

A Study on New Product Development in Indian Manufacturing Industries

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Abstract:

Based on the role of New Product Development process (NPD) in the Indian Manufacturing Industries and the importance of various stages that make up the process. New Product Development deals with the whole practice of creating a new product (or process) or improvements in existing products and the commercialization of existing products- a means to attain competitive advantage. New Product Development has a very vast literature discussing its history and its stages and can be considered as a practice related to both the fields of Business and Engineering and has gained a lot of incentive as being a crucial part of Industry 4.0- along with practices such as Six Sigma, Change Management, Lean Manufacturing, Supply Chain Management and more. The Manufacturing Sector is considered the backbone of economic growth in many developing countries. The recent boom in start-ups and the promise of a bright future for MSMEs (Micro, Small and Medium Enterprises) in India has gained a lot of focus. Various incentives had been introduced to promote the Manufacturing Sector. A survey questionnaire was prepared that considered the various stages of New Product Development processes, the challenges that the Indian Manufacturing Industries face and the views of industry professionals, academics and students regarding the above topics were collected and analyzed. Discussions and conclusions were derived from the questionnaire data.

Keywords —New product development, Stages of New Product Development, Manufacturing Industry, Indian Industries, Innovation, Product Development

I. INTRODUCTION

The world is changing rapidly, globalisation, innovation and change constantly keep producers and the consumers on their toes. Buzz words such as “Consumerism”, “Fast Fashion”, “Sustainability”, and “Upgradation” constantly crop up.

The Indian Manufacturing Industry has shown a lot of promise and the nation has put in a lot of effort to support and sustain its growth. With growth comes competition and with it comes the constant need for innovation and change and it is up to the corporations how they can cope with these requirements. The Indian Manufacturing Sector is very dynamic and provides employment to the large technically-skilled population of India.

But, in order to continue being viable, manufacturing organisations need to focus on the aspects that act as the

stimulus for their profitability. Widespread literature has identified the three most important requirements to achieving, and more importantly, sustaining success, viz. Cost of production, Time of Delivery, and Quality assurance for the customer. Hence the competitive advantage of companies lies in their ability to continuously innovate, develop the know-how to manufacture new products and the ability to identify customer needs and satisfy these needs.

As growth in any trade leads to competition, manufacturing industries too have to emphasize on constantly innovating and delivering newer products - these can be material products or services. Newer products and innovations are essential as change in today’s competitive atmosphere is inevitable, whether one likes it or not. Hence, developing products and services and then commercializing them at a rapid pace is crucial for the long-term success and security of these industries.

Thus, both in the field of business management and engineering- New Product Development (NPD) covers the wide-ranging activities of bringing a new product to market. “It is one of the most powerful but difficult activities in business” (Wheelwright & Clark, 1995) Many immensely successful companies such as Apple, Samsung, 3M are known to invest heavily on Research and Development (R&D), NPD interconnects and helps managers strategize all the aspects from initial idea formulation to the final product release, also involves marketing activities and risk analysis of the product.

II. LITERATURE REVIEW

The Indian Manufacturing sector in recent years has gained a lot of focus and attention in the past two decades. As is common knowledge, India with its vast resources, in many aspects- primarily natural and human, provides an ideal playground for large as well as small and medium enterprises. Since the Nation’s independence in 1947, at which point, the agricultural sector was the largest contributor of the GDP, attention on the manufacturing sector as a source for large economic growth, infrastructure and employment is key. (Mehta & Rajan, 2017)

“Manufacturing is an Engine of Economic Growth”(Kathuria, 2010)- this can be perceived by the argument that the transfer of labour and resources from the Agricultural Sector to the Manufacturing proves to be more dynamic and shows high productivity but the transfer from manufacturing to services leads to a “change in the burden structure”(Baumol’s Cost Effect) which leads to a very negligible productivity transfer.

As has happened in many developing countries, India in its pursuit of becoming at par with Highly Developed Countries finds it essential to attract Foreign Direct Investments (FDIs). FDI will not only bring financial capital but also various other benefits such as technological transfers, knowledge and managerial skills and marketing access (Ahmad, n.d.) The Government of India has placed great emphasis on the importance of FDI by introducing the “Make in India” Campaign and its policies in order to attract foreign investors and provide an atmosphere of growth for domestic enterprises. This also includes collaborations in the Defence manufacturing sector (that were hitherto not permitted) which has attracted a lot of global investors.

