

Open Innovation Business Model in the Food Industry: Exploring the Link with Academia and SMEs

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Abstract—The aim of this paper is to provide an overview of the recent developments that have been made in the area of innovation management in the food industry. The paper tackles particularly open innovation and how it has been applied in the food industry. Open innovation is the strategy adopted by companies where they get to share certain levels of technology up to some levels as a way of continued and improved productivity in the food sector. The continued research by companies has made them realize that it would be cheaper to share some of the knowledge and skills that have already been made in the food industry, and in order to do so, certain rules have been made to govern the sharing of the particular skills and knowledge. This has involved measures such as companies licensing their set of research skills and sharing them or selling them when they see it necessary. This paper also highlights how various bodies contribute to creativity and innovations being carried out in the food industry.

Index Terms— Innovation management, food industry, open innovation, academia, SMEs.

I. INTRODUCTION

The food industry is one of the most important industrial sectors of the national economy in each country, and has a high ranking in terms of employment, turnover and value-added investment. Moreover, the food industry has significant links with the various sectors in the value chain, such as agriculture, retail and pharmaceutical industries, chemical industry, packaging, etc. [1].

Food processing industry was traditionally characterized by reluctant to changing technology. From a historical perspective, food processing is associated with low-tech processing of agricultural products. In fact, the research and development activities in the food industry are of secondary importance compared to other industrial sectors such as the chemical industry or the information and communication technology (ICT). However, due to the need to maximize profits and satisfy customers, the industry is slowly adopting modern technology. Further, the need to reduce operational cost has also contributed tremendously towards the prevailing trend. Also, the need to increase efficiency has influence this industry to share new and innovative strategies to for mutual benefit of all firms.

Although large and multinational food companies invest heavily in R & D, most food companies still do not have the means to invest in modern laboratories and intensive research.

However, one cannot deny the dramatic changes the food industry has experienced in recent decades. First, the food industry is experiencing increased competition both in the domestic market and international market. In addition, the industry has faced a string of threats to food. Finally, environmental and cultural factors have entered the food debate [2].

In response to these changes, the food industry has to undertake innovations and should increase the quality of its products, improve consumer confidence and encourage modernization, technological development and environmental suitability. Higher standards of living are in conjunction with greater potential spending on commodities with greater added value, together with better packaging, useful shelf life, flavor, etc. These standards are achieved through proper management, innovation and technological development. Innovation is one of the main determinants for companies in the food industry to achieve success, high performance and get to survive in the long run. Innovation is carried out by companies in either their processes or products and it involves the combination of technology with other aspects of the social and cultural platforms [3]. The past decades have seen innovation adopted by both the large and small firms, and various studies have been carried out to come up with measures that are efficient and more applicable in the situation of the food companies other than those used traditionally. The past trends have also seen companies aiming their innovation strategies for purposes of cutting down the cost of production in their products and services and maximizing on the profits, but this trend has recently changed with companies focusing more on customer satisfaction.

Innovation is achieved through research and development which is carried out by the universities and research centers for purposes of formulating efficient methods to be used for production and supplies in the food industry, and secondly is the market orientation which is carried out mainly by the management of the company for the purpose of knowing the market situation, and with such knowledge, there would be high chances of achieving success in terms of introducing new products to the market [4]. Innovation is mostly driven by pressure from the external environment with factors such as competition, scarcity of resources, deregulation and customer demand being the main driving force for the companies to take up innovation. Open innovation in this case is therefore the way through which the companies share the knowledge that has been obtained through the research that they have carried out. The paper therefore will look at the background of how open innovation came about, the recent and future developments and how open innovation has generally impacted to the food industry.

