

A Comparative Study of Automotive NPD'S Performance Indicators between Industry and University Based Projects in a Developing Country.

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Abstract

New product development (NPD) is described in the literature as the transformation of a market opportunity into a product available for sale [1]. In the automotive industry, within the context of ISO/TS16949:2002 (the automotive quality management system international standard), consists of Three main phases such as planning, Implementation and sales. There are also five sub phases called "Planning", "Product Design", "Process Design and Development", "Product and Process Verification and Validation", and "Production". These phases may be done concurrently and have correlated activities.

Our analysis shows that most of domestic researches about the new product development success factors are based on the Western literature and use them as the theoretical platform in the design of their own research strategy and research questions design. The paper proposes a contribution of measuring indicators extracted from literature review and completed by several industry and university experts' interviews to finalizing the weighting indicators that could be useful in performance measuring on Auto new product development gates.

Keywords: Automotive NPD, Performance Indicators. Process Controlling

1. Introduction

Today, due to the rapid growth of production and competitiveness of the market, the need for products and services is increasing dramatically. Population increase and diversification of needs are the encouraging factors of achieving product and more new goods by organizations.

Therefore, it is obvious that organizations and companies tend to maintain their benefits at this stage. The fundamental solution is the preservation of life and survival of companies in today's competitive market, innovation and development of new products, and replacement which researchers consider the new product development concept (NPD). [1]

Changes in business in some years ago are impact of solutions in NPD process, which are done and managed. To summarize, we can list the main driving forces that determine the concentration on product development activity.

1. Increasing level of competition (more firms competition for similar markets) [4]
2. Rapidly changing market environment
3. Shorter product life cycle [5]

A primary effect of environmental factors on the company is to have some changes that lead to the overall efficiency and effectiveness of the NPD process. Since last decade, many of new techniques and tools has been proposed in order to improve product development

A key element is the focus on the consumer who is always available. All activities must be worth something to a customer. All the work that is done onto a product and does not add any value is regarded; hence the pure model is in contact.

The matter in automotive section is that the new product development normally will take up to three years; the process consists of several gates. To control each gates it is interesting to understand if the measuring performance indicators which are mentioned in literature, are sensing in reality and what could be there weight according to industrial managers and scientific workers in a developing country.

2. Methodology

To start, the Indicators in three main phases of new product development which are planning, Implementation and Sell were extracted. (See Fig 1)

The framework promotes a holistic view of performance by considering three categories of activities: Planning, Implementation, and Sales and Delivery. Successful performance evaluation comes from acknowledging the fact that there are different objectives for each of the three activity categories.

Moreover, performance may be expressed as a function of the performance of the Planning, the Implementation, and the Sales and Delivery activities. The planning activities have been concluded, based on the identified success factors, to be categorized

into why, what, how, and when something is to be developed. The implementation activities on the other hand are more operational in character. The categorization of success factors related to the implementation activities includes management, technology, people, and processes. When comparing the framework of success factors, as identified in this research, with the literature it is especially the explicit focus on the planning activities and the focus on technology including for example the product architecture that differs. This may be the result of this research's explicit focus on the development of

Complex products while other studies e.g. (Ernst 2002; Tang, Liu et al. 2005) are covering a more general context.

3. Factors underlying product development

The idea of having a limited set of factors that affect the performance of the development of new products is appealing for both practitioners and researchers. As a result, a considerable amount of empirical research on the determinants of new product-development performance is reported in the literature (Ernst, 2002; Montoya-Weiss and Calantone, 1994). No prescribed common criterion can, however, explain how successful new products are

Created (Poolton and Barclay, 1998).

Tang et al. (2005) identified a distinct set of success factors for product development: Leadership, Organizational culture, Human resources, Information, Product strategy, Project execution, Product delivery, and Results.

In a thorough review of critical success factors by Ernst (2002), the following categorization, as previously developed by Cooper and Kleinschmidt (2007), was adopted: Customer integration, Organization,

Culture, Role and commitment of senior management and Strategy. Adams et al. (2006) present another review drawing on a wide body of the product innovation literature, and identified the following seven categories as

Important in the product innovation process: Inputs management, Knowledge management, Innovation strategy, Organizational culture and structure, Portfolio management, Project management, and Commercialization. Further, Bessant and Tidd (2007) argue for the following success factors in product innovation: Market knowledge, Clear product definition, Product advantage, Project organization, Top management support, Risk assessment,

Proficiency in execution, and Project resources. Product advantage involves product superiority in the eyes of the customer e.g. delivering unique benefits to the user and a high performance-to-cost ratio.