Thus, New Product Development has attained great prominence and many corporations have been forced to acknowledge its integral part in business strategies.

There is a very broad field of literature related to New Product Development, but it can basically be surmised as a process strategy that deals with the formulation, creation, designing and implementation of a new product in an organisation. Several scholars have proposed the stages of New Product Development – various management models consisting of 4- 12 stages; the three main phases are: Strategic Planning, Market analysis and Product Development (Markkanen et al, ND). When we talk about a product, it can be tangible/physical or a management or production process- that can bring about sufficient change to the business of a corporation to be deemed as a competitive advantage. “A new product is a good, service, or idea that is perceived by some potential customers as new.” (Kotler & Armstrong, n.d.)

In their paper on the aspect of NPD on Italian Manufacturing Industries, (Bigliardi et al., 2013), have identified three key evolutions of the of NPD model. The first evolution (till 1980) considered NPD as a series of processes that help in simplifying the innovation aspect of a business. Then in the late 1990s, NPD was referred to as a parallel management process used for non-industrial goods. And, lastly the third evolution termed NPD as a process of integrating all the essential activities be it managerial, R&D or marketing- that deals with the movement of product from a nascent stage to its final launch.

Urban and Hauser (1993) emphasised that NPD was considered as a liberty by some corporations and unsystematic and disorganised implementation led to a lack of proper tools and information which in turn resulted in New Product failure and stressed on the time factor.

(Azizi et al., n.d.) (2009), in their study- ‘Factors Affecting NPD in Malaysian Manufacturing Industry’ concluded that “both strategic orientation and marketing strategy” played a huge role in NPD while environmental factors had negligible consequence.

(Tuli & Shankar, 2015) in their work- ‘Collaborative and lean new product development approach: a case study in the automotive product design’ compared two

scenarios in the automotive manufacturing field, one – a generic method of development, and the other New Product Development with ‘collaborative and lean’(C&L) approach. Their conclusion was that Lean Practices in integration with NPD had a lot of merit in reducing waste and cycle time and could improve the efforts and value-stream mapping of the activities involved.

Georgise et al. (n.d.), published a case study on supply chain integration with manufacturing firms, in Ethiopia. They argued that the integration of supply chain within various organisational processes is key to enhance value creation, i.e. new product development process. The challenges faced by manufacturing firms in developing countries (such as Ethiopia) is that they are limited by the expertise and the technology and concluded that greater integration in this age can be achieved through Information Technology and proper inter and intra organisational integration strategies.

Marion (n.d.), in the article ‘The Power of Pre-Prototype’ stated that the earliest stages (termed as pre-prototype stage) of New Product Development are the most crucial and challenging. These stages according to the article were to “identify an opportunity”, “identify the idea” and then “conceptualisation of that idea”. Also, the article showcases that many companies find it challenging because of the lack of critical time-frame, capable sourcing partners and also lack of collaborative efforts.

Büyükoğkan et al. (2007), in their article ‘Integration of Internet and Web-based Tools in new product development process’, the article discusses that irrespective of whichever field the product is developed for, implementing technology-oriented designs is necessary in this day and age. Also, according to them, the customer is also a part of the production process. It was also pointed out that customers expect highly customized products with affordable prices and hence it is necessary that the supply chain is highly integrated to maintain quality yet be open to customisation.

Gurbuz (2018), published a paper on ‘Theory of New Product Development and its Applications’. The work discusses in detail how ideas or identifying market opportunities is crucial but has a long way in ensuring success of the New Product. It identifies several key ingredients in the success of a new product- firstly,

creating an environment that rewards feedback and innovation from all employees, secondly, a strong inter-organisational structure for efficient and effective flow of ideas, and that sometimes even though a product is perfect in every way, certain factors such as pricing, market size or the time of release may lead to its failure. It was also pointed out that academic institutes, such as colleges and schools may help in bringing about new ideas in the Research and Development department. Lastly, the lack of literature focussing on Product-Life Cycle and Failure Analysis in NPD was pointed out.

“The need for Failure and Risk Analysis is also very important and is most commonly overlooked, usually due to the manufacturer’s confidence in the success of the product or due to prevailing market conditions. Hence, there are a few literatures that discuss the Failure Analysis integration with New Product Development” (Bongiorno, 2001).