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The purpose of this article is to determine the impact of open innovation business models on the food sector. This main aim is subdivided into the following more specific research objectives:

- 1) To know how the open business model applies in the food industry
- 2) To know the advantages of using the open innovation business model
- 3) To determine the shortcomings that faces the use of the open business model
- 4) To determine the different models of open innovation and how they are applied by the food industry companies
- 5) To determine how various bodies contributes to creativity and innovations being carried out in the food industry

II. ANALYSIS AND DISCUSSION

A. Background

Globally, all companies endeavor to maximize they profit. To achieve this, they combine forces to maximize their output while satisfying their customers. Customer satisfaction is the most crucial endeavor that food processing companies must consider. Further, companies have now turned to innovating business techniques to gain superiority. Food processing companies have now enshrined innovative strategies using open innovative technology to maximize their profit while satisfying their customers and enhancing overall growth through cooperation.

Open innovation has been applied by the food industry in the recent times. The past has seen little research being carried out in the food sector, but this trend has changed in the current times where companies are dedicating most of their time and resources on the research aimed at improving their productivity and innovations. The open innovation therefore comes about as a result of the companies coming together to utilize on the common knowledge that has been achieved in the specific areas of creations being carried out in the food sector [5]. Companies have realized that with time, it becomes effectively cheaper to share on some of the common knowledge and skills that are being applied in their production processes, and thus the coming together has proved to be cheaper in the long run from the activities being carried out by the company. The sharing of such information by companies has however certain protections, once the company has their research innovations in place, then they are entitled to ownership of the innovation, and thus they will be responsible in any form of sharing or distribution of those ideas to the other companies. This means that such ideas will be highly protected from any form of unauthorized sharing. The past of the open innovation can therefore be murky but the future trends tend to focus more on the open innovation models and how they would apply in helping improve on the relationships and an eventual productivity of the companies.

B. How the Open Innovation Business Model Works

As in Fig. 1, Open Innovation can be described as:

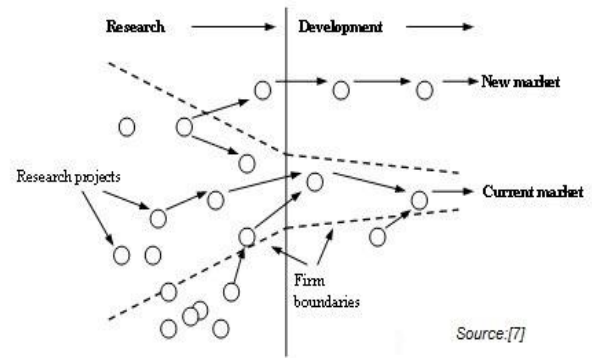


Fig. 1. Open innovation.

Combining internal and external ideas as well as internal and external paths to market will advance the development of new technologies.

Open innovation is the use of inflow and outflows of knowledge for purposes of accelerating innovation. The approach involves companies using both external and internal ideas and paths to market themselves as they look to advance their technology, since they cannot rely in their own innovations at the current times given the widely distributed knowledge.

The food industry has adopted innovation basing their model on the idea that sharing is winning, and this has driven the mutual vision for the industry sector to be driven towards innovation and at the same time enhancing the social responsibility [6]. The basis behind the open innovation and basically to the food industry is that there is a widely distributed knowledge and skills that have been developed to deal with processing of the food material and their supply and thus companies prefer to share such knowledge between them instead of relying entirely on their own research. Various guidelines have however been developed to help govern such sharing and this involves measures such as buying of licenses or entering into joint ventures with other similar arrangements depending on the agreement between the involved companies [7]. This system involves different ways in the sharing of ideologies unlike the closed innovation applied to some industries which has control in their ideas, production techniques and other factors affecting the industry.

C. The Models of Open Innovation

- 1) The idea competition is a model that encourages competitiveness from the food industry sector by rewarding those that come up with successful innovations. This can be applied as a way of having large quantities of innovative ideas and a deeper insight to the needs of the customers and the involved personnel.
- 2) The product plat forming is also a framework that can be applied in the food industry where there is development and introduction of the partially completed product to the market as a way of providing a framework to have the contributors get to access and customize the product or developed machineries into emerging with a more superior kind that can easily suit into the needs of the customers.
- 3) The customer immersion methods that can be used by companies in the food industry which involves an extensive interaction of customers through a host

organization which will have companies incorporate their activities accurately according to the needs of the customer, and at the same time be involved in the process design required in the different organizations [8].

