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INNOVATIVE PRODUCT DEVELOPMENT PRACTICES IN SMALL AND MEDIUM SIZED ENTERPRISES: A REVIEW

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Abstract
The Small and medium enterprises of India is an important driving factor for the growth of Indian Economy. These SMEs not only provide the employment opportunities but helps in the process of industrialization in rural areas simultaneously reducing the unequal income distribution among the residents. The SMEs contribute significantly in the development of Indian economy through export production, domestic production, low investment requirements, operational flexibility, technology oriented enterprises etc. In India, after agriculture, small business is the second largest employer of human resources. SMEs constitute more than 80 percent of the total number of industrial enterprises and support industrial development, 40 per cent of industrial output, 80 per cent of employment in the industrial sector, 45 per cent of value added by the manufacturing sector and 40 per cent of total exports. In this we made to know the growth and contribution made by Small and Medium Enterprises in India and to understand the role of SMEs in providing employment opportunities in India. The innovation in New Product Development (NPD) process to achieve success in the market but majority of the research have considered innovation as an element within the NPD process.Most of the manufacturing organizations strongly believe that more emphasis on NPD is required to keep pace with rapidly growing technology and increased global competition. But our research shows that fundamental issues related to innovative NPD are not yet properly researched keeping in mind the unique needs of the developing world, more so particularly in the SMEs. Further, in order to verify whether QFD constitutes innovative product development process or not, QFD articles were benchmarked to identify the different best practices of QFD model. However, the best practices model only enhances the customer involvement into the NPD process but there exists no evidence that it can be used as innovative product development model. Hence, a survey was administered to evaluate the reliability and validity of both NPD best practices and NPD innovation constructs to propose innovative product development (IPD) practices in SMEs.
Keywords:Small and Medium Sized Enterprises (SMEs),New Product Development (NPD), innovative product development (IPD),Quality Function Deployment (QFD),Employment, Growth, Challenges of SMEs, MSME (Micro, Small and Medium Enterprises)

I. Introduction

The Small and Medium Enterprises (SME) sector has emerged as a highly vibrant and dynamic sector of the Indian economy over the last five decades. It contributes significantly in the economic and social development of the country by fostering entrepreneurship and generating largest employment opportunities at comparatively lower capital cost, next only to agriculture.SMEs are complementary to large industries as ancillary units and this sector contributes significantly in the inclusive industrial development of the country. The SMEs are producing a wide range of products and services to meet demands of domestic as well as global markets. On an average this sector has almost 36 million units that provide employment to about 80 million individuals. This sector through the production of 8000 products contributes 8% to GDP of the country. The schemes & various

initiatives of Ministry of SMEs & other organisations seeks to provide the following facilities: Adequate flow of credit from financial institutions/banks, Support for technology up-gradation and modernization, Integrated infrastructural facilities, Modern testing facilities and quality certification, Access to modern management practices, Entrepreneurship development and skill up gradation through appropriate training facilities, Support for product development, design intervention and packaging, Welfare of artisans and workers, Assistance for better access to domestic and export markets, and Cluster wise measures to promote capacity-building and empowerment of the units and their collectives. The various commissions, institutions , organisations & acts has been setup by the concerned Ministry to promote & develop the various industries at micro, small and medium levels. Some of the important institutional setups are as: Small and Medium Enterprises Development (SMED) Act 2006, Khadi & Village Industries Commission (KVIC), Coir Board, National Small Industries Corporation (NSIC) Ltd., Mahatma Gandhi Institute for Rural Industrialization (MGIRI), National Board for Small and Medium Enterprises (NB SME), and National Institute for Small and Medium Enterprises.[1][3]

It is globally acknowledged that SMEs are the spinal bone of the economy. SME sector has emerged as a very important sector of the Indian economy, committing markedly to employment creation, innovation, exports, and inclusive growth of the economy. A huge fragment of India's firms is small, informal, and work in the 8 unorganized sector. Based on annual reports on SMEs designate that the sector shares around 30% of India's GDP and locate on conventional estimate employ all over 50% of industrial workers. SMEs contribute about 40% of the overall export. Over 97% of micro-firms are part of SMEs and 94% of firms are registered with the government. The sector is consistently growing over urban and rural areas and is equitably constitute in the trade, manufacturing, and service sector.The current coronavirus crisis (COVID-19) impacting SMEs, which are the backbone of India's all-round development story, has felt a remarkable impact and faced critical disturbance. As SMEs are an important part of the domestic and foreign value chain, the predicament of the sector is of deep perturb**.** In most developing countries, Micro, Small and Medium enterprises (MSMEs) constitute the bulk of the industrial base and contribute significantly to their exports as well as to their GDP or GNP (Kharbanda, V. P., 2001). SMEs are said to be the lifeblood of any vibrant economy and they are known to be the silent drivers of a nation's economy (Monika, S., et. al., 2010). The majority of people living in rural area draw their livelihood from agriculture and allied sectors. However, the growth and balanced development of other sectors such as industries and services is also necessary to sustain the growth of Indian economy in an inclusive manner.