(Belu et al., n.d.)in their article titled, “Application of FMEA method in New Product Development Stage”, emphasised that FMEA is essential for Quality Assurance for the customer and for identifying sources of potential losses for the company. The proposals of proper FMEA implementation were presented in a chart-analysis.

III. METHODOLOGY

The research methodology adopted for this paper can be divided into three parts:

- a. Secondary research through various literature consisting of published articles and research papers.
- b. Preparing a questionnaire survey, which consisted of both qualitative and quantitative responses.
- c. Analysis of the responses obtained from the above questionnaire and gaining various inferences and conclusions from it, based on the literature presented.

The data collected for the paper was primarily through online resources and the survey respondents consisted of people from various academic and professional backgrounds- college students, university academics,

entrepreneurs, and marketing as well as operations managers. The Survey Questionnaire consisted of a combination of quantitative (based on Likert Scale) and qualitative questions (Multiple choice-type) The data collection was done through snowball and convenience sampling method. Respondents were given liberty to share their names and email addresses on their own accord- guaranteeing their privacy but making it necessary to reveal whether they were students/industry professionals or other professionals. There was a total of 156 respondents.

IV. RESEARCH ANALYSIS

A. Cronbach's Alpha Test

By using the Minitab Software and running an Item Analysis on the Quantitative Response Questions, we tested the internal consistency of the questions, determined by the Cronbach's Alpha test. An initial Cronbach's Alpha value of 0.79 was returned when we ran the test selecting all nine of the questions. After examining the Correlation matrix of the nine questions, the Question- "How familiar are you with NPD process" was removed from the selection to get an Alpha value of 0.82.

The value of Alpha shows that it is consistent to a reasonable extent, although ideally a value of 0.9 or above is preferred, hence we move forward with our response analysis.

B. Descriptive Statistics

The author's obtained a graphical summary of the data and tried to understand and analyse the variations between the responses based on their occupation, i.e. Industrial Professional, Student or Other.

a. Importance of NPD in Indian Manufacturing Sector (fig-1): Majority of the Industry Professionals agree that it is important, giving it a score of 4 or 5 (although there is a strong variation). The Students responded between 3-4 showing little variation amongst their responses. Other category however displayed a very large variation in the responses although peaking between 4 and 5.

b. Importance of Quality Assurance (fig-2): Most industry professionals agree, showing little variation in their responses, that Quality Assurance is very important in NPD. Students, on the other hand showed huge variations in their responses, (80% variation), yet the mean and the median of the data was close to 4. And in Other category, they strongly agreed, most giving it a 5 and showed little variation.

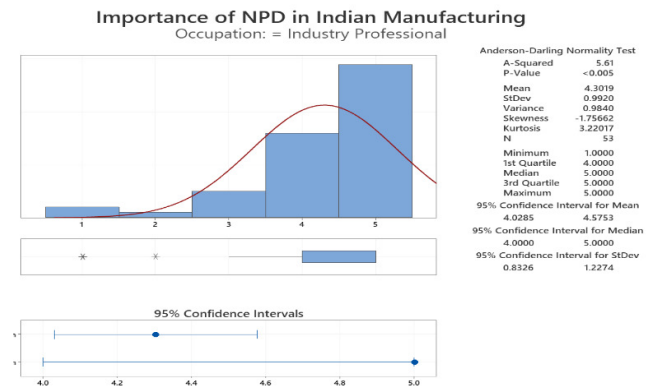


Fig.-1: The descriptive analysis of the data to understand the importance of NPD in Indian Manufacturing.

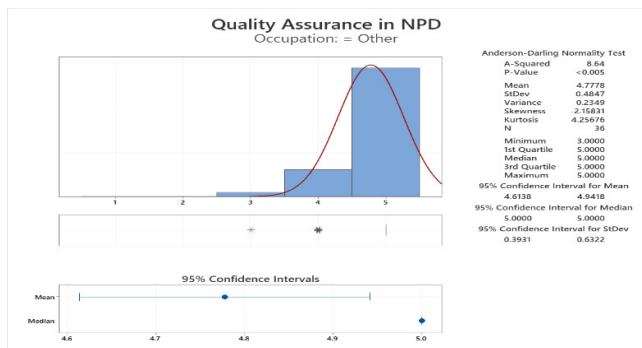


Fig.-2: The descriptive analysis of the data to understand the role of Quality Assurance in NPD.

