Transition to industry 4.0: impediments, facilitators and gains

Sérgio Miele Ruggero
Paulista University – UNIP
São Paulo, SP, Brazil
smruggero@uol.com.br

Nilza Aparecida dos Santos
Paulista University – UNIP
Fatec Cotia
São Paulo, SP, Brazil
nilza.santos@uol.com.br

Antonio Carlos Estender
Paulista University – UNIP
Estácio- SP
São Paulo, SP, Brazil
estender@uol.com.br

José Benedito Sacomano
Paulista University - UNIP
São Paulo, SP, Brazil
jbsacomano@gmail.com

Abstract
Industry 4.0, an integral part of the fourth industrial revolution, is a technological trend that brings strong implications to industrial production worldwide. The transition to Industry 4.0 is shown to be inevitable, even if the results to be obtained are not yet widely known. Lean manufacturing's management philosophy, associated with Industry 4.0 technological principles, can accelerate this process and minimize potential risks, thereby facilitating implementation solutions, even though the transition occurs gradually. The methodology applied for this research is exploratory, possessing both qualitative and quantitative aspects. Primary data were collected through a survey answered by 50 managers from the automotive sector. Based on the obtained results, it was seen that companies have different levels of maturity regarding their digital transformation process. Although competitive advantages might be gained by such technological advancements, the surveyed companies did not show that competitiveness could be a differential, but recognizes that lean manufacturing can contribute to leverage the transition to Industry 4.0.

Keywords
Lean Manufacturing; Industry 4.0; costs.
The Industry 4.0 concept considers the major technological innovations in the fields of automation, control and information technology applied to manufacturing processes (LEE ET AL. 2015). Being part of the fourth industrial revolution, it is a technological trend that brings reflexes to world production, based on the concept of physical cyber systems, internet of things, big data and cloud computing (SCHWAB, 2016).

In an intelligent factory, the production process can promote real-time communication of workers, machines and inputs, allowing information to be obtained in real time (RODRIGUES, JESUS; SCHUTZER, 2016). The transition to Industry 4.0 is shown to be inevitable, even if the consequences for manufacturing operations are not yet widely known, which brings the need for companies to define their manufacturing model and plan their transformation program (ALMADA LOBO, 2016).

Lean manufacturing's management philosophy, which applies Toyota Production System concepts, can leverage the transition to Industry 4.0. The combination of Industry 4.0 technologies and Lean concepts can accelerate this process and minimize potential risks, thus facilitating implementation solutions, even though the transition occurs gradually (KOLBERG; ZUHLKE, 2015). The Brazilian automotive chain is made up of a large number of manufacturers and is divided into four different segments: automakers, spare parts dealers, providers and importers (FERREIRA; MARTINS; MOREIRA, 2012).

Considering the pillars of Industry 4.0, the competitiveness and companies’ requirements in the automotive segment, the questions to be studied in this research are: How does the auto parts industry in Brazil is being prepared for the transition to Industry 4.0? What are the impediments to this transition and what gains can be made? Aiming to identify the facilitators for this transition.

The methodology applied for this research is exploratory, qualitative and quantitative. The primary data were collected through a survey system called survey answered by 50 industrial managers from the automotive industry. The research talked about the bottlenecks for using new technologies, the facilitators for the transition to industry 4.0 and the gains and impediments of this transition. The surveyed sample consisted of 70% of auto parts companies, 30% of automakers.

The most cited bottlenecks were the lack of indicators to measure return on investment, connection between business chain participants and the availability of financial resources relative to Industry 4.0. The most cited impediments were lack of knowledge on the subject, lack of interest of the company and investments incompatible with available resources. Cost reduction, agility in production processes and availability of information were the most cited gains, while the competitive advantage was less pointed. As for the facilitators, 96% of the companies considered Lean important for the transition.

Based on the obtained results, it can be seen that companies have different levels of maturity in relation to the transition. Although competitive advantages might be gained by such technological advancements, the surveyed companies did not show that competitiveness could be a differential, but recognizes that lean manufacturing can contribute to leverage the transition to Industry 4.0.

Acknowledgements

This work was carried out with the support of the Higher Education Personnel Improvement Coordination - Brazil (CAPES) - Financing Code 001.

References

KOLBERG D; ZUHLKE D. Lean Automation enabled by Industry 4.0 Technologies. IFAC. Vol. 48; p. 1873; 2015.

Biography

Sérgio Miele Ruggero. Master student in Production Engineering at UNIP, graduated in Business Administration from the Municipal University of São Caetano do Sul. Has international experience in Engineering and Administration, with emphasis in Production and Quality. Post Graduate in Production Administration from USCS, Post Graduate in Quality and Productivity from FEI, Post Graduate in Production Engineering and Executive MBA in Business Consulting and Planning from UCAM. 30 years of experience in multinational companies working in the management of the functions involved in the Manufacturing process with emphasis on production management, processes, logistics, quality, maintenance and continuous improvement. Research Group Participant (CNPQ) on Industry 4.0: Technological and Economic Aspects. Professor in the areas of administration, production and logistics.

Nilza Aparecida dos Santos. Doctoral student in Production Engineering from University Paulista (2019 - in progress), with a degree in Economic Sciences from the Municipal University of São Caetano do Sul (1988), Specialization in Economic Financial Administration (1990), Master in Business Administration from Alvares Penteado University Center ( 2002), MBA in Management at the Guarulhos University (2010) She is currently teacher FATEC Cotia. She is a business consultant in the area of cost management and financial planning. Has experience in Administration, focusing on Administration and Economics, acting on the following subjects: financial planning, cost management, sales force automation, business management systems, strategic partnership and economics. Participant of Industry Research Group (CNPQ) 4.0: Technological, Economic Aspects.

Antonio Carlos Estender. Lecturer in undergraduate and graduate since 2000. I coordinate Marketing and Logistics courses at Estácio - Conceição, I teach at Estácio São Paulo Campus Conceição in Marketing and Administration courses, I am Fatec Professor. Graduated in Marketing (1994) and Pedagogy (2018). Master in Business Management (2006). PhD Student in Production Engineering (2019). Specialist in the areas of Marketing, Hospitality Administration, Administration and Communication and Degree in Education. He worked as a consultant at the Siegen Institute; Editor and Board Member of the 3rd Sector Electronic Journal of Guarulhos University; I teach undergraduate and postgraduate in Management, approved an article in PBL in the United States. Controllership, Competitiveness, Marketing and Methodology. Participated in nine editions of the Rondon Project. As Operation Coordinator and as Assistant Professor. Attended the Sife HSBC Financial Literacy Grant Notification. He is co-author of some books and, author and co-author of several articles in various areas such as: Business Management, Public Health; Veterinary, among other topics. Also guides several papers of Scientific Initiation and Scientific Articles; Scientific Papers Coordinator since 2009, Member of the Scientific Committee of Evaluation of the International Congress of Administration since 2012; Ad Hoc reviewer from various magazines.

José Benedito Sacomano. He holds a degree in Civil Engineering from the University of São Paulo (1968), a master's degree in Mechanical Engineering from the University of São Paulo (1983) and a doctorate in Mechanical Engineering from the University of São Paulo (1990). He is currently a full professor at University Paulista. Has experience in Production Engineering, focusing on Planning, Design and Control of Production Systems, acting on the following subjects: planning, quality, construction, production management and production engineering.