III. Literature

In [1] Dr Ch. Hema Venkata Sivasree1, Dr. P. Vasavi Micro, Small and Medium Sized Enterprises in India – Growth and Challenges (2020). The MSME sector in India is growing at good pace & even is providing employment opportunities to masses of the people. The contribution of Manufacturing Sector as well as Service Sector of MSMEs in significant to the total GDP of the Country. Status of Indian MSMEs is better than its counterpart in Bangladesh & Pakistan. About 36% of Pakistani SMEs have bank accounts where as about 46% Bangladeshi's SMEs have Bank accounts. In comparison to them about 95% of Indian SMEs have their bank accounts. He further stated that Indian Govt. should accelerate its initiatives to provide further support to these Small scale industries.

In [2] R. Vettriselvan, A. Balakrishnan Growth and Performance of Micro Small and Medium Enterprises In India MSMEs sector has performed exceedingly well and enabled our country to achieve a wide measure of industrial growth and provide employment. The sector is basically less capital intensive and high manpower absorption in nature.

India, the enterprises have been classified broadly into two categories: (i) Manufacturing; and (ii)

Those engaged in providing/rendering of services. According to the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 both categories of enterprises have been further classified into micro, small and medium enterprises based on their investment in plant and machinery (for manufacturing enterprises) or on equipments (in case of enterprises providing or rendering services). The present ceiling on investment for plant, machinery or equipments is like as follows:

Table 1Distribution of Enterprises based on the Investment Ceiling

Nature / Type	Manufacturing	Service
Micro	Upto Rs.25 lakh ($50,000)	Upto Rs.10 lakh ($20,000)
Small	Rs.25 lakh ($50,000) to Rs.5 crore ($1 million)	Rs.10 lakh ($20,000) to Rs.2 crore ($0.40 million)
Medium	Rs.5 crore ($1 million) to Rs.10 crore ($2 million)	Rs.2 crore ($0.40 million) to Rs.5 crore ($1 million)

Source: Ministry of MSME, Govt of India.

In [3] Ujjal BhuyanA Study on the Performance of Micro, Small and Medium Enterprises (MSMEs) in India (2016) The MSME sector is considered to be the engine of growth for an economy. The estimated contribution of Micro, Small and Medium Enterprises (MSME) sector, including service segment, to the country's GDP during 2012-13 was 37.54 per cent; while the total employment in the sector is 805.24 In Lakh. The contribution of the sector to India's total export for the year 2014-15 was 44.70 per cent.

MSME also plays a crucial role in encouragement of entrepreneurial instinct in the country. The scheme called "Support for Entrepreneurial and Managerial development of SMEs through Incubators" is operational since April 2008. This is one of the components of National Manufacturing Competitiveness Programme (NMCP) which emphasis's on the Support for Entrepreneurial and Managerial development of SMEs through Incubators. Under the scheme the main task is to promote individual innovators who can become technology based entrepreneur.

In [4] Sanket L. Charkha1, Bhavana Shah Growth, performance and projections Micro, small, and medium enterprises (MSME's) in India: A discourse analysis (2021). The research is based on secondary information. To get deep insights into the topic area, prominent research researchers conduct a literature review. Several public reports are also studied during the study, including the MSME Annual Report 2014-15 and the Ministry of Micro, Small and Medium Enterprises, Government of India's websites, among others.

In [5] Ms. Jyoti Sharma, Ms. Guneet GillMSME- An Emerging Pillar of Indian Economy (2016) The micro, small and medium enterprise (MSME) sector is an important constituent of the Indian economy, contributing significantly to the Gross Domestic Product (GDP), manufacturing output, employment and exports. This sector also plays a decisive role in nurturing entrepreneurial talent as well as distributing wealth at grassroots level.

In [6] Muhammad Iqbal and Amalia Suzianti New Product Development Process Design for Small and Medium Enterprises: A Systematic Literature Review from the Perspective of Open Innovation (2021) New product development (NPD) is essential for large, as well as small and medium, enterprises (SMEs). Despite its importance for the economy, challenges remain in the NPD in SMEs. Product success is related with the NPD process, so it is important for SMEs to be able to design their NPD process. This paper aims to identify SME's NPD research topics, the characteristics of the NPD process in SMEs, and important aspects to be considered for NPD process design.

In [7] Srecko Curcic Sida Milunovic Product Development Using Quality Function Deployment(QFD)2007 In this paper is given importance analysis of some soap characteristics for its quality on the base of evaluation from product customers using Quality Function Deployment (QFD) method. The results of analysis shall to be base for product quality development plan creating.

In open market conditions, just one product characteristic can be critical for customer locality in regard to competitors products. Characteristic which is noticeable, have two dimensions: the preference level and noticeable appreciate level. If customer have strong preference for certain product and if there is not noticable difference between that product and others, he can decide for whatever alternative. Strong preference in combination with low difference perception can lead loyalty in regard to many products

[8] Kássio Santos*, Eduardo Loures, Flávio Piechnicki, Osíris Canciglieri Opportunities Assessment of Product Development Process in Industry 4.0, 27th International Conference on Flexible Automation and Intelligent Manufacturing, FAIM2017, 27-30 June 2017, Modena, Italy

The presented work represented concepts about Industry 4.0, which were separated in two mains areas: Future Manufacturing Business Model and Technology Enablers. Consequently, these areas were separated in other concepts, represented in the paper. The objective was to create a relationship between these concepts with the PDP Phases, using a method of multi-criteria decision making and identify the principals phases that are affected in the PDP, through the sensitive analysis. Product development specialists were consulted and have weighted this analysis. Through these values, opportunities like, product cost reduction, quality products, data exchange, can be identified in the phases of the product development process comparing the concepts of Industry 4.0.

