

## Review of New Product Design: Strategic Opportunities in Entrepreneurship Education as Educational Tools Engineering

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### ABSTRACT

The aim is to demonstrate a case for the expansion of new product design topics related education as a strategic opportunity for technology instruction. A brief literature review about a new product design topic is introduced, as well as an exploration of the current criteria for various technology issues. Approaches for achieving is presented noting that mechanical engineering and industrial engineering are often more closely associated with the new product design issue. Views of industry reveal the need for identifying preferred approaches. If a new product design topic is to be admitted as part of an entrepreneurship program, there are a number of potential attacks of all the new engineering sciences that will impact engineering education where none is bigger than the internet. The number of new product design course educational programs in the Malaysia is growing substantially. New programs are encouraged along with review of educational content in traditional engineering disciplines, especially the related discipline of mechanical engineering. The study leads to believe that new product design topic represents a strategic management and opportunity for technology education to follow.

**KEYWORDS:** New Product Design, Technology and Innovation, Entrepreneurship, Engineering Education, Educational Tool.

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### INTRODUCTION

In the manufacturing sector in Malaysia, an effort for development of new products was done consistently and drastically, particularly in the segment of product design. This is in line in order to achieve the level of competitiveness and innovative capacity of the global standards; the manufacturing sector plays an important role and tries to do our best to achieve the goal. Malaysia also hopes will be a successful country in the production of high-tech products, an efficient value added and became a manufacturer of a wide range of more advanced services products. Therefore, joint ventures and strategic cooperation made with local and international institutions and developed countries will result in many benefits to the parties involved. After that, Malaysia will be at a higher level and respected globally. Furthermore, from this strategy, Malaysia can get the flow of expertise really needed and as well as benefit from transfer of technology in accordance with the agreed strategies. From another point of view for example, Malaysia can also carry out overseas projects with countries that have expertise in the manufacture of materials by using labour from Malaysia. This will provide profits for both parties. After the process of technology transfer occurs in some time, Malaysia will have his own energy experts and can be proud of when known as a developed nation.

As known that Malaysia is famous for its agriculture-based sector. In Malaysia, some commercial crops has greatly expanded. As a result of this plant are used to produce several types of raw materials such as palm oil, rubber, timber, rice and fibres. Unfortunately, the revenue that can be generated from agro-based sector does not really have a big impact when compared with the manufacturing sector. For that reason, Malaysia continues to develop the manufacturing sector and in the sector, Malaysia must not only rely on agro-based sector alone. In addition, the manufacturing sector will help in improving agriculture sector development by offering the ability of some downstream activities such as processing, packaging and distributing of the product.

An activity such as described above is useful to optimize the use of raw materials such as oil palm, rubber and rice to be finished products or semi-finished products. In addition, the manufacturing sector can help in research and development (R&D), the use of the design of new products and the latest technology for the purpose of manufacturing and business. Therefore, during this discussion, they are expected to know and identify the variables in particular to new product designs that can help successfully and lead manufacturing new product design, especially in Malaysia to compete and survive in an era of globalization [5].

### LITERATURE REVIEW OF NEW PRODUCT DESIGN

In [12, 24] stated that the concept of a new product can be defined in a variety of definitions. A definition can also be considered basically describes the types of products include original products, products that are

better, which has been renovated and brand new products developed through research and development efforts undertaken by the organization. Classification related [20, 23], stated that there are three different categories identified from the definition of these new products. Those that are really innovative product will meet the demand of the present that cannot be resolved by means of redesigning an alternate product that is different from existing either in form, function and advantages of the products available. New product design is the improvement of the production of new products to the market and organisations as well.

The next concept from [8, 21] is the design of new products have been classified into two dimensions, namely 'newness to the organization' and 'newness to the markets'. Starting from the lower level to the highest level in each dimension, there are six categories were identified. These categories are cost reductions, improvements in existing products, repositioned products, additions to existing product lines, new product lines allowing a firm to enter established; markets, new to the world products that create new markets.

