set for Digital technology adaptation which require employee training.

6. Conclusion

Industry Practitioners had varying views regarding the impact of Digital Transformation on IA Companies. Professionals believe that there is tough competition due to IT player entry to the IA domain. If implemented with right vision and strategy transformation will open new business domains, enhances customer experience, and optimize the engineering, manufacturing, and other business processes.

In response to the challenges of digital transformation, plugging some digital tools and software will not help for holistic growth of the organizations; however a strategic management framework including strategy formulation to execution and control is required. Impact analysis presented in this article is one step in this direction. However, more research and practice are needed. As study covered just six executives' there is an opportunity for further investigation for more insight from all stakeholders. This research will continue to work on the action fields and success factors to implement digital transformation in IA companies.

References

- Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., and Venkatraman, A., Digital business strategy: towards a next generation of insights. *MIS Quarterly*, 37, 2, 471–482, 2013.
- Brettel, M. N., Friederichsen, Keller, M., Rosenberg, M., How virtualization, decentralization and network building change the manufacturing landscape: An industry 4.0 perspective, *International Journal of Mechanical, Industrial Science and Engineering*;8(1) 37–44, 2014.
- Brien, O., Resnick, C., and Avery, A., Top 50 Automation Companies of 2017: Digitalization takes over. *Controlglobal. Com*, 2018.
- Coad, A., Nightingale, P., Stilgoe, J., and Vezzani, A., Editorial: the dark side of innovation. *Industry and Innovation*, 28, 1, 102–112, 2021.
- Creswell, J., *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage publications, 2003.
- Dąbrowska, J., Lopez-Vega, H., and Ritala, P., Waking the sleeping beauty: Swarovski's open innovation journey. *R&D Management*, 49, 5, 775–788, 2019.
- Dąbrowska, J., Almpantopoulou, A., Brem, A., Chesbrough, H., Cucino, V., Di Minin, A., ... & Ritala, P., Digital transformation, for better or worse: a critical multi-level research agenda. *R&D Management*, 2022.
- Horvat, D., Stahlecker, A., Zenker, C., Mladineo, L., A conceptual approach to analysing manufacturing companies' profiles concerning Industry 4.0 in emerging economies: Paper ID: 1213, *Procedia Manufacturing*;17, 419–426, 2019.
- Horvat, D., Kroll H., Jager A., Researching the Effects of Automation and Digitalization on Manufacturing Companies' Productivity in the Early Stage of Industry 4.0. *Procedia Manufacturing* 39, 886–893, 2019.
- Hess, T., Matt, C., Benlian, A., "Digital transformation strategies," *Bus. Inf. Syst. Eng.*, vol. 57, no. 5, 339–343, 2015.
- Hess, T., Matt, C., Benlian, A., & Wiesbock, F., Options for Formulating a Digital Transformation Strategy. *MIS Quarterly Executive*, 123–139, 2016.

- Kamila, T., Digital Transformation Theoretical Background of Digital Change. Management Science Naukio O Zarzadzaniu. Volume: 24, No. 4 32-37, 2019.
- Kanadli, S., Prospective teachers' professional self-efficacy beliefs in terms of their perceived autonomy support and attitudes towards the teaching profession: A mixed methods study. Educational Sciences: Theory & Practice. Volume: 17, No.5. 1847-1872, 2017.
- Lanzolla, G., Lorenz, A., Miron-Spektor, E., Schilling, M., Solinas, G., and Tucci, C.L., Digital transformation: what is new if anything? Emerging patterns and management research. Academy of Management Discoveries, 6, 3, 341–350, 2020.
- Marsh, E., Vallejos, E.P., and Spence, A., The digital workplace and its dark side: an integrative review. Computers in Human Behavior, 2021.
- Manyika, J., Chui, M., Bughin, J., Dobbs, R., Bisson, P., and Marrs, A., Disruptive Technologies: Advances that Will Transform Life, Business, and the Global Economy. McKinsey Global Institute, 2013.
- Müller, R., Pemsel, S., and Shao, J., “Organizational enablers for governance and governmentality of projects: a literature review”. International Journal of Project Management. Vol: 32. No: 8. PP: 1309–1320.2014.
- Nambisan, S., Digital entrepreneurship: toward a digital technology perspective of entrepreneurship. Entrepreneurship Theory and Practice, 41, 6, 1029–1055, 2017.
- Oesterreich, T. D, Teuteberg. F, Understanding the implications of digitisation and automation in the context of Industry 4.0: A triangulation approach and elements of a research agenda for the construction industry, Computers in Industry;83 ,121–139, 2016.
- Piccarozzi, M., Aquilani, B., & Gatti, C., Industry 4.0 in Management Studies: A Systematic Literature Review. Sustainability. MDPI journal. Volume: 10, No:10, 3821, 3-24, 2018.
- Ramnarayan, S., & Mehta, S., Leading Digital Transformation in Traditional Organizations. Leading Human Capital in the 2020s: Emerging Perspectives, 8–23, 2020.
- Schaede, U., How Japan Can Compete: Executing the Ambidexterity Strategy and Managing Change for the DX and the post-COVID-19 Era. Nippon Institute for Research Advancement, 1-47, 2020.
- Setia, P., Venkatesh, V., and Joglekar, S., Leveraging digital technologies: how information quality leads to localized capabilities and customer service performance. MIS Quarterly, 37, 2, 565–590, 2013.
- Song, A.K., The digital entrepreneurial ecosystem: a critique and reconfiguration. Small Business Economics, 53, 569–590, 2019.
- Ting, J., Digital Transformation in Process industries. Digital Customer Experience, Digital Platform Center, Yokogawa Electric International Pte. Ltd. Volume: 64, No:1, 1-6, 2021.
- Yokogawa, Digital Transformation in Process Industries A Journey Towards Autonomous Operations. EBOOK-DXPC-012021, 2021.

Biography

Rajeev Joshi: He is B.E (Instrumentation) from Karnataka university, MBA from University Chester UK and currently pursuing DBA from SSBM Geneva. He has over 22 years of experience in the field of engineering and management. He has worked in countries like Australia, Singapore, USA and India. He has three publications to his credit