[9] Rodney L. Stumpa, Gerard A. Athaideb, Ashwin W. Joshic, The Journal of Product Innovation Management 19 (2002) 439–454Managing seller-buyer new product development relationships for customized products: a contingency model based on transaction cost analysis and empirical test.

Sellers often customize their product offerings in order to increase the value offered to individual buyers and gain a competitive advantage over the seller's competitors. However, such customization has a downside—it usually requires considerable seller-buyer interactions aimed at matching the seller's technological capabilities with the buyer's needs, which can pose exchange risks such as the safeguarding and adaptation problems noted in the transaction cost analysis literature. In the present study, we develop a contingency model to investigate the impact of product customization on sellers' perceived relationship satisfaction and subsequent expectations of relationship continuity. We draw on the logic of transaction cost analysis to hypothesize that product customization's effect on satisfaction and continuity may be moderated by three activities that sellers may engage in during the new product development (NPD) process: education, product knowledge generation, and joint new product development.

[10] R. K. J. De Silva, T. D. Rupasinghe& P. Apeagye A collaborative apparel new product development process model using virtual reality and augmented reality technologies as enablers

NPD process models discus products realisation, visualisation and synchronization within its value chain partners and customers. Many improvements are needed to establish the human–computer interaction in apparel NPD followed with a systematic process. Collaborative NPD model is

demanded by the apparel industrialists with the aid of virtual simulation technologies. Consumer connectivity throughout the NPD process is more crucial that reduces the NPD risks.
[11] PerHilletofth, Dag Ericsson, Olli-Pekka Hilmola and Philip Hedenstierna1. New Product Development in a Manufacturing Company – A Challenge for Supply Chain Management.
The conventional approach to product design and development is to assign representatives from support functions to review and recommend changes as the process evolves. The more recent concept of concurrent design involves a multi-function design team, which is highly structured and with greater responsibility and authority. Concurrent design has, so far, mostly focused on internal collaboration. However, in today's global competition, Marketing Product development R&D Strategic plan Business Opportunities Primary/Product Development Generation and Portfolio Planning New Product Development in a Manufacturing Company – A Challenge for Supply Chain Management concurrent design, based on integration and collaboration in the extended enterprise is a vital key to success. It means that the design function is aligned and integrated with other main functions in the company and in the extended enterprise. Traditionally, most organizations have been functional in their structure with responsibility for each stage in the SC, including design, being separate from the other. Typically in these businesses the new product development process is linear and sequential with a consequent lengthiness of time-to-market and time-to-volume. In today's challenging markets these 'silo' type structures are not capable of rapid response to fast-changing requirements. In the market places where short product lifecycles are the norm, delays in bringing products to the market can have detrimental consequences to sales and profit.
[12] Sumit Shandilya*, Surendra P. Tiwari**,GyanabrataLahkar*** International Journal of Scientific Research and Engineering Development-– Volume 3 Issue 6,
Nov-Dec 2020 A Study on New Product Development in Indian Manufacturing Industries.
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 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 inn 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 implement Product Development and the responses prove that both of them need to have a seamless communication between them as their end objective is same.
[13] Muhammad Iqbal and Amali SuziantiJ. Open Innov. Technol. Mark. Complex.2021, 153.New Product Development Process Design for Small and Medium Enterprises: A Systematic Literature Review from the Perspective of Open Innovation.
These are the conclusions of this study:
RQ 1: What are the topics of previous studies on the NPD process in SMEs? Topics related to SMEs' NPD from previous studies include collaborative product development, competitive advantage, ICT, concurrent engineering, quality function deployment, and continuous improvement. Collaboration with stakeholders is important for SMEs' NPD. Tool supporting quality and development time considerations are another issue that interest researchers regarding SMEs' NPD. They also need technological support, and awareness of process management also emerged as an issue in SMEs' NPD.
RQ 2: What are the characteristics of the NPD process in SMEs? The characteristics of SMEs' NPD process include low formality, informal strategic planning, limited resources, centralized decision-making; need for adaptive, easy-to-use design methods; constantly changing priorities, need to anticipate risks and challenges, need for technological support, lack of milestones in processes, lack of capabilities in certain fields, having the potential to be agile and adaptive, external involvement is

crucial in certain processes, the autonomy of projects, limited data management, need of considering various design aspects, utilize software tools, have multidisciplinary team involvement, and have close relationship with customers.
RQ 3: What are the important aspects to be considered for SMEs' NPD process design? Important aspects that need to be considered in SMEs' NPD process design are design activities, collaboration and source of innovation, and process modeling, tools, and techniques.
[14] Helen Perks and Deborah Roberts A Review of Longitudinal Research in the Product Innovation Field, with Discussion of Utility and Conduct of Sequence Analysis. November 2013 Journal of Product Innovation Management.
This paper has provided a systematic review of the conduct of longitudinal research in the product innovation domain. Through this, novel insight into the nature of longitudinal research is developed. This provides a contribution to the emergent but limited body of knowledge concerned with longitudinal methodologies in innovation research. Specifically, the findings confirm that there is growth in the adoption of longitudinal methods.
[15] Chengyan Zhao · Masaki Ogura· Masako Kishida · Ali Yassine Optimal resource allocation for dynamic product development process via convex optimization. Research in Engineering Design, 2021.