Chen et al. (2010) further argue, on the basis of their findings, that process and team characteristics are more generalizable and cross-situational consistent determinants of product-development speed than strategy and project characteristics.

In the review by Henard and Szymanski (2001) they conclude that out of the

24 determinants of product-development performance only five, i.e. product advantage, market potential, meeting customer needs, predevelopment task proficiencies and dedicated resources, are salient determinants of product development performance.

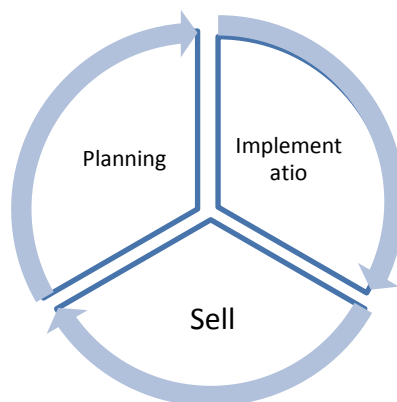


Fig1. Three main phases in automotive new product development

Table 1. Important factors for success planning

What and why	How and When
Market environment analysis	Technology Road map
Customer Needs and Wants	Metrics
Business Case	Organization
Risk Management	Ownership from Top Management
	Planning Competence

Table2. Important factors for successful implementation activities

Processes	Management	People	Technology
Process Quality	Professional Project Implementation	Feedback	Technical Platform / Architecture
Clear Development Process	Multi-project / Portfolio management	Culture / Attitude	Pre-development of Technology
Tools	Risk Management	Organization	
Industrial Structure	Handle Dependencies	Resources	
Requirement Management	Global and Local Development	Competence	
	Clear Objectives / Requirements	Incentives	
	Supplier / Partners		

Table 3. Important factors for successful sell activities

Cost	Time	Quality
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4. Conceptual framework

Having literature review the success factor develops in the all three main phases which is illustrated in tables. ()

A questionnaire were develop and accepted by specialist to understand these success factors weighted from both university and industry experts and contribution was made.

The questionnaire has got three main questions as bellows:

1. How important is Success Factor X for successful product development in your organization according to your opinion?
[1= Not at all - 7 = Most important]

2. How important is Success Factor X for successful product development in your organization according to the organizations opinion?
[1= Not at all - 7 = Most important]

3. To what extent does your organization systematically evaluate Success Factor X through a measurement system?
[1 = Not at all - 7 = fully]

5. Differences in Success Factors between industry and university expert based projects

The result was different between the industry and university based project.

Fig () shows some of its differences and a total comparison is illustrated in table ()

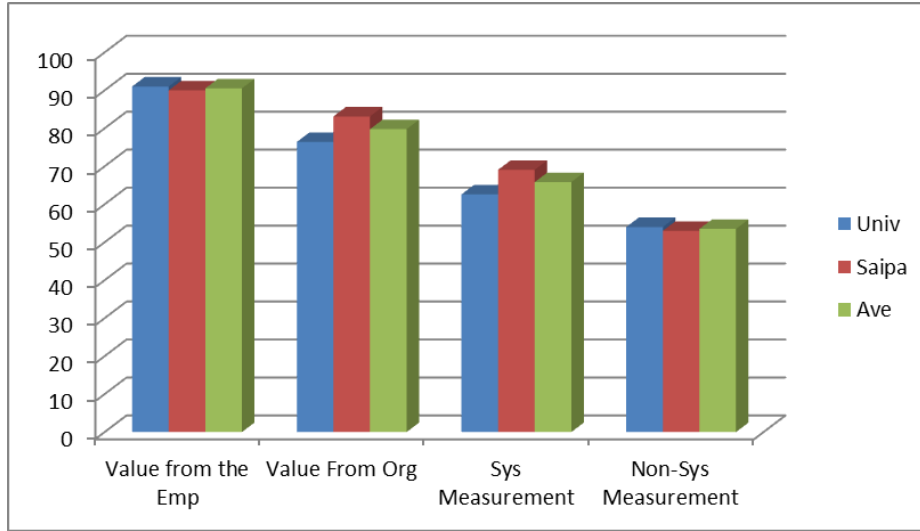


Fig2.. Sample Factor of Planning level (Market Environment Analysis)

