

Conference Paper

Why Does Theory of Inventive Problem Solving Matter in Malaysian Food and Beverage industry?

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Abstract

Nowadays, the competition in the food and beverage industry has developed from a single food competition to comprehensive competition in all aspects: from the pursuit of high-quality products to the expansion of market share, to the promotion of the brand effect and to the new shape of pursuing the entire enterprise. Consumers' demands keep changing with time. These changes are different from demands that occur for classy foods requiring typical features such as nutrition value, the lusciousness of taste, and accessibility, to basic aspects such as improved food safety, food life span, durability, and waste food proper management. Thus, the objective of this research work is to review the TRIZ-theory of inventive problem-solving the matter in Malaysian food and beverage industry. The new product development in Malaysian food and beverage industry needs to accommodate the market demand. This study revealed that the actual product development process could be analyzed by assessing the interactions between consumer demands and expectations, the producer's technical capacity of the food, and emerging knowledge from scientific researches about food. This has been attributed to the problem of the low quality of input terms of the food industries and productivity growth of Malaysian manufacturing industries, which is input-driven rather than total factor productivity-driven.

Keywords: new product development, balanced scorecard, food and beverage industry, TRIZ theory.

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1. Introduction

Companies are facing an enormous challenge to continuously improve its performance to meet its stakeholder's obligation (Danso et al., 2019; Dembek, York, & Singh, 2018; Silva, Nuzum, & Schaltegger, 2019) and performance (Aydiner et al., 2019; Liu et al., 2018). One of the best-known approaches to performance is Balanced Scorecard (BSC). BSC is considered as one of the best highly specific multidimensional system for performance measurement to maintain a multitude of stakeholders who seek perfection in accountability (Trotta, Cardamone, Cavallaro, & Mauro, 2013). A customized scorecard

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design can assist in the development of processes that lead to better sustainable performance (Reefke & Trocchi, 2013; Shad et al., 2019). A strongly designed BSC on a hierarchical basis acts as a bridge between performance measurement and key organizational performance (Shen, Chen, & Wang, 2016).

2. Food and Beverages Industry (F&B) Performance in Malaysia

The product and the process development are considered as the essential and critical part of developing smart business strategies for any food industry, just like any other industries. Failure to develop innovative products relay firms to compete entirely on prices which benefited the players with an approach to the lowest cost inputs (Ravindran & Jaiswal, 2016). Implementing a lower cost policy for a country economy, can create an unforeseen outcome, especially when another country, with a lower cost structure, invade the market (Avermaete et al., 2004).

There are more than 9000 food processing firms in Malaysia, of which 95% are categorized as small-scale each having simple to complex organizational structure and thrive on being flexible that can adapt to changes at disparate stages of the product development and procedures to accommodate consumer interest are better suited for the industry of food processing (Talib, Ali, & Idris, 2013). Figure 1 shows the F&B revenue projection in Malaysia in a million USD.

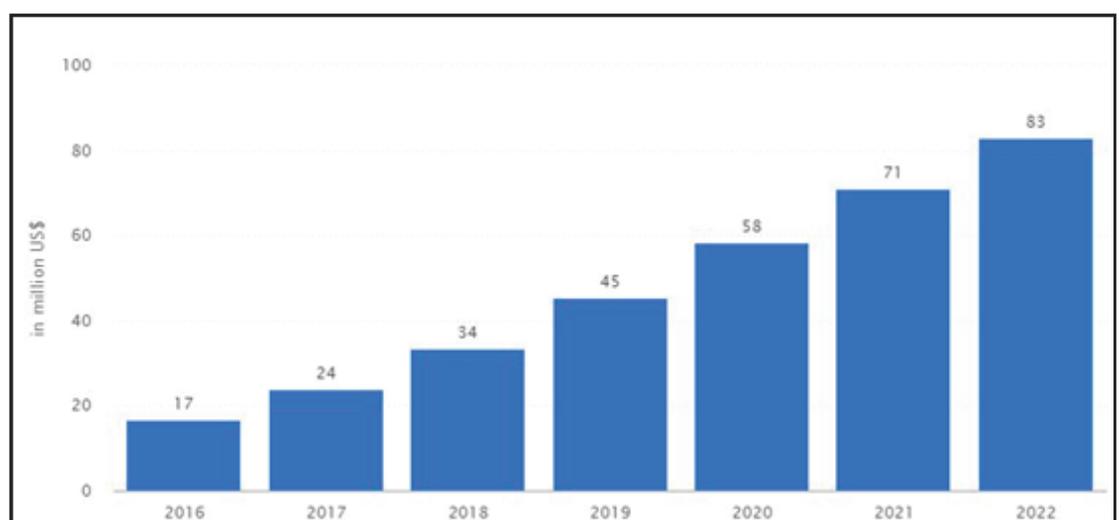


Figure 1: Food & Beverage revenue projection in Malaysia in a million USD (Source: (Statistica, 2017)).