PD managers with an efficient tool to allocate development resources optimally for the budget constrained problem and performance-constrained problem, where the resources can be allocated on both modules and design rules. Although we carried out the experiments with two types of problems, and with different product architectures for each problem, the evolution of the investment and remaining work exhibit similar trends, which shows that the evolution property of the PD process is independent of the problem formulation and product architecture. Moreover, the investment and performance in modules also illustrate that certain correlations exist despite the problem formulation and product architecture, which also confirms that these trends and correlations are the intrinsic properties of the PD process.

1. Data Collection: Loch and Kavadias framework of innovation in NPD
Loch and Kavadias (2008) proposed an evolutionary view of innovation in NPD Identifying three distinct levels, i.e. gene, individual, and group. Figure 3.10 describes the three levels of evolution in detail. A *process*, consisting of procedures, rules, and norms, i.e., 'the way things get done,' and it corresponds to an 'individual' in the context of building a framework of NPD, where an NPD process is one of a population of processes that together make up the firm. At the ('gene') level below, individual *innovations* are generated, selected, and evolve, and a population of innovations lives and evolves within an NPD process. At the aggregated level above the process, a *firm* corresponds to the group (the firm is made up by a population of processes together with the people), and the population of firms forms an industry that evolves over time

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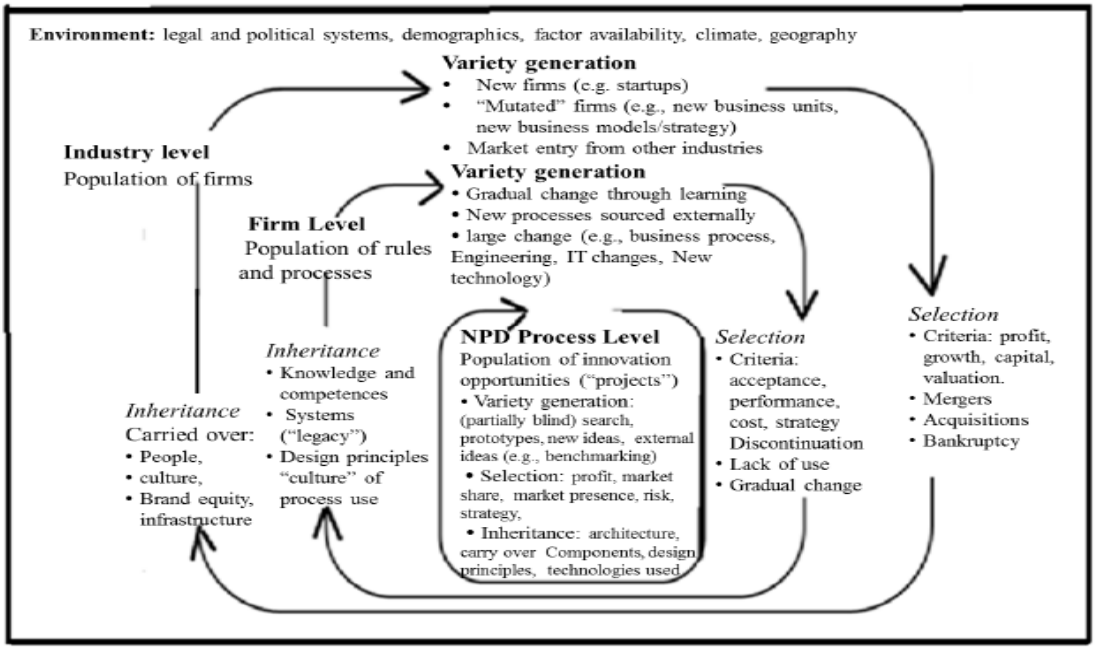

Figure 1: An evolutionary view of innovation in NPD (Loch and Kavadias, 2008)

3. Rainey product innovation model

Rainey (2005) reported that the primary objectives of product innovation are to create value, to obtain a competitive advantage, and to achieve long-term success through the development and commercialization of new products and services

