



A NEW INTEGRATED PROCESS AND PRODUCT

Eng. alsimaa ayman , Dr. Ahmed Badrelden ALhamaki , Prof. Dr. Hazem Abd El-Latif

Abstract: Within the knowledge Economy century all nations competing to innovate new technologies leading to an introduction of robust, economic and quality products. The relation between the different domains affecting such capability were given in an integrated system to lead to above results. The first domain is the Business environment it was analyzed to lead to the pre-feasibility of the product creation. The second domain is the market analysis, segmentation taking into consideration customer needs and competition. The third step in the proposed system is the managerial readiness of the product developing company including all managerial functions and the necessity of implementing the organizational change techniques if necessary. The first engineering critical domain of the technology creation which product concepts and robust quality design was analyzed considering the design innovative methodologies, theories, techniques and relevant software. The production processes and quality techniques to assure producing with the required quality and price levels was given. Finally the necessities of product distribution, service and after market was given in brief. The system was supported by the related internet enable and the latest software via hyperlinks. The above model was implemented in Egypt and foreign countries leading to very good results.

Key words

Product Development - Technology-Innovation-Design-Knowledge economy- Organizational change

1. INTRODUCTION

Integrated Product design and process Development (IPPD) is associated with information integration to innovate and manage a New Product / platform or improving old one, through establishing a systematic and standardized system that let innovation and improving within particular steps. Information integration and cooperation are the basic aspects of successful integrated model.

Researches in business success among different organization and products have shown that number of factors are important to create competitive product.

To establish successful, and effective product and process development model not only avails to control the production process effectively but also to integrate all available information and inputs that will trigger product improvement.

2. TECHNOLOGICAL BACKGROUND

This literature review shows the concepts of Integrated Product Development Process (IPPD).

Our proposed model encompass these mutual relationships between the external forces drive the business, the market forecasting, and the organizational aspects with the production process technicality.

Prior IPPD models were linear, such that the activities done in series with no integration, and also not considering the international changes in developing products, neglecting its complexity and related needs for innovative ideas, concepts and new technologies in order to face competition and realize the speed to market, the integration also allowed us to consider aspects have been neglected such as business environment, market, company strategy management. The global market now days depend on information integration, and to cope with it the product development system used must be integrated as well and be integrated, Systematic, Coherence, flexible, innovated and Conciseness. In this paper we will show in details the first two domains and their contents. The review establishes an overview on each theme, as well as their relation to each other.

2.1. Integrated Product Development Process

I.P.P.D provides a systematic approach to product development that achieves timely collaboration of relevant stakeholders through the product life cycle to better satisfy customer needs.

Integrated Product design and process development refers to set of major categories that include many tools, techniques and concepts applied over the phases of a product life cycle. The applications of these tools, techniques and concepts, when taken together, provide the necessary underlying capability to compete effectively in the area of cost, quality, and particularly, time and it used to conceptualize, design, and rapidly produce competitively-priced quality products.

3. THEORY: NEW MODEL.

In Our proposed Model the domains emanate from each other and the activities are not done in series, they are integrated together and allowing the necessary feedback. This model has got 6 domains:

- 1- The Business environment
- 2-The Market environment
- 3-Company Management
- 4-Technological creation
- 5-production/launch
- 6-Post Launch

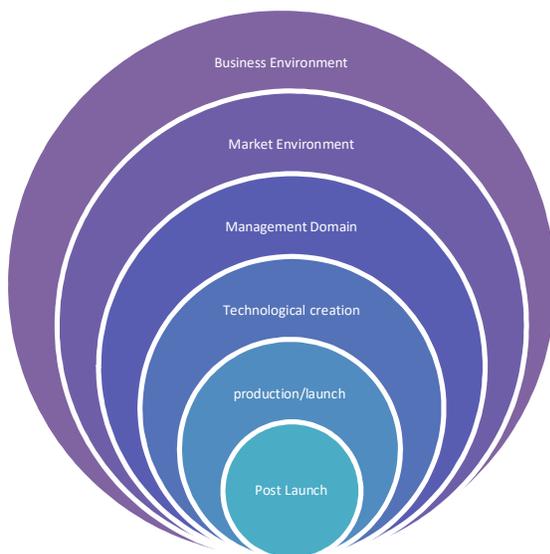


Fig. 2. Model domains

2.2. PESTEL tool

It is a tool that is used to identify and analyze the key drivers of change in the strategic or business environment. The abbreviation stands for **Political, Economic, Social, Technological, Legal, and Environmental** factors. The tool allows the assessing of the current environment and potential changes. The idea is, if the project is better placed than its competitors, it would be able to respond to changes more effectively

The PESTEL world contains of 6 letters each one refers to an external factor such that: P for policy, E for economic, S for social, T for technological, E for ecological, and L for legal.