From Figure 1, it is evident that the growth of F&B revenue projection in Malaysia from 2016 to 2022 is growing at a rapid pace. An increase from 17 million USD in the

years 2016 to 83 million USD in the years 2022 is witnessed. So, we can say that the growth of F&B in Malaysia is very high, and so is the demand for F&B (Statistica, 2017). Figure 2 shows the F&B revenue growth projection in Malaysia.

The growth of F&B revenue growth projection in Malaysia from 2017 to 2022 is visualized in the Figure 2. The amount of F&B growth projection rapidly decreases from 42.7% in the years 2016 to 16.6% in 2022. So, we can say that the growth of F&B is based on demand. The demand seems to be decreased due to some reasons which the academicians and industrial managers should take this into account seriously (Statistica, 2017).

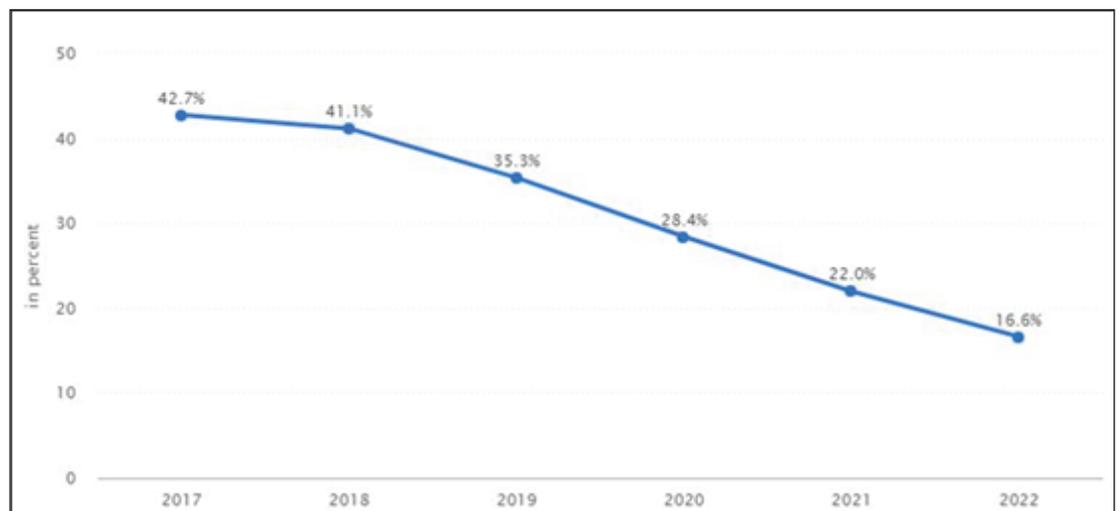


Figure 2: Food & Beverage revenue growth projection in Malaysia (Source: (Statistica, 2017)).

One of the highly uncertain industries that are competitive is F&B. Therefore, it can challenge company business performance to improve, which is performance. The competition in the food industry has seen tremendous growth, from producing high-quality products to the expansion of market share, to the promotion of the brand effect and to the new shape of pursuing the entire enterprise and there is always a competition between the competitors (Jin, Shu, & Zhou, 2019). Successful food and beverage innovation are essential in helping companies achieve sustainable growth and profitability. In a recent survey, over 60% of F&B executives stated that product innovation or portfolio adjustments to 'healthier' trends would be the key drivers they turn to for revenue growth over the next three years. While executives acknowledge that achievement of strategic goals will be mostly dependent on product innovation, many companies hardly strive with adequately delivering on innovative initiatives to meet those goals, with failure rates of new food and drinks products climbing as high as 70%-80% (Boyd et al., 2017).

Malaysia exports a variety of commodities like the other developed countries. However, processed food products constitute the main portion of these exports (Parfitt, Barthel, & Macnaughton, 2010; Wang, Jin, & Zhou, 2019). Rapid urbanization and restructuring in economically developing countries have transformed the food market. Malaysia is now participating in global trade agreements with other countries for a wide range of food products stability (Somasundram, Razali, & Santhirasegaram, 2016; Weis, 2007). Based on the subsequent government's attention over agriculture concerns, the agro-based industry is witnessing Malaysia as one of the largest foods and beverage processing hub. During the time of the Industrial Malaysian Plan 2006-2020 (IMP3), the investment's target of the food processing industry has been set at RM24.60 billion (Stoloff & Sikka, 2012). At various business environments, small and medium scale companies altered and influenced the Malaysian food production and industry (Goswami, Mattoo, & Sáez, 2012). Presently, the major advancement and gain areas are convenience food, food ingredients, functional food, health-related food, and halal food. In response to peripheral environmental changes around the globe, the industrial sector is going through several modifications caused by a variety of determinants such as technological developments, shifting demand patterns, rising production costs, and changes in competitive groupings (Ayupp, 2013).