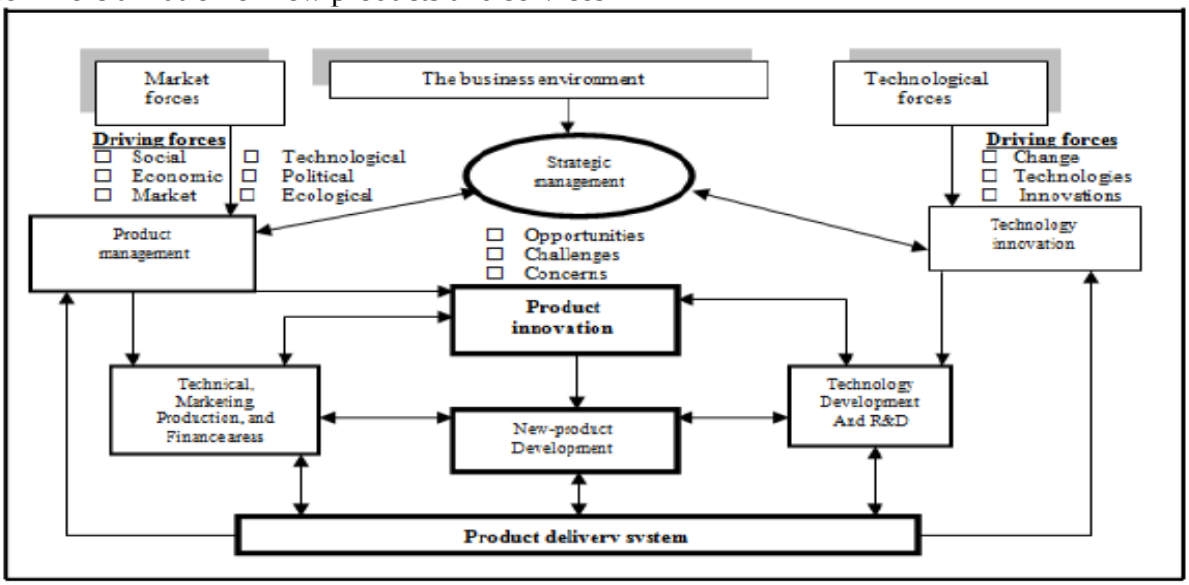

Figure2: Product innovation frameworks

4. Benchmarking methodology to propose best practices of QFD model

According to Camp there are four types of benchmarking: internal, competitive, functional, and generic. Internal benchmarking studies the best performers in an organization; competitive benchmarking deals with the best competitors in an industry; functional benchmarking investigates competitors or industry lead firms in similar functions; and generic benchmarking studies the best business practices in the world. Camp's internal benchmarking model ("Xerox" methodology) was

highly rated by Zairi and Leonard (1994) in their study and stated that all of the processes they examined contain planning or preparation, analytical, integration and action phases and concluded that "most, if not all, of the methodological approaches (i.e. models) are preaching the same basic rules of benchmarking, but using different languages", and that "most methodological approaches are based on the Xerox approach, which is considered to be an effective and generic way of conducting benchmarking projects". The literature review also revealed that the Xerox benchmarking process model shown in following figure has been highly cited and quoted in the literature.