Each domain contain a several activities and the final model will help the user to understand the surroundings and their needs

3.1 Business Environment

The sum total of all external and internal factors that influence a business. For example, a health and safety regulation is an external factor that influences the internal environment of business operations. Additionally, some external factors are beyond your control. These factors are often called external constraints.

It is important to interact and transact with business environment because it has direct relationship with the organization success. The success or failure of an organization is primarily established by the effectiveness of its interaction with its

Business domain includes 3 sub domain:

- 1- External Environment (PESTEL Analysis tool.)
- 2- Internal Environment
- 3- Resources

environment. Kotler and Armstrong (2004) explain that different restrictions are imposed on all organizations by the environment. The enterprise has little influence on the environment and therefore, it is important for the company to identify with the environment of its operation and devise its policies in relation to the forces in that environment.

The readiness of it will facilitate the decision of investing and the success of the whole project.

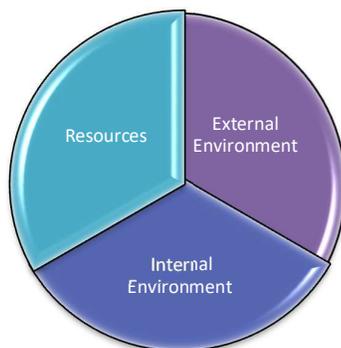


Fig. 3. Business environment subdomains

3.1.1 External Environment (PESTEL Analysis tool):

The success or failure of an organization is primarily established by the effectiveness of its interaction with the external environment surrounding it, such that The enterprise has little influence on the environment and therefore, it is important for the company to have the readiness of external environment and knowing the social behavior and devise its policies in relation to the forces in that environment.

PESTEL analysis tool will help the user to understand and configure the external influences on the business, and this tool is especially useful when starting a new business or making a new platform or introducing a new market

3.1.2 Internal Environment:

It encompasses various elements present inside the organization, and refers to the organization culture and road map that influence the decision of the entrepreneurs and managers.

3.1.3 Resources:

The basic idea underling the importance of the resources is that the degree of resources availability and the easy to access to it will determine the effort need and help entrepreneur in the decision.

3.2 market Environment

After business readiness, market domain is established to help entrepreneur and managers to continuously market reading and forecasting, and those information can change the state of technical domain data so the product evaluated and improved continuously, so that the screwy involvement of improvement can be promoted.

This domain contains of 7 subdomains showed in figure 3.