BSC systems enrich and formulate the development of strategy into the implementation at an operational level and create a strong "strategic map" that incorporates all four dimensions BSC in a single chart. The four dimensions are financial (Sainaghi, Phillips, & d'Angella, 2019), the customer (Niven, 2014), internal business and learning and growth (Ottman, 2017) that are a core strategy of any businesses. When a balanced scorecard and a strategic map is combined, it acts as a performance appraisal tool to execute the planned strategy effectively (Fooladvand, Yarmohammadian, & Shahtalebi, 2015).

Therefore, a modern BSC will help to determine the company strategy and will help companies achieve high business performance (Sainaghi, Phillips, & d'Angella, 2019). Since business performance depends on strategic planning, the corrective role of strategic performance management on short-term and long-term goals are facing many challenges like external environment, customer expectations, judicious resources management, uncertainty and risk, and timely decision making. BSC suggests feasible solutions and control the conditions of the highly variable uncertain economic and social environment (Trotta et al., 2013).

These internal and external environments pressure are affecting the business performance of a company. Even when companies practicing BSC to improve business

performance, companies are facing uncertainties from a dynamic business environment. The development process of the actual product is signified by the interactions among buyer demands and prospects, the producer's food processing capability, and understanding of the scientific knowledge about food science. (Coles, McDowell, & Kirwan, 2003; Dou et al., 2016). Therefore, with new product development, companies can meet customer expectations and in the end, increase business performance. Other than increasing business performance, companies also can increase innovation that comes from BSC practices. The best strategy for each company would be determined by the unique characteristics of the company and the external environmental factors to guarantee exclusive growth for those companies. Hence, to be successful in the beverage and food industries, companies need to depend on confined and implicit knowledge that can behave and benefits instantly to business indicators such as price issues, cost inequities, legislative compliance, competition restrictions, and changing customers' preferences that brings diversity in taste from original traditional foods, etc.

Whether the proprietor or the administrator manage the company, the authorities' direct interaction with end-users and flexible attitude creates an environment which brings a unique advantage to these companies (Ayupp, 2013). The two essentials pillars for a food business are the quality and safety of the food. Also, the customer satisfaction is realized by the quality of the products which also acts as a strong weapon (strategy) for the business success in the competitive environment (Talib, Ali, & Idris, 2013).

3. Food Waste in Malaysia

Over several decades, attempts have been made to quantify global food waste, motivated partially by the need to indicate and highlight the scale of 'waste' about global malnutrition (Alexandropoulou et al., 2017). The most often quoted estimation is that 'as much as half of all food grown is lost or wasted before and after it reaches the consumer's (Romani et al., 2018). There will be an impact on the composition of solid waste by the rapid development of economic growth. The new trends in lifestyle, especially in the metropolitan cities, have led to more severe waste handling and disposal problems. It was estimated in the Ninth Malaysia Plan that percentage of food waste would be the maximum (45%) among the others waste including paper (7%), iron and glass (6%), plastic (24%), with the remaining makeup by other materials (Romani et al., 2018).

It is obvious that Malaysian solid waste is composed of an extremely high proportion of food surplus. According to a survey in 2008, the food waste statistic reached up to 63.1% (Siwar, 2008) overall Malaysia while the value of 74% in particular reported

for Kuala Lumpur (the capital city of Malaysia) which is the result of incinerated waste products into the dumping ground areas. The figures mentioned above can be further increased if other recyclable materials are recovered from the waste stream, which mainly dumped at the landfills sites (Ghani et al., 2013). Due to various restrictions, food waste segregation and minimization programs have not been extensively implemented in Malaysia unlike the other recyclable waste such as glass and paper, which basically due to low awareness among waste generators and low demand recyclable products from waste food such as fertilizer and compost (He & Lin, 2019).

In Figure 3, the graphical depiction of recyclables percentage is presented. The results signify that the major component followed by mix paper and plastics is food (organic) waste. However, unluckily, the attention rewarded by authorities towards this aspect is not enough to undertake this issue. Though recycling activities in Malaysia is rising, the recycling industry still needs to be more enhanced (Bong et al., 2017).

