STUDY OF FACTORS CRITICAL IN SELECTION OF HUMAN RESOURCE FOR NEW PRODUCT DEVELOPMENT

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Abstract

The customer expectations from an auto industry has created competitive pressure and enriched the industry with attitude, knowledge, flexibility and speed for new challenges and changes. Processes are being streamlined and automated, and work teams are reorganized and redeployed for higher productivity on quality, delivery time and cost. New Product development management has been a major component of competitive strategy to enhance organizational productivity and profitability.The factors that are critical for selecting the human resource for new product development in automobile industry is listed and established as important for new product development in automobile industry, mainly Original Equipment Manufacturers (OEM). A framework has been provided for the factors and link established between factors and Managing Excellence of Engineers (E2) in selected automobile industry.

Vol 1 Issue 1 September 2013
www.eecmbajournal.in

Introduction

In life, it is usually easier to say no than yes. But in product development the opposite is more likely true — it's hard to turn down a major customer asking you to add more features to your product or asking you a new model product. Despite substantial prior research on new product success, there are still high failure rates. Organizations are shifting away from a company with rigid and preplanned activities to one that is able to react quickly and appropriately to changes. Improving performance in new product development has become one of the critical issues for gaining competitive advantages for companies. Providing quick and quality responses to new product development events requires the coordination of multiple functions across the enterprise.

Supply Chain of Indian Automobile Industry

The supply chain of automotive industry in India is very similar to the supply chain of the automotive industry in Europe and America. The supply chain is supported by three tiers. The Automakers/Vehicle Manufacturers/Original Equipment Manufacturers (OEMs) work to

understand and fulfill wants and needs of consumers. They play a key role in supply chain of the automotive industry.

New Product Development Professionals

The new product development professionals are the one who are supposed to possess multi facetted qualities with engineering qualification. Their roles and responsibilities is spread, either partial or full, from concept design, detailed design, product development, process development, process and product validation and mass production of a new product. The organization gets the benefit of demonstrating their skill to the external world – the customer as well as competitors. The ability of being customer centric rolls out new and unique featured automobiles they were passionately dreaming within them.

Motivation and Problem Statement

In the present scenario there is a dearth for factors in the selection of development professionals for automobile new product development. There is a scantiness of research in understanding the factors and its impact in bringing out excellence in development engineers. The research is an attempt to ascertain the factors and show its collective energy in heaving out engineer's excellence.

Literature Review

Reducing cycle time and first to market in NPD and commercialization are key to success and profitability. Takeyuki (1995) explained that target cost management is concerned with simultaneously achieving a target cost alongside the planning, development and detailed design of new products. David (2006) stated that the basic premise of sustainable business development from a technology perspective is that leading change involves proactive development of new technologies, improving existing ones, creating new products and processes, and improving existing ones.

David (2008) stated that the management of technology, technological change, and innovation are essential determinants for NPD effectiveness. Alan (2005) indicated the creative intelligence differs from what is normally considered general intelligence. Creativity focuses on how we think and our strong desire to achieve something new or different.

Rathan Ready (2005) referred leadership as "the art or process of influencing people so that they will strive willingly and enthusiastically toward the achievement of group goals". Graeme Salaman, and John (1947) explain the importance of innovation.

Innovation is increasingly identified as the critical factor in economic competitiveness. Sense of Purpose – Edward (1986) has clearly stressed that "a strong sense of purpose is one of the most important aspects of thinking skill". Edward de bono, who coined the term "lateral thinking", says richness is what matters, richness in thinking, thinking laterally and turning problems around and look at them from a fresh perspective.

Team building and team working is key to success of any organisation which are into new product development. It has become a key strategy for success as expressed by Bill (1994). Tony, Mare, and Robert (2006) give their point on learning to act and learning to learn. Learning to act is type of learning takes the current strategic objectives as given and does not question them.