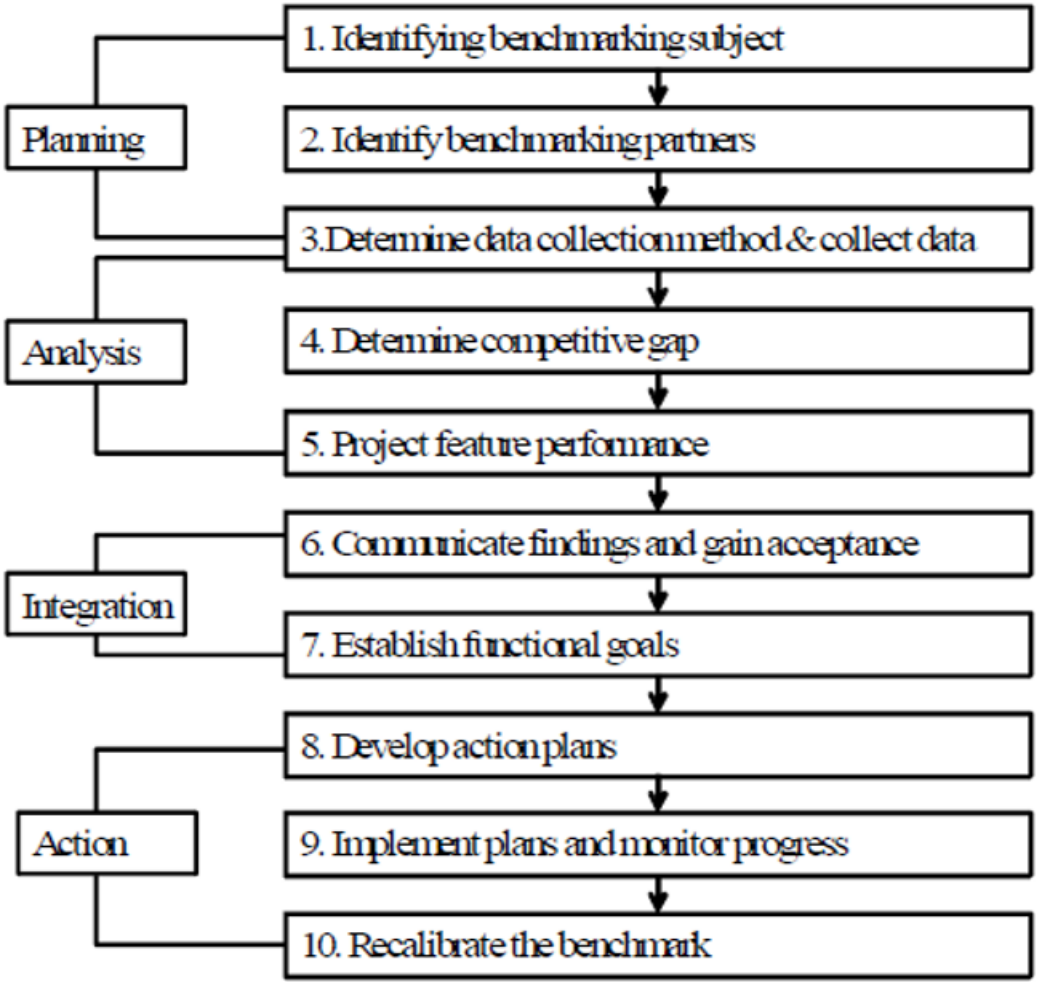

Figure 3 :: Xerox/Camp benchmarking model (Source: Camp, 1989)

Hence, it is assumed that it is the most commonly used model by the practitioners. Further, the Xerox model has been used for quite a long time without any modifications. Hence, it was felt that it should be improved and evolving best practices should be incorporated within this model. For these reasons, fundamental Camp benchmarking model or Xerox's benchmarking model has been used to benchmark the existing models to identify the best practices in QFD. Anand and Kodali (2008) attempted to identify the best practice universal benchmarking model by benchmarking the benchmarking models. They evaluated all the existing benchmarking models using the Xerox model or Camp model (1989). A four phase and ten steps camp model (1989) as shown in Figure 3 was used to benchmark the QFD models available in the literature.

House of quality (HOQ) for product planning matrix
(Source: Shen et. al, 2000)

The following steps proposed to conduct the benchmark on QFD models.

Phase 1: Planning

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Step 1: Identify the benchmarking subject

In this case, the subject is to improve the existing QFD process and identification of best practices of QFD model.

Step 2: Identify the benchmarking partners

The QFD process involves four phases (Kumar et. al., 2006): (I) Product planning- this compares the customer's foremost requirements (user requirements) with product characteristics (product attributes), which are the technical requisites needed to render product specifications coherent with customer expectations. The matrix thus obtained defines the relationships occurring between the two elements and their reciprocalpriorities. Furthermore, it enables the user to develop comparisons between product characteristics and the best available competitor performances found on the market (benchmarking). (II) Product design or parts deployment- this compares product characteristics with the requirements of the more important components (subsystems) into which the product can be broken down (critical part characteristics). (III) Process planning- this relates the characteristics of the single subsystems with their respective production processes (critical process steps). (IV) Process control or quality control charts- this defines inspection and quality control parameters and methods to be used in the production process of each process step (quality control process steps). These four Phases of the QFD represented in sequence of HOQ's are shown in Figure 4.

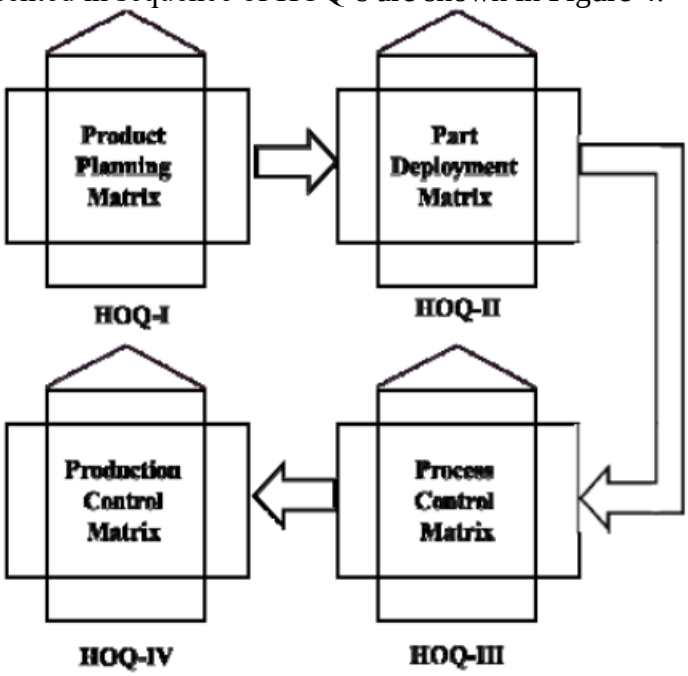

Figure 4: Sequence of HOQ's in QFD (Source: Kumar et. al. 2006)

In these four phases, all QFD models available in literature are reviewed and the benchmarking partners identified. For example, consider the Phase-I where the house of quality (HOQ) is a matrix style chart that correlates the identified customer attributes called the "What's'' with the technical characteristics called the "How's." The HOQ is a kind of conceptual map that provides a means for inter-functional planning and communications. It usually has six sub-matrices including customer attributes, planning matrix, technical characteristics, relationship matrix, technical correlations, and technical matrix. HOQ for product planning matrix is shown in Figure 5.