From the concept of generation is the process of producing new ideas. It was supposed to be synthetic rather than analytical. the goal was originally not intended to assess the possibility of a solution but to continually come up with new ideas, regardless of the situation practical or not. This approach is in contrast to what students learn in mathematics and science classes because there is no right answer in this brainstorming. They need to think critically about these solutions.

There are four steps in the creative process.

1. Preparation-collecting information about a problem.
2. Incubation-unconscious recombination of ideas (requires conscious thinking about the problem).
3. Illumination-moment of inspiration.
4. Verification-implementation/testing of the idea.

The concept idea first product developed through research on market demand and consumers. However, the critical judgments on the technical aspects of the product must be addressed. It is closely related to the company's needs and requirements of users. In a marketing context, a discussion between the groups needs to find the right information. New product design development, especially industrial products, customer needs is paramount to achievement of the purpose of the development of innovative product concepts that can reduce production time and improve the overall product concept. Studies on the concept of product ideas have led to the finding of more data and also ideas to product details including ideas usability.

A view on a strategic role in the management of new product design has great potential to contribute to the new design and product development studies. Potential new product design must be continued to generate innovation, because it has become a priority in research Marketing Science Institute, which is a special issue of the Journal of Product Innovation Management featuring articles on topics such as the role of marketing and design in discontinuous product development, links between marketing and engineering on product design [17], the effect of product appearance on customer choice [4] and the financial rewards to superior industrial designs [5]. Indeed, recent work in [3] reports that design investments enhance firm performance.

## **PRODUCT DESIGN AS EDUCATIONAL ENGINEERING**

In [2] provides for the definition of entrepreneurial opportunities as situations in which new goods, services, raw materials and business rules can be introduced and sold at a price higher than the cost of production. According to [18], the product design is part of the people's response to changes in lifestyle needs and to improve the quality of life by designing and creating innovation. Product design improved through knowledge of social factors, technology, economics, history, ethics, legislation, environment and culture. These factors affect the aesthetics, form and function of a product that has been developed in the past and that has not been developed. Product design process involves the identification of the actual needs and then translated in designing new products. It needs to be reviewed and informed by research to help find a solution with regard to the physical and allows the product to function in three dimensions. This method requires the use of technology solutions and creative skills defined as educational engineering including think to design products, drawing with computer aided design, testing processes and materials, planning, construction, manufacturing and evaluation. Knowledge especially in educational engineering and use of resources is a matter of great importance in designing the product. These resources include a wide range of materials, equipment and machinery to transform these elements in the right way and securely into products more innovative and useful. Increasingly, consumer awareness of the importance of environmental sustainability has an impact on the development and design of new products. A more sustainable approach is to be performed primarily by management at the forefront to maintain product lifecycle.

To product design processes that are effective, it must identify customer needs and requirements, thus realizing the product and make it producible, where decision-making was identified as a credible alternative. In a race competition in the marketplace, organizations need to make the right decision and drastic. What is important is to get a strategic position and is exclusively in the market in order to guarantee the product to

continue to be competitive. On the other hand, the rapid advances in technology, market and innovation have accelerated changes in previous decades. This requires a method and new techniques to bring new products to market successfully. However, in [14] said the new product design which has long been recognized as one of the major corporate functions. Over the past 25 years, the new product design has been increasingly recognized as a critical factor in ensuring the longevity of a firm will remain. The rates of growth of the market and technological changes have been affecting factors of consumer needs and this requires methods and new techniques for making new products successfully on the market. Information technology (IT) is one of the factors that have increased the flexibility to new product design. New product design requires good cooperation from members of the new products team within or outside the firm. This will create new opportunities in the field of entrepreneurship to generate profit. This put researchers in a position of uncertainty when found that entrepreneurial opportunities in the market are the most profitable is by the internet. Many businesses now have changed their marketing strategy to suit the current market conditions. For companies that do not want to make changes to its marketing strategy, no new opportunities that will exist and it will not develop entrepreneurial potential.