Vol 1 Issue 1 September 2013
www.eecmbajournal.in

The Advent of Factors

The detailed literature survey resulted in a substantial number of factors elaborated by various authors in their papers published on new product development. These factors were listed after conscientious study and understanding - Techno commercial, Interpersonal, Lateral proactive thinking, Innovation, Cross functional working, supplier integration, Leadership, Creativity and Continuous learning. These factors evolve together to bring out the inherent talents embedded in the engineers and is collectively termed as E2 - Excellence in Engineers.

Variables that predict other variables

Interpersonal skill

- Continuous learning
- Techno commercial skill
- Creativity
- Lateral proactive thinking

Vol 1 Issue 1 September 2013
www.eecmbajournal.in

Variables that are predicted by other variables

- Innovation
- Leadership
- Supplier integrating skill
- Cross functional working
- Managing Excellence in engineers –E2

Model

The understanding of the existing factors and their practices in new product development has been taken as the basis for development of the conceptual model. This is being supported with twenty two years of experience of the researcher in automobile industry with fundamentals in process engineering and development of new product. Apart from nine independent factors a dependent factor was derived as Managing Excellence in Engineers (E2). Using these factors a frame work developed shown in Figure 1.

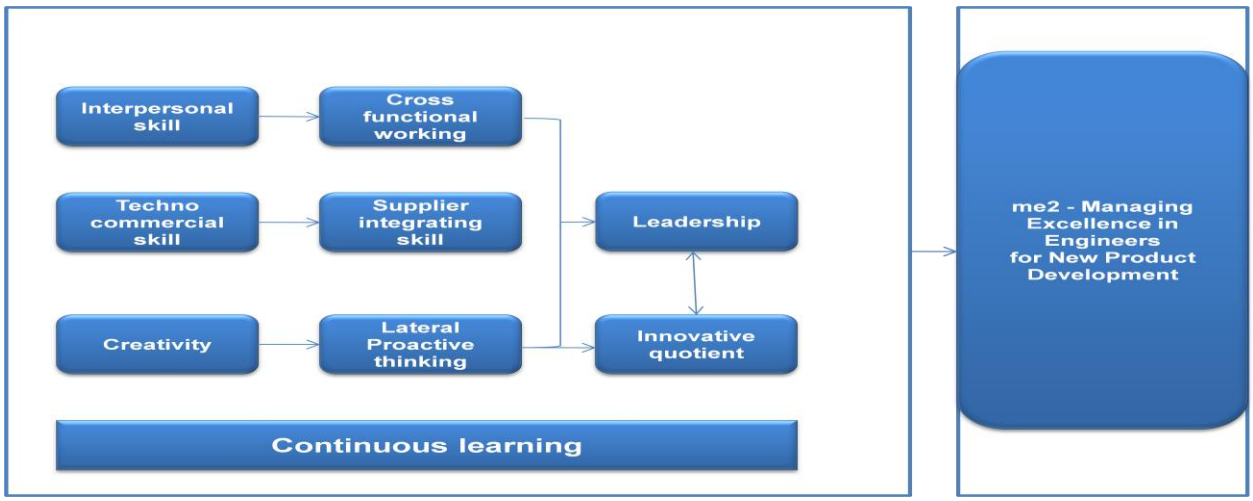

Figure 1 Frame Work

Objective of the Study

To identify the factors, its relations and its impact that brings out excellence in engineers involved in automobile new product development.

Scope of Study

The Scope of this study is constrained with nine factors. The study has been conducted in India with automobile organizations listed in Automotive Components Manufacturers Association of India 2011 (ACMA). The study is limited to the development professionals in

automobile new product development with involvement from conceptual design till the responsibility of handing over the new product developed for mass production as shown in Figure 2 in conjunction with APQP (advanced product quality planning) as system framed by GM, Ford and Chrysler.