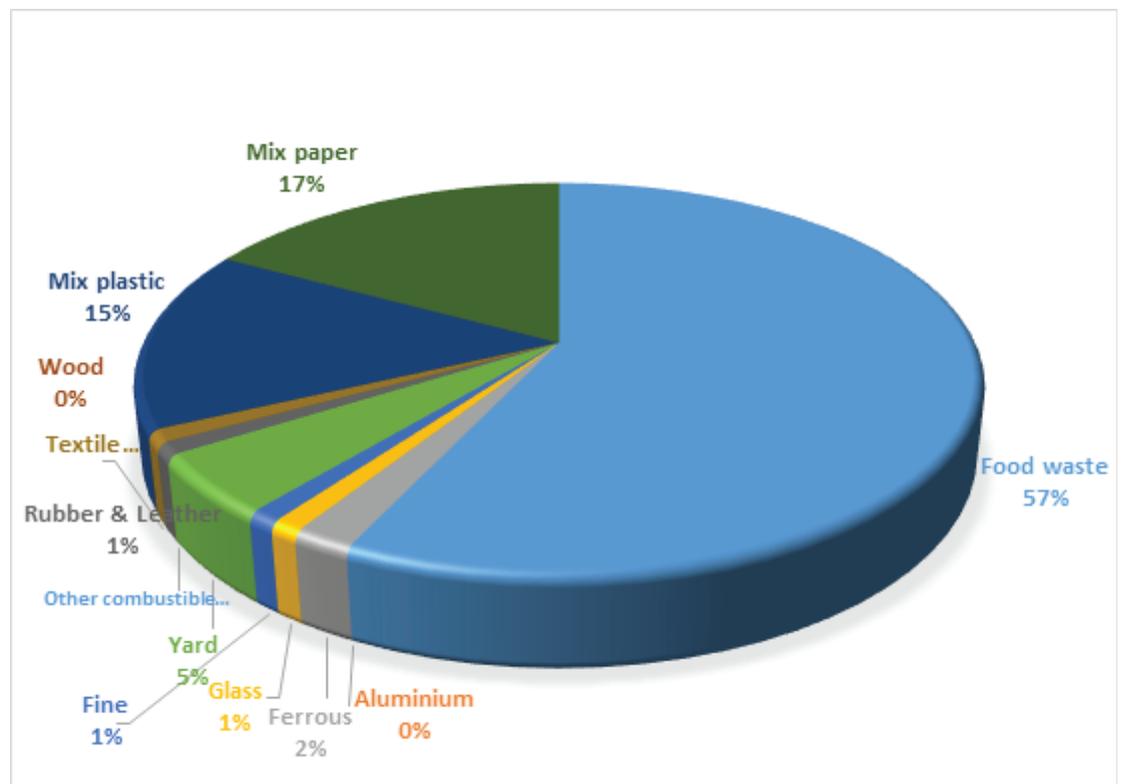


Figure 3: MSW Recyclables of Kuala Lumpur (Source: (Bong et al., 2017)).

4. New Product Development (NDP)

The management and control programs for the new products received a positive impact by the implementation of formal NDP process which solely depends on the way the

companies adopt the process (Cooper, 2019), formal NPD processes have had a positive impact on the way that some companies' new product programmed are managed and controlled. Proper management for new products can produce a substantial injection in the growth of new products that unusually be monitored by the existing products. The three building blocks of NPD growth involves; process, strategy, and resources. Having an innovative business strategy for a product that correlates product development to the company strategy, that differentiates between the spotlight and the areas of focus for product development, having a longer-term drive, and finally, that is clearly articulated and communicated to all in the company, can direct a company towards success. Ample financial resources are another factor that can move a company NPD towards success, which can be achieved by appointing the people with expertise in relevant areas and managing the funds for R&D expenses in place. Finally, the most important point among the three aforementioned is to have an innovative idea for a new product which can guide towards the launching stage.

Similarly, if there are three bases of NPD success such as process, strategy, and resources, which will improve the performance of the food industry. New products and product advancements in food processing industries could fluctuate from expanding the existing production lines, introducing new flavors, and varying the product's package wrapping to give the customer a new appeal for the products (Ayupp, 2013; Cooper, 2019). This will have a direct impact on the performance of the newly launched products for the food industry.

5. TRIZ As an Underpinning Theory

TRIZ has proved to solve difficult technical issues that require innovative thinking. TRIZ theory provides the integration of experiences and knowledge which acts a base for the invention in the world, creating a through a methodology for solving the technical problems in NPD (Butler et al., 2013). Also, the TRIZ theory provides a good mean to analyze and deal with many types of complications. The researchers pointed out the three important outcomes about the process innovation (Hidalgo & Albors, 2008). Firstly, the repetition of problems and solutions across industries and sciences. Secondly, the repetition of technical evolution across industries and sciences. At third place, the use of innovation outside the effects of the scientific field where they were developed. For instance, in the Project plan (Butler et al., 2013).