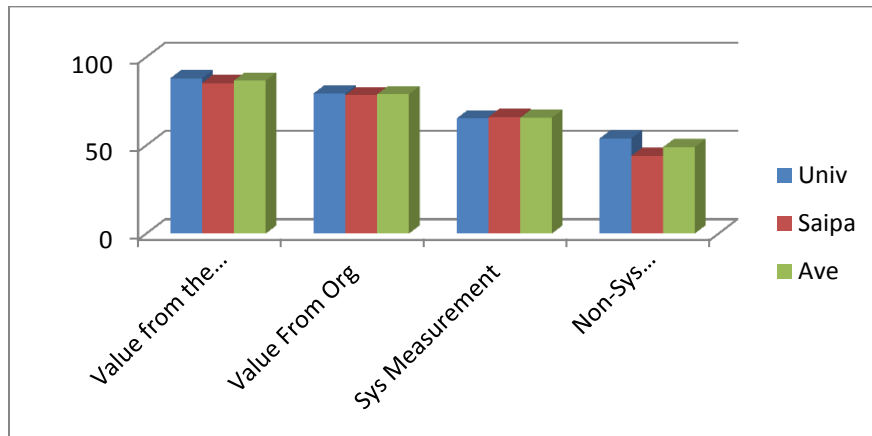


Fig3. Sample Factor of organization level (organization)

6. Conclusion

The research was done in a developing country between a same project in Automotive industry and in University.

The research has shown that in industry projects of new product development factors such as Market Environment analysis, Customer needs and want , Business case , Risk management, Ownership from Top Management , Planning Competence , Process Quality , Clear Development Process, Tools, Risk Management ,Handle Dependencies , Global and

Local Development, Supplier / Partners and Feedback has more value than in compare with the university and factors such as Technology Road map ,Metrics

Organization , Industrial Structure Professional Project Implementation , Culture / Attitude , Competence ,Incentives

Technical platform/Architecture Predevelopment of technology has more weight in university rather than in industry.

Table 4: Factors comparison

Factors weight	University	Industry
Market environment analysis	76.4	83
Customer Needs and Wants	79	83
Business Case	67.8	78
Risk Management	70.4	81
Technology Road map	85	83
Metrics	71	62
Organization	79	78
Ownership from Top Management	85	88
Planning Competence	65.2	72
Process Quality	73.4	81
Clear Development Process	65.3	75
Tools	68	80
Industrial Structure	74	66
Professional Project Implementation	85	73
Risk Management	80	82
Handle Dependencies	82	67
Global and Local Development	79	77
Supplier / Partners	88	90
Feedback	79	83
Culture / Attitude	79	70
Competence	70	60
Incentives	74	76
Technical platform/Architecture	88	77
Predevelopment of technology	80	75

References

- [1]. Bourne, M., J. Mills, et al. (2000). "Designing, implementing and updating performance measurement systems." *International Journal of Operations & Production Management* 20(7): 754-754. Bremser, W. G. and N. P. Barsky (2004).
- [2]. "Utilizing the balanced scorecard for R&D performance measurement." *R & D Management* 34(3): 229-238. Chiesa, V., F. Frattini, et al. (2009).
- [3]. "Performance measurement in R&D: exploring the interplay between measurement objectives, dimensions of performance and contextual factors." *R&D Management* 39: 487-519. Clark, K. B. and T. Fujimoto (1991).
- [4]. *Product Development Performance: Strategy, Organization, and Management in the World Auto Industry*, Harvard Business School Press. Clark, K. B. and S. C. Wheelright (1993).
- [5]. *Managing new product development and process development*. New York, USA, The Free Press. Colquhoun, G. J., R. W. Baines, et al. (1993). "A State of the Art Review of IDEF0." *International Journal of Computer Integrated Manufacturing* 6(4): 252-264.
- [6]. Cooper, R. G. (2009). "How companies are reinventing their idea-to-launch methodologies." *Research Technology Management* 52(2): 47-57. Davila, T., M. J. Epstein, et al. (2006).
- [7]. *Making innovation work - How to manage it, measure it and profit from it*. New Jersey, Wharton School Publishing. Driva, H., K. S. Pawar, et al. (2001).
- [8]. "Performance evaluation of new product development from a company perspective." *Integrated Manufacturing Systems* 12(5): 368-378.
- [9]. Ernst, H. (2002). "Success Factors of New Product Development: A Review of the Empirical Literature." *International Journal of Management Reviews* 4(1): 1-40.
- [10]. Gharajedaghi, J. (2006). *Systems Thinking: Managing Chaos and Complexity - A Platform for Designing Business Architecture*. San Diego, Elsevier Inc. Goffin, K. and R. Mitchell (2005).
- [11]. *Innovation Management: Strategy and Implementation Using the Pentathlon Framework*. London, Palgrave

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 Vol. 4, Number 2, June 2016

MacMillan.Jiménez-Zarco, A. I., M. P. Martínez-Ruiz, et al. (2006).

- [12]. 12- "Performance measurement system (PMS) integration into new product innovation: A literature review and conceptual framework."Academy of Marketing Science Review 10(7).Kaplan, R. S. and D. P. Norton