### **HOW INDUSTRIAL NEED A NEW PRODUCT DESIGN SUCCESSFUL**

According to [7], the product is designed based on the experience and creativity of designers is made on a subjective feeling. Therefore, the designs of new products are constantly being introduced to the market all the time, but most of them failed. Many inventors are not aware that their failure is not due to some huge faults in the product itself, but how it's presented. Creation of new product design should be successful if done the right planning and development at various stages of operation.

#### **Address Customer Needs**

Many products fail due to their unclear handle any needs or solve any particular problem in meeting the needs of users. Often, customers are not only looking for new features stylish, but they find the solution method with the availability of new product designs. For example, users are not concerned with the preparation of food using microwaves, but they are looking for a simple solution to the problem of preparing dinner after spending the day at the workplace. A successful product is a product that can fill in the lives of our customers. In a successful marketing strategy, the vacancy must be clearly identified. Once they are identified, it is time to introduce a solution by way of manufacturing a new product designs.

#### **Offer Good Price for Value**

As soon as the customer needs have been identified and offers a possible solution, the next step is to determine the value. Although it is a common problem and there is no other product on the market and the firm offers the perfect solution, but if there is no demand, the solution becomes worthless. If the price is not reasonable, the client will try to get their needs by using products that are not quite appropriate. For example, if the client needs to drill the hole but require high costs, the customer may try to use other tools to lower costs because the goal is just to drill the hole. Price is an important factor for the customer to justify the purchase of a product, especially new products.

#### **Communicate**

Often, marketing strategy only works in one way. Through advertising, the firm will try to attract potential customers with the advantage of the characteristics of their products. But at the same time do not try to solve each client's needs. For example, firms may be approached and started a dialogue to learn consumer needs to suit their new product design through target groups, consumer associations and review. Creating a platform for effective communication with customers is important because it will give a clear representation about the perspective of a new product release to the company. Directly from the client perspective this will result in the success of the product. Often the customer feedback has been taken into justification the consideration of cost. The firms need to make significant changes to their products and plan effective marketing strategies that can lead to increased sales.

#### **Availability**

All new product design can be perfect. But if the products are hard to come by, customers will choose a different solution way and avoid buying the products. The company must be very careful in considering the means of distribution, when and how the customer can get the product. Whatever else the method taken for distribution, it should be easy for the user. For example, product purchase through online. Should it do not need instructions too complicated just to purchase a product. Simple, honest and straightforward is the factor that will

provide assurance to customers that they have made a good choice and ensure long term relationships with the company.

### **NEW PROGRAM CONTENT ENCOURAGED IN ENTREPRENEURSHIP EDUCATION RELATED TO DISCIPLINE OF ENGINEERING**

In recent years, many studies have been conducted in many countries to determine the technical and personal abilities needed by engineers in the industry today [6, 13]. The results of these studies have shown there are some major concerns. Today, engineering graduates mostly do not have the skills in communication, team work and high skills. Most graduates also do not have extensive experience in their field of work involving such issues involving social, skills and technologies and also from an economic standpoint. After undergoing a process of education, finally, they graduate with the skills and knowledge of technology and has its basis in the operating computer, but it does not have much effect if not in practice by the graduates.

The approach of new accreditation emphasis on 'what matters is learning' rather than 'if you want to learn' that is being practiced at present [10]. Implementation engineering program especially in technical institutions have to prove that they can achieve an output of graduates learning outcomes and acceptable methods of decision-making and so on can be implemented particularly in areas involving skill and technology. Therefore, there is a need in some countries to enhance teaching and learning in the context of education, particularly in programs that involve technology product design. On an assessment of the results of industrial research and review the accreditation criteria for new product design program, it indicates that the scope of work, industry and workers need changes entailed in the preparation of programs, especially those involving the design of new products.