Ippolito and Zoccoli (2013) developed a macro and micro level BSC to identify measures and target values, and action plans related to budget and also take care of

other stakeholder's requirements. This proved as a dynamic tool that incorporated both dynamism and supported different roles and situations to achieve strategic flexibility. Similarly, the BSC model for R&D was established by (García-Valderrama, Mulero-Mendigorri, & Revuelta-Bordoy, 2008) to test recognized specialists in administration and R&D. Here the BSC is put forward to check the organizational effectiveness in achieving the strategic objective and then later group them into a set of BSCs' five broad perspectives. Based on the procedures followed and as well as insights derived from these two studies. The current study is focused on designing a BSC as a performance measurement tool in the context of NPD for the F&B industry.

The applicability of TRIZ (a Russian acronym for Theory of Inventive Problem Solving) is yet to be tested for effective adoption towards technology innovation and NPD. In a recent study, Huang reported that the use of TRIZ, for designing of a new product, could be one of the best ways out to cope with the hurdles of satisfying the customer through new product design (Huang, 2013). In this stringent international competition, each successful organization creates a unique business model which is suitable for its own. Solving an innovate business model via the universal TRIZ standard procedure could be the best option, which provides a scientific basis for enterprises to accelerate the revolution steps of a business model (Gu, Ouyang, & Liang, 2010).

Meaning of TRIZ in other words, a theory of inventive problem solving (Rantanen & Domb, 2008). TRIZ comprises three pillars, which are analytical logic, knowledge-based philosophy, and a logical way of thinking. TRIZ is the evolution of technologies, not an unsystematic process, but one established on several laws (Khomeenko & Ashtiani, 2007). TRIZ is also categorized as a problem-solving method based on logic and data, not intuition, which accelerates the project team's ability to solve these problems creatively (ReVelle, 2016). TRIZ theory has been applied by several global organizations who have found it particularly useful for spurring new product development (Tukker, 2015). TRIZ can also be used as a useful method in the new product development process to generate alternatives (Ekmekci & Koksall, 2015). To make the comprehensive budget management align effectively with business strategies, the contradictions of the comprehensive budget management system planning processes must be identified and resolved based on TRIZ theory (Song & Yi, 2015).

TRIZ also provides reproducibility, probability, and reliability due to its structure and algorithmic approach (Silverstein, DeCarlo, & Slocum, 2007). In contrary to psychologically-based common creativity tools, "TRIZ is an international science of creativity that based on the study of the patterns of problems and solutions, instead of spontaneous and intuitive creativity of individuals or groups (P. K. Ng, Jee, & Choong,

2016). The validity of TRIZ theory as a problem-solving methodology is principally evidenced with a high level of difficulty associated with a problem or when problem classified as a non-routine or inventive problem whose solution needs some creativity (Ilevbare, Phaal, Probert, & Padilla, 2011).

These difficulties levels related to each other to the source of knowledge required to solve. There are five levels of TRIZ Theory. Level one stated about the knowledge available quite easily and understandably solving a simple problem. The level 2 demonstrated the solutions of the problem require knowledge outside the industry, but still, be solvable inside the industry. In level 3, the problem needs appropriate knowledge outside the industry, but still within a discipline. It is about clever analogous things (I. M. Ilevbare, Probert, & Phaal, 2013). Level 4 using new technical systems together with solutions from wide boundaries of knowledge. Level 5 involves discovery something innovative in science to develop new systems which can be implemented to meet formerly unfulfilled needs (Gadd, 2011).

TRIZ offers many solutions to problem-solving. This is the advantages of TRIZ over other methods that provide ambiguous ways of resolving problems like brainstorming, mind mapping, lateral thinking, and morphological analysis. Moreover, TRIZ provides the delivery of systematic innovation, acceleration of problem-solving in creative ways, confidence that all possibilities of new solutions have been covered and breaks up mental inhibitors (psychological inertia) to innovation and indenture problem solving (Hicks, 2004).

6. Conclusion

This paper review about to promote the new product development, which is one part of the BSC revolution. The food industry's ability to interact with sustainable BSC framework, while also delivering greater in vision and strategy, allow it to deliver positive prospects as a conventional product with computing the effectiveness of revenue growth and cost reduction, measuring related to the most desired customer group, identifying more effective processes for organization to achieve high efficiency and aligning the internal skills and capabilities to strategic goals.

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