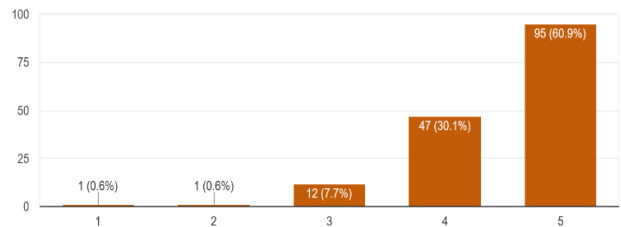


Fig.-3: The analysis of the data to understand the importance of customer feedback in New Product Development.

- c. Importance of customer feedback (Fig.-3): About 60% of the total respondents gave it 5. All three categories agreed that customer feedback is very essential, showing minimum variations in the responses.
- d. Importance of Sales Division in NPD (Fig.-4): The average response of Industry Professionals gave a 4, showing little variation between 3-4 (about 66%). Students' responses peaked at 4 as well, showing lesser variations (60%), Others responded between 3-4 and showed a relatively high variance of 74%.

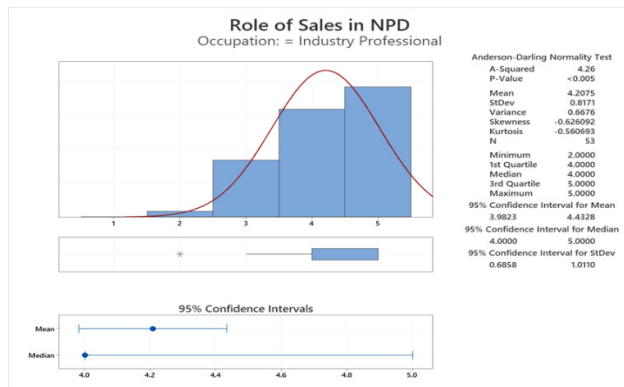


Fig.-4: The analysis of the data to understand the importance of sales division in New Product Development.

- e. Role of Research and Development (Fig.-5): Almost 72% of the total respondents consider it crucial for New Product Development Process. Industrial Professionals responded strongly to the importance of R&D and the average response was 5. Students-about half of them responded with a 5 and the average response was a 4. Others too, agreed (gave it a 5) showing little variation (16%).

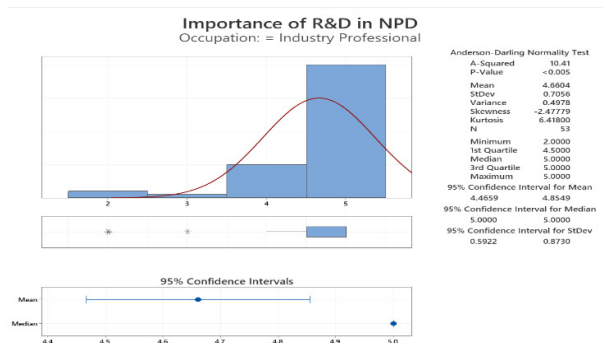


Fig.-5: The analysis of the data to understand the importance of R&D function in New Product Development.

- f. How important is the support of Top Management in this (Fig.-6 & Fig.-7): Industry professionals strongly agreed that the support from Top management is important in NPD, showing only 30% variation. Students responded with “neutral” or “agree”, i.e. between 3 and 4. Others' responses were somewhat scattered, between 3, 4 and 5, average of them responded with a 4.

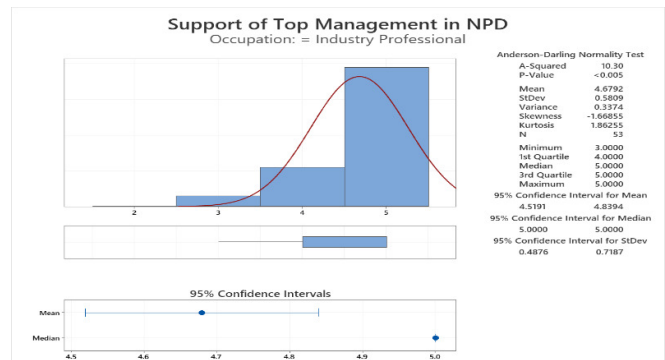


Fig.-6: The analysis of the data to understand the importance of support of the management in New Product Development.