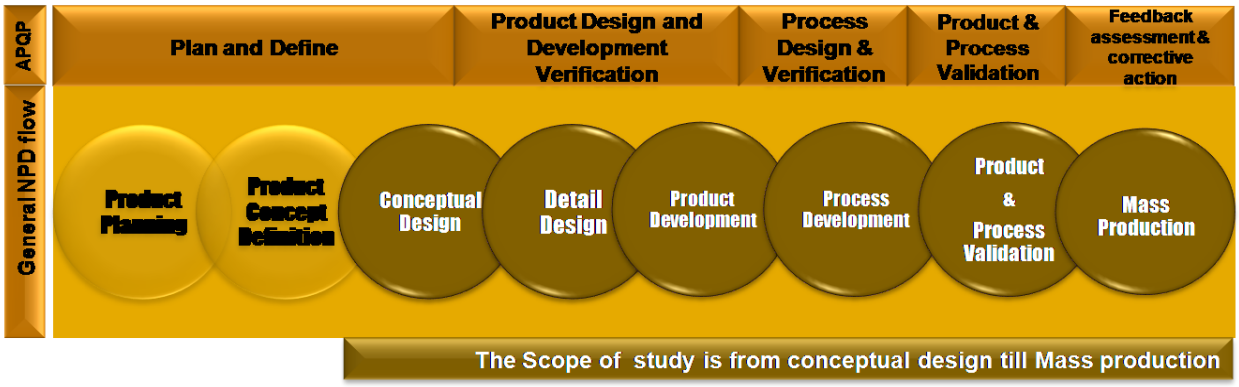

Figure 2 Scope of the study with general flow of new product development

Hypothesis

Hypotheses were developed in line with the objective.

There exists no significant relationship between factors that brings out excellence in engineers.

Research Methodology

Study Area The development and design professionals in Original Equipment Manufacturer originated in India has been the core of the study.

Research Design The research design selected is cross sectional design based on descriptive methodology leading to conclusions.

Instrument Development The instrument for this research is a questionnaire prepared with 9 sections with 5 points scale Engineers.

Sampling Design - Type of Population – finite universe: In this study the plan is to cover automobile industries in India.

Sample size determination - The data is predominantly scaled continuous data. The alpha level of 0.05 with margin of error is 0.03 provided 118 as sample size from Cochran (1977) sample size formula for continuous data. Nevertheless for an increased reliability of the data, the sample size was targeted for 500.

Vol 1 Issue 1 September 2013 www.eecmbajournal.in

Content Validity

Expert in the area of new product development were mailed with the questionnaire with the above explained clarity and relevance scale. These experts are in the field of new product development in development and also in design. The questionnaire was checked for its clarity and relevance with 17 experts. The ratio was checked for both clarity and relevance and found satisfying the conditions.

Pilot Survey

The pilot survey was conducted with 70 respondents and checked for its reliability. The Cronbach alpha test which was found to be 0.969 for overall data and 0.770 to 0.941 for each factors, indicating its suitability for confirmatory factor analysis. The results were found to be acceptable and the survey was continued for the balance samples coverage.

Confirmatory Factor Analysis

In the confirmatory factor analysis the values of P, GFI, NFI, RFI, CFI, RMR and RMSEA were found statistically significant as shown in Table 1.

FACTORS	Chi-square value	P value	GFI	NFI	RFI	CFI	RMR	RMSEA	Cronbach reliability (alpha)
Interpersonal Skill	16.290	0.131	0.991	0.962	0.928	0.987	0.006	0.031	0.792
Techno Commercial Skill	20.207	0.124	0.990	0.950	0.900	0.983	0.008	0.030	0.778
Innovation	0.134	0.715	1.000	0.999	0.996	1.000	0.001	0.000	0.813
Creativity	2.130	0.345	0.998	0.966	0.899	0.998	0.005	0.011	0.941
Lateral Proactive thinking	21.164	0.098	0.990	0.957	0.913	0.984	0.008	0.032	0.835
Leadership	1.381	0.710	0.999	0.995	0.982	1.000	0.002	0.000	0.821
Continuous Learning	22.056	0.141	0.989	0.925	0.868	0.977	0.007	0.027	0.822
Supplier Integration skill	27.421	0.052	0.986	0.924	0.875	0.969	0.009	0.035	0.837
Cross functional working	22.998	0.149	0.989	0.949	0.915	0.986	0.007	0.026	0.867
Excellence in engineers	14.705	0.326	0.991	0.933	0.892	0.991	0.007	0.016	0.770