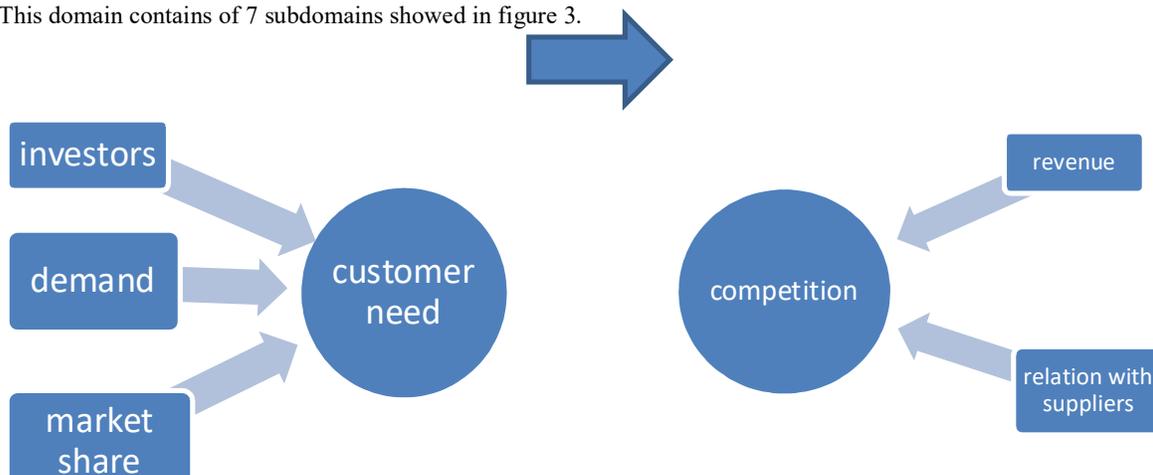


Fig. 4. Market subdomains

4. APPLICATION

Our proposed model is consistent with requirements of the economic century so we designed a user friendly interface that interact and support the users need.

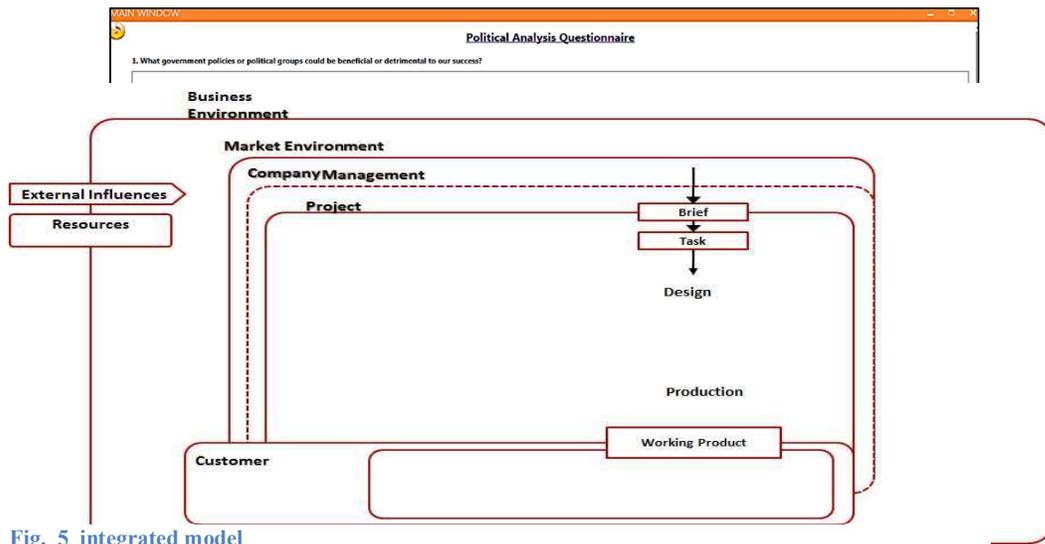


Fig. 5 integrated model

The interface is supported with internet enablers and data entry pages to help user in his research and the final decision.

As shown in figure 5 The PESTEL tool contains of 6 external factors each factor listed inside the parameters effect on it and some linked to internet enablers.

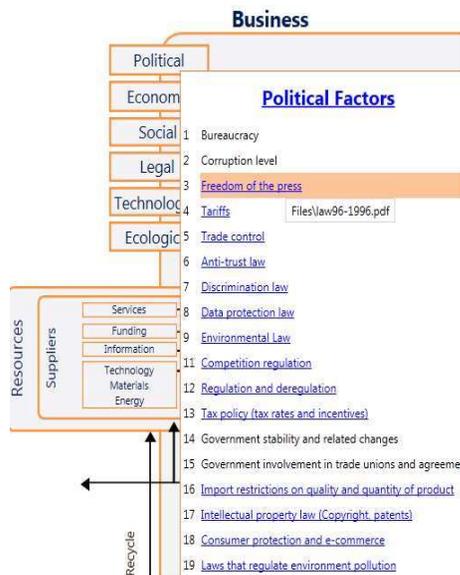


Figure 6

Example: If the user press on Tariffs, the user will be transferred to the Egyptian ministry of finance / Tariffs section. So that the user can know all what is need and be aware of any changes happened in the tariffs.

After studding those parameters a questioner for each factor must be done, figure 6.

After studying the PESTEL factors and answering the questioner, the model analysis the data (SWOT/PESTEL analysis) to help user in his decision, figure 7.