Importance of support of Top Management in NPD? 156 responses

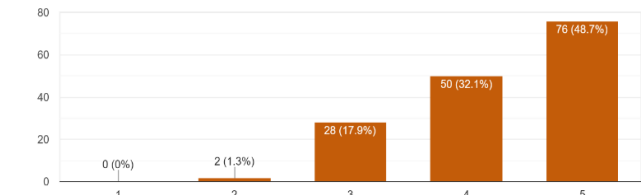


Fig.-7: The analysis of the data to understand the role of top management in New Product Development.

- g. Need for Innovation in Indian Manufacturing (Fig.-8): Industry professionals strongly agree that Innovation requirement is very high in this sector, students showed a little variation (60%) between “neutral” and “strongly agree” and at least one responded “disagree”. Others' responses showed agreement with those of the industry professionals showing variation of only 42%.

- h. Importance of FDI in Indian Manufacturing (Fig.-9 & Fig.-10): This has shown a variety of responses, about 40% of the total respondents “agreed”, while

28% “strongly” agreed. Most industry professionals gave it a (4), i.e. “agreed” and a small portion of the sample either stayed “neutral” or “strongly agreed” and only one respondent disagreeing. Students too, mostly agreed, yet there were significant responses that were “neutral” and “strongly agreed”. Others mostly responded with “neutral”, while there were a few responses which “agreed” or “strongly agreed”.

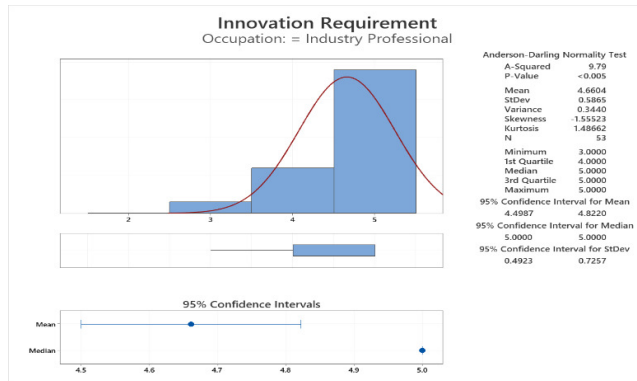


Fig.-8: The analysis of the data to understand the need of innovation in New Product Development.

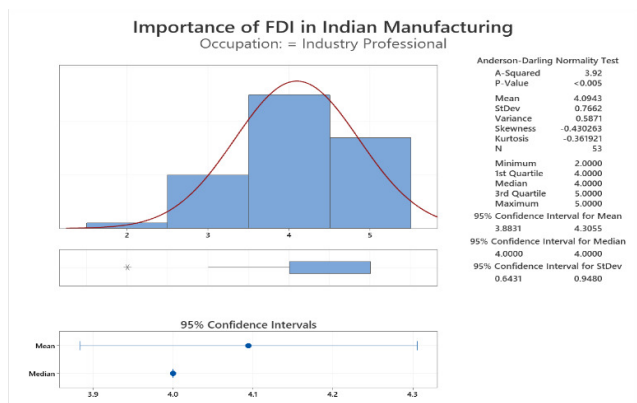


Fig.-9: The analysis of the data to understand the importance of FDI in New Product Development.

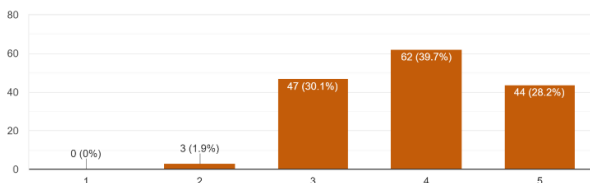


Fig.-10: The analysis of the data to understand the role of FDI in New Product Development.

i. Need for FMEA in New Product Development (Fig.-11): About 45% of the total respondents agree, but only 22% strongly agree, therefore we can say that majority of the responses (approx.. 67%) feel that FMEA is necessary for new product development.