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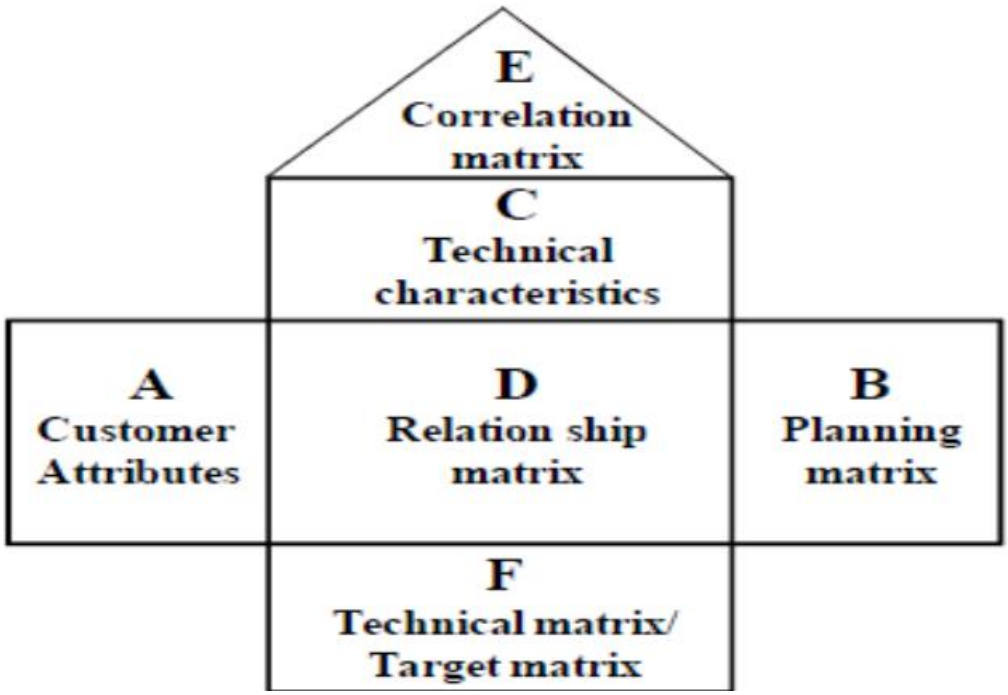

Figure 5: House of quality (HOQ) for product planning matrix (Source: Shen et. al, 2000)

According to Shen et. al. (2000), Section A of Figure 3.15 contains a list of customer wants and needs or ``voice of the customer"; Section B is the planning matrix involving importance to customers, competitive benchmarking, sales point and final priorities; Section C lists the technical characteristics of a product; Section D is the relationship matrix between Sec A to Sec C; Section E, the roof of the HOQ, contains the technical correlations that captures the trade-off between pairs of technical characteristics; and Section F contains the technical matrix, which includes technical Benchmarks, technical difficulties, estimated cost, targets and other related information.Literature available related to all these six sub- matrices shown in Figure 3.15, and for all four phases are shown in Figure 3.16 were considered in the study. Research articles available in all the four phases as shown in Figure 3.16 were considered as benchmarking partners.

Step 3.Determine data collection method and collect data

The external data collection method has been used for collecting the data through literature review. To explore the articles/ research papers related to QFD, two key words namely “quality function” and “QFD” were used.

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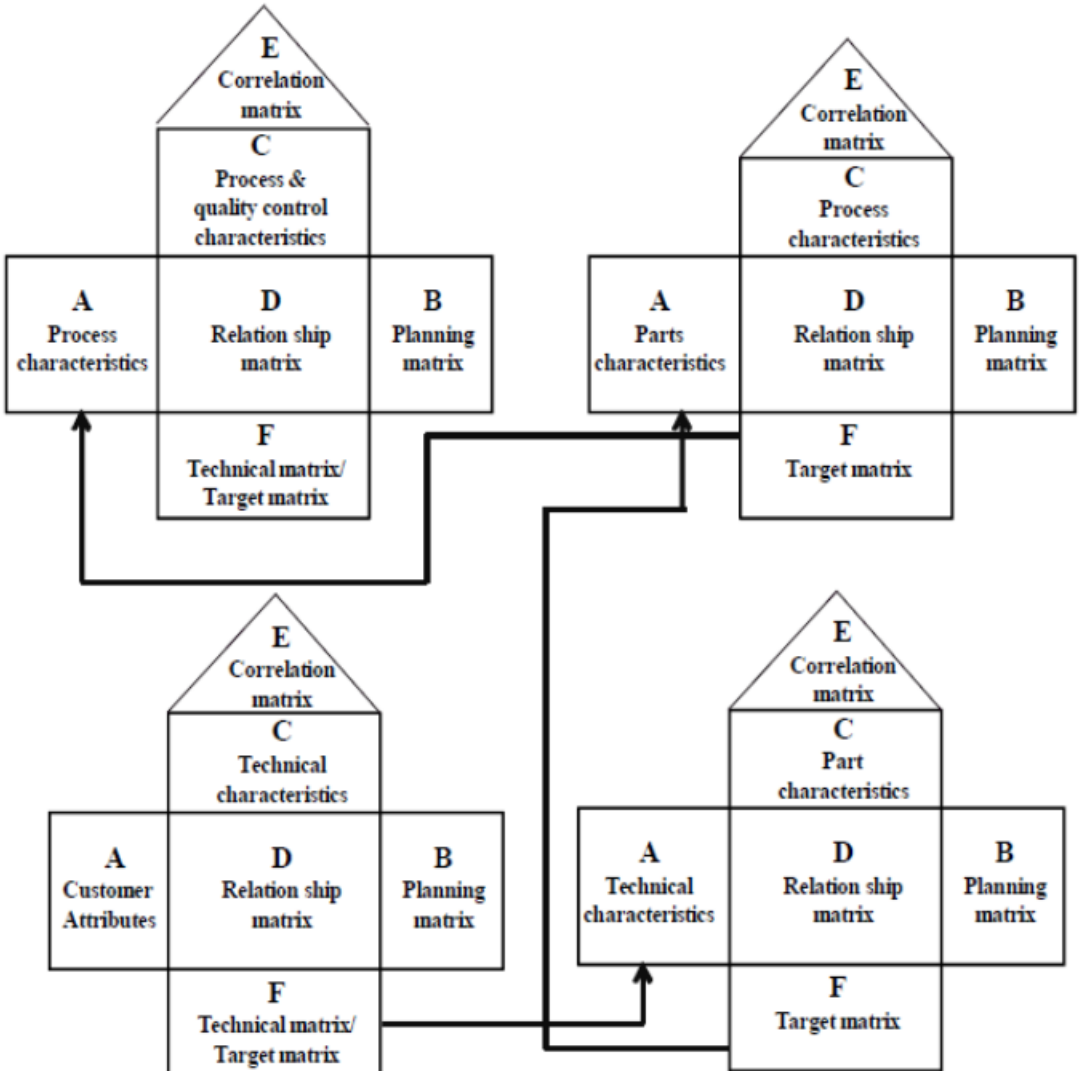