Table 1 – Results of Confirmatory factor analysis for Pilot study with Cronbach alpha

The above Table 1 with the values of Chi-square, P value, GFI, NFI, RFI, CFI, RMR and RMSEA were found statistically significant.

Convergent Validity

Convergent validity shows that the assessment is related to what it should theoretically be related to. Richard and Lyn (1982) defined Convergent validity as "the degrees to which two or more attempts to measure the same concept are in agreement". Convergence was assessed through the calculation of the average variance extracted scores. Fornell and Larcker (1981) in their evaluation has stated that AVE score greater than value 0.50 support convergent validity. The convergent validity shows the average variance extracted (AVE) for all the variables which were ranging from 0.50 and above. The convergent validity has been found apparent.

Discriminant Validity

Richard and Lyn (1982) defined discriminant validity as "the degrees to which measures of distinct concepts differ". It is important for the model fit as it ascertains two or more constructs are separate and distinct from one another. If constructs are separate and distinct from one another, then it can be established whether or not a predictive or casual relationship exists between them. Fornell and Larcker (1981) provided a method for assessing the discriminant validity of two or more factors. AVE of each construct with the shared variance between constructs is compared. If the AVE for each construct is greater than its shared variance with any other construct the discriminant validity is supported. The results of the Discriminant validity were found satisfying the requirement for all the factors.

Research Findings – Observations and Analysis

The respondents were approached directly in person, through e-mails, through references, directly by friends. A total of 1580 respondents were contacted and the received 528 responses, out of which 504 were found with full completion of questionnaires.

The adoption of the factors in induction greatly enhances the quality of new automobile. These factors comprise acceleration of innovation, escalation of globalization and

driving intensified business competition. The identified factors when profiled in new product development engineer will enable the organization to develop a flexible and competent workforce to take advantage of new business and technological opportunities. The need to employ the best and most motivated individuals to drive and execute the organization's vision will spiral endless products benefiting the customer and the society.

This study was not targeted to check the status and reject development professionals during induction. Many respondents had given very favorable opinions about the factors listed in the study. The level of the factors in engineers, when getting identified, enable the organization to position the engineers in a new product team. The need based training can be planned for the professionals.

Ranking of the Independent Variables

It was observed that majority of the participants (74.03%) felt the importance of listed factors for automobile new product development. Around 75.74% of the respondents have rated 5 for cross functional working identifying it as an important factor followed by continuous learning with 74.97%. The supplier integrating skill has been with 72.9% 5 rating, the lowest in the list. The Table 2 shows the ranking of the independent variables.

CFW	CL	TCS	LEA	IPS	INN	LPT	CRE	SIS
75.74%	74.97%	74.86%	74.13%	73.81%	73.53%	73.19%	73.16%	72.87%

Table 2 Ranking of variables

Conclusion

This research has identified and united the critical factors and presented with a model which showcase the importance of each factors and also the relation between them. The statistical tests supported the importance with significant results.

Applicative Value

There has been demanding growth for an automobile in the society. To fulfill the requirement there is always a demand of the best team – a team consisting of engineers who has to breathe automobile. On the evolution to identify the solution it was few key factors which has been critical and has to be consolidated to have a leap of success in development of automobile.

All the factors which have been identified are essence of various qualities which lie in a human. The juxtaposition of these factors and its level, when getting identified, determines the team's performance in developing new product in automobile industry. We have to surpass the unsurpassed.

Vol 1 Issue 1 September 2013
www.eecmbajournal.in

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