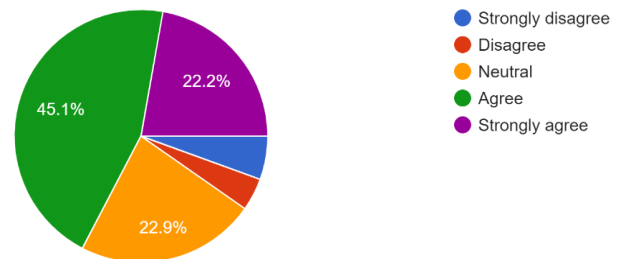


Fig.-11: The analysis of the data to understand the role of FMEA in New Product Development

V. CONCLUSION & FUTURE SCOPE

From the survey and the literature review it is clear that although there is significant growth in the Indian Manufacturing industry, the competition within the domestic and international market will make the need for new products necessary. Survey analysis shows the general perception of all three key groups of the economy- industry professionals, students and others (entrepreneurs, academics and customers). During New Product Development and the need for innovation, support from top management, and the need to attract Foreign Direct Investment is essential for the proper growth of the venture. As mentioned earlier the Research and Development aspect and the Sales aspect both play a crucial role in the implementation of New Product Development and the responses prove that both of them need to have a seamless communication between them as their end objective is same.

Also, responses indicate that different fields of the manufacturing industry (metal manufacturing, automotive, food production, etc.), New product development in one benefitted the other. The various stages of New Product Development were examined and the three crucial stages, found were- “Concept Development” “Testing” and “Commercialization”.

As for future research, there is a need for more studies on the integration of FMEA with New Product

Development. The responses related to this, in the survey, too, showed large variations- showing a lack of clarity about the topic. And the integration of other practices such as lean manufacturing or supply chain management with New Product Development in the Indian Market could be looked into.

REFERENCES

- [1] Ahmad, Dr. A. (n.d.). MAKE IN INDIA: A FEASIBILITY STUDY. *Journal of Intellectual Studies & Theories*.
- [2] Azizi et al. (n.d.). (PDF) Factors Affecting New Product Development in Malaysian Manufacturing Industry. Retrieved May 22, 2020, from https://www.researchgate.net/publication/248391832_Factors_Affecting_New_Product_Development_in_Malaysian_Manufacturing_Industry
- [3] Belu, N., Rachieru, N., Militaru, E., & Anghel, D. (n.d.). (PDF) Application of FMEA method in product development stage. Retrieved May 22, 2020, from https://www.researchgate.net/publication/259645438_Application_of_FMEA_method_in_product_development_stage
- [4] Bigliardi, B., Bottani, E., & Rinaldi, M. (2013). The new product development process in the mechanical industry: evidences from some Italian case studies. *International Journal of Engineering, Science and Technology*, 5(2). <https://doi.org/10.4314/ijest.v5i2.1s>
- [5] Bongiorno, J. (2001). Failure Modes and Effects Analysis in product development process. Use FMEAs to Improve Your Product Development Process. *PM Network*. <https://www.pmi.org/learning/library/fmeas-product-development-process-4962>
- [6] Büyükoçkan, G., Baykasolu, A., & Dereli, T. (2007). Integration of Internet and web-based tools in new product development process. *Production Planning and Control*, 18(1), 44–53. <https://doi.org/10.1080/09537280600940705>
- [7] Georgise, F., Thoben, K., & Seifert, M. (n.d.). Supply Chain Integration in the Manufacturing Firms in Developing Country: An Ethiopian Case Study. <https://doi.org/10.1155/2014/251982>
- [8] Gurbuz, E. (2018). Theory of New Product Development and Its Applications. In *Marketing InTech*. <https://doi.org/10.5772/intechopen.74527>
- [9] Kathuria, V. (2010). Manufacturing an engine of growth in India- Analysis in the post-nineties.
- [10] Kotler, P., & Armstrong, G. (n.d.). Principles of marketing (Book, 2010) [WorldCat.org]. Retrieved May 22, 2020, from <https://www.worldcat.org/title/principles-of-marketing/oclc/813854600>
- [11] Marion, T. (n.d.). The Power of Pre-Prototype | MedTech Intelligence. Retrieved May 22, 2020, from https://www.medtechintelligence.com/feature_article/the-power-of-pre-prototype/
- [12] Mehta, Y., & Rajan, A. J. (2017). Manufacturing Sectors in India: Outlook and Challenges. *Procedia Engineering*, 174, 90–104. <https://doi.org/10.1016/j.proeng.2017.01.173>
- [13] Tuli, P., & Shankar, R. (2015). Collaborative and lean new product development approach: A case study in the automotive product design. *International Journal of Production Research*, 53(8), 2457–2471. <https://doi.org/10.1080/00207543.2014.974849>
- [14] Wheelwright, S. C., & Clark, K. B. (1995). Leading product development: the senior manager's guide to creating and shaping the enterprise.