		PESTLE					
		Political	Economic	Social	Technological	Legal	Environmental
SWOT	Strengths	1	2	3	4	5	6
	Weaknesses	7	8	9	10	11	12
	Opportunities	13	14	15	16	17	18
	Threats	19	20	21	22	23	24

Fig. 8. swot/pestel analysis

Now the internal environment section which contains of 4 parts that the enterprise should create, they are vision, mission, values, objectives and clear goals and millstone.

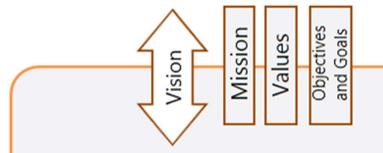


Figure 9

Each slot linked to another page that allowed the user to write down the data.

For Example Mission, figure 9.

Fig. 10. Mission

as shown in figure 10 user will study the availability of the resources and services needed to develop the product, then rank each one.

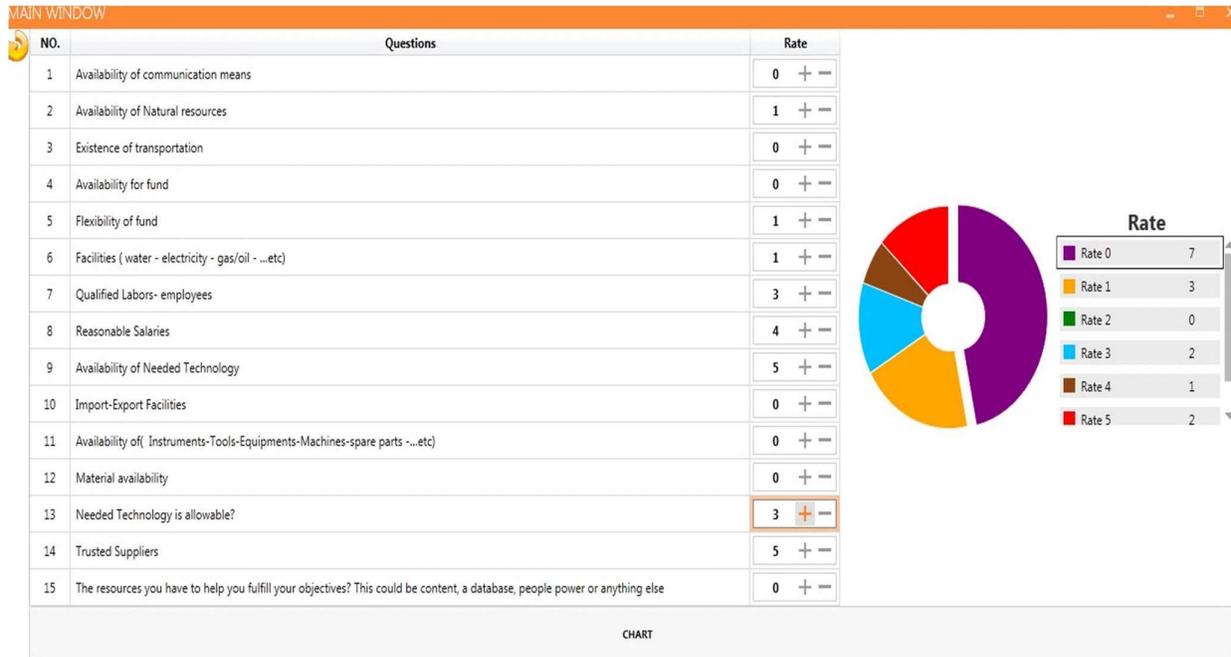


Figure 11

As shown the model take in consideration the important of voice of customer, the market share and the competition in order to enhance the user final decision.