From the discussion above, there are some critical issues that must be addressed. Here are some issues which are summarized as follows.

1. Focus is given only to the engineering curriculum to carry out engineering and technical courses without providing a bonding that is acceptable to industry practices.
2. The current program does not provide new product design experience sufficient to students.
3. Graduates still lack communication skills and experience teamwork and programs need to incorporate more opportunities for students to develop these things.
4. Program should develop more awareness among students on issues of social, environmental, economic and law that are part of the reality of modern engineering practices.
5. Existing faculties do not have enough practical experience. Therefore, it cannot fully implement the relation between theory and practical experience in providing new product design.
6. Cultural teaching and learning of existing engineering program is no longer feasible at the present time due to technological developments and innovations fast.

Taking into account the context of technical education in Malaysia to address most of the issues, the proposed solution is the formulation of the basic curriculum in engineering. It can be done by way of revised criteria for accreditation of courses through Malaysian Qualifications Agency (MQA) and Asia Pacific Accreditation and Certification Commission (APACC) will mean that all technical and vocational education and training (TVET) institutions in the Malaysia should review the program and course structure and developing new methods of teaching process to help graduates get the skills and qualities that meet the needs of the industry in the future. However, most institutions will probably choose to change gradually due to financial problems, the cultural and the existing expertise and experience that is limited in the institution. A more radical approach is also applicable in education by making modifications to a project or a learning model and this is known as problem-based learning. The use of problem-based learning in engineering should be performed because when reviewing the six critical issues for program design new products suggested above, the problem-based learning is a method that can be used to address the problems of the numbers 1 to 4 and 6. Once it is successfully implemented, the problem of the number 5 also can manage.

### **DISCUSSION**

Mechanical Engineering course is oriented towards traditional analysis based on performance as measured by the availability of the product. If an element of the production is taken into account as part of the mechanical engineering program, there are several approaches that might be implemented. The list below is 7 scenarios that may occur if the above factors are taken into account.

1. Increase the awareness of manufacturing through modifications of existing mechanical engineering courses. This could be done without a complete overhaul of the curriculum.
2. Review of educational content in traditional engineering with increasing manufacturing content in mechanical engineering.

3. Present a product design applications as part of the instruction in traditional areas. In many courses, educators choose application areas to illustrate the concepts they are teaching. Some applications could be chosen from real design.
4. Use manufacturing applications in laboratories. Traditional laboratory experiences could include manufacturing applications such as automated assembly operations or measuring variation from a fabrication process.
5. Design assignments that include process and tooling design. Design assignments could include the requirement to address process product design and tooling design, as well as the traditional functional design.
6. Economic studies that include manufacturing issues. Discussions of economics could include manufacturing issues.
7. Use manufacturing vocabulary in the classroom. Discuss manufacturing considerations as part of materials course. Materials subjects are natural places to discuss manufacturing processes.

### **CONCLUSION**

In terms of the accreditation criteria have been revised, it is taking into account the needs of industry and the approval of the graduates, particularly in the fields of engineering; but it cannot be satisfied with traditional engineering curriculum and pedagogy alone. Mixed mode approach is successfully practiced in some institutions need to be followed. In the early stages, some courses are taught in a traditional way in advance especially in the early years of study. There are components subject content should be added according to the suitability of a project. With this it will give the skills that are very valuable to students, especially in the latter years of the program. It is one of the best methods to meet the needs of the industry by implementing a method of mixed mode without leaving the foundations of engineering knowledge. It shows that the engineers and academics is more agree with the concept of the project in their professional practices, in comparison with the concept of learning based. Therefore, it suggests that project based learning is more easily adopted for use in engineering programs at institutions of technical education skills. The project based learning is suitable as a main component and engineering program should be implemented as far as possible by the institution. Here clearly shows that any improvements to the existing program based lecture capture engineering will be welcomed by students, industry and also the accreditors.

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