Figure 6: The four phases of QFD and related six sub- matrices

VI. Conclusion

New product development with multiple objectives like growth of NPD research; growth in identified research streams; exploring the NPD research focus towards various issues like of innovation, framework development and performance measurement in NPD research; list and classify the NPD best practices elements and to show the changes and trends over the time period as and when required. This study on NPD research also identifies the sector wise growth in NPD research vis-à-vis industrial, consumer and service sectors. It is observed that many researchers have failed to judge the level of innovativeness in NPD research and in the classified literature more focus was observed towards moderate innovation. An attempt has been made to explore the focus towards framework development in terms of number of articles published and in adequately addressed issues were highlighted. NPD performance issues were dominated by focus towards success factors. Further, reviewed all empirical articles in new product development literature with multiple objectives like purpose of empirical research, level of analysis, country/region studied, sample size, type of respondents and analytical tools used. NPD empirical research have been more focusing on identification and validation of various success factors at program and project level but they do not distinguish between different factor levels i.e. how factors are interrelated and influence NPD success. Researchers are mostly used the case studies and survey methods as an investigative tools

and multivariate statistics as analytical tool to analyze the results. Empirical research in NPD is predominantly performed in developed countries. Therefore, there is a need to evaluate the theory which has been build and verified primarily from developed countries to determine whether such knowledge holds true in developing and undeveloped countries also.

References

[1] Dr Ch. Hema Venkata Sivasree1, Dr. P. Vasavi Micro,Small and Medium Sized Enterprisesin India – Growth and Challenges (2020). The MSME sector in India is growing at good pace &even is providing employment opportunities to masses of the people. The contribution of Manufacturing Sector as well as Service Sector of MSMEs in significant to the total GDP of the Country**.**

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[9] Rodney L. Stumpa, Gerard A. Athaideb, Ashwin W. Joshic, The Journal of Product Innovation Management 19 (2002) 439–454Managing seller-buyer new product development relationships for customized products: a contingency model based on transaction cost analysis and empirical test.

[10] R. K. J. De Silva, T. D. Rupasinghe& P. Apeagye A collaborative apparel new product

development process model using virtual reality and augmented reality technologies as enablers.
[11] Per Hilletofth, Dag Ericsson, Olli-Pekka Hilmola and Philip Hedenstierna1. New Product Development in a Manufacturing Company – A Challenge for Supply Chain Management.
[12] Sumit Shandilya*, Surendra P. Tiwari**, GyanabrataLahkar*** International Journal of Scientific Research and Engineering Development-– Volume 3 Issue 6, Nov-Dec 2020 A Study on New Product Development in Indian Manufacturing Industries.
[13] Muhammad Iqbal and Amali SuziantiJ. Open Innov. Technol. Mark. Complex.2021, 153.New Product Development Process Design for Small and Medium Enterprises: A Systematic Literature Review from the Perspective of Open Innovation.
[14] Helen Perks and Deborah Roberts A Review of Longitudinal Research in the Product Innovation Field, with Discussion of Utility and Conduct of Sequence Analysis. November 2013 Journal of Product Innovation Management.
[15] Chengyan Zhao · Masaki Ogura· Masako Kishida · Ali Yassine Optimal resource allocation for dynamic product development process via convex optimization. Research in Engineering Design, 2021