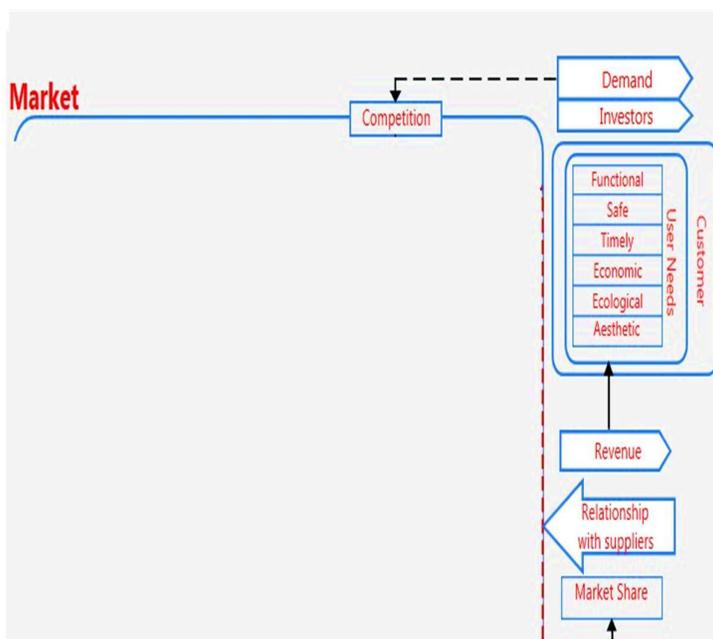


Figure 12

After finishing the first two domains a decision must be taken to continue in this project or not, if the user decided to continue, then he must proceed in the rest of the model domains.

The proposed Model will be with the entrepreneur from the first step to last,

Help in managing and development of the entire process.

CONCLUSION

The findings of this paper addressed a common challenge in product and process modeling, and tried to simulate the information integration era.

Our findings have important implications for entrepreneurs and managers who wants to introduce a new product, or improve old one, or even enter a new market.

Our proposed model encompass all the domains that will affect the project success, taking into consideration the variation between industries segments and their needs, the model is Taylor made such that it is flexible and can be adapted.

By using this model Entrepreneurs will be able to decide when and where they will establish their

ACKNOWLEDGEMENTS

The author would like to thank supervisors who support my research and provide help.

REFERENCES

[1] Yingkui Gu, Juanjuan Liu, Weidong Wu, ‘‘ Integrated Product and Process Development Mode Based

On Models Coupling’’. Proceedings of the 6th World Congress on Intelligent Control and Automation, 2006.

[2] Kenneth J. Petersena, Robert B. Handfieldb, Gary L. Ragatzc, ‘‘ Supplier integration into new product development: coordinating product, process and supply chain design’’. Journal of Operations Management, 2005.

[3] JAMES M UTTERBACK, WILLIAM J ABERNATHY. ‘‘ A Dynamic Model of Process

projects, as they will scan the business environment and forecast the market need , turning those need to a reliable design with competitive characteristics. Such information will have impact on entrepreneur’s decision.

Finally our study also high light two important aspects first one is the importance of simulate the reality and let model be integrated with activites emanate rom each other not done in series, and the second one is the importance of taking into consideration the external forces that drive the business and emphasize the criticality of the information integration within the whole organization, and how to manage them.

and Product Innovation’’. OMEGA, The Int. J1 of Mgmt Sci., Vol. 3, No. 6, 1975.

[4] ROBERT G.COOPER, ‘‘ A Process Model for Industrial New Product Development’’. IEEE Transactions on Eng. Manag. , Vol. Em-30, no. 1, 1983.

[5] Mohammad Hassannezhad, P. John Clarkson, ‘‘ Internal and External Involvements in Integrated Product Development: A Two-Step Clustering Approach’’. The 27th CIRP Design Conference, 2017.

[6] A.F. Curi de Moura Leite et al., ‘ ‘The reference view for semantic interoperability in Integrated Product Development Process: The conceptual structure for injecting thin walled

plastic products''. Journal of Industrial Information Integration, 2017.

[7] Anderson Luis Szejkaa, Osiris Canciglieri Juniora., '' The application of reference ontologies for semantic interoperability in an integrated product development process in smart factories''. The 27th International Conference on Flexible Automation and Intelligent Manufacturing, 2017.

[8] Karl T. Ulrich, Steven D. Eppinger., '' Product Design and Development''. The 5th Edition, 2012.

[9] Abbie Griffin, Stephen Somermeyer, '' The PDMA Tool Book 3 for New Product Development'', 2007.

[10] Peter Fisk, '' People, Planet, Profit'', vol. 1, 2007.