- 4) The innovative design can be used to develop an innovative idea that will be used as an open innovation by companies to solving their different problems in the food industry. This model always has a network of contributors mostly the food industries dealing in similar products into developing the design process that will offer rewards to the outstanding ideas.

D. The Advantages and Disadvantages of Open Innovation

The main advantages of utilizing open innovation in the food industry are listed as follows:

- 1) The companies in the food industry will have a reduced cost being incurred when conducting the research and development aspects for their various products. This is because the shared technology in the long run will prove to be cheaper in its adoption from other companies if they prove to be efficient and more applicable to the operations of the company.
- 2) There would be high production as a result of the improved and cost effective methods being applied by the company [9]. This is an advantageous move for the companies involved in the open innovation because profits will improve and the cost reduced from the extra money that could have been spent in the research for the new methods.
- 3) The use of the open innovation is a potential way to market the products of the company that have been produced as a result of the application in the innovation techniques. Better innovation techniques applied in the food industry will earn the loyalty of customers and the benefits involved alongside them will be useful in earning the company good reputation and thus good sales.
- 4) There would be increased accuracy in the research being carried out and marketing strategies adopted which will have the company gain more focus in their operations and the possibilities of an eventual expansion will occur. The focus will also mean that the company will be aware of the market and thus cautious to prevent any negative moves in their operations.

These are some of the ways that the company could benefit from the adoption of the open innovation. There are however risks and challenges that are associated with the open innovation business model and these might involve a situation where the company might end up releasing some of their vital information which will end up giving away some of their information that may take away the reputation of the company or their share in the market [10]. The open sharing of information can also have other companies benefit from the effort of others without investing on their own innovation strategies. There would also be increased controls and regulations on how the technology should be applied meaning that production can still be low with more restrictions in regard to how innovation is applied in the food industry.

In a survey conducted in Germany, it revealed that in

2006/2007, open innovation contributed to food consumption increase from 138 billion to 245 billion. This was because food industries ensured their open innovation was persistently updated in their food chain. Open innovation has led to general profitability and customer satisfaction. Open business association and federation are also a source innovation in technological chain. This association offer professional advice which could be applied to enhance efficiency of operation in the chain [11].

E. Bodies Involved in Carrying Out Open Innovation

Currently, technology has enabled external creativity to be incorporated in new invention and even in enhancing sound decision making. As regards to external integration, food processing companies are slowly integrating external players such as research centers, universities, customers and laboratories. This incorporation has dramatically increased creativity and innovative strategies when making decisions. As illustrated in Fig. 2, external player incorporation serves to provide a platform for tapping business environmental changes. This network has increased innovative intensity which enhances competitive advantage. Firms in this model must strive to tap flow of new technology from innovative process technology. Firms must devise new policies to enhance tapping of new technology from technological networks [12]. Another advantage of open innovation is that, it allows firms to concentrate on product differentiation and customer satisfaction since they all share a common innovation. Three of the influencing factors involved in carrying out open innovation business model in the food industry are:



Fig. 2. Open innovation collaborative network.

1) The academia and research centers

It is valuable to realize that, Universities carry out research which offers a golden opportunity in discovering new and innovative strategy in the food industry. University interacts with student informally through university research and publication. Academia is a source of innovative strategy and especially on field related to food processing. They engage in laboratory testing which provides an opportunity for new discoveries. Universities are funded by firms to carry out research which is then tapped in the open innovation model. The innovative food companies are in the effort of obtaining knowledge and establishing formal agreements with various actors in the supply chain and majorly to the external organs which are the universities and research centers. The food

companies are establishing partnerships with the institutions belonging to their own sectors because this is a factor that highly characterizes their overlapping skills, competencies and knowledge [13]. This is aimed at increasing success from the innovation processes applied. Most of the innovations in the food sector are developed outside the processing industry and such includes the fields of biotechnology and preservations which offer opportunity for value added applications that can be applied to various fields of the food industry. The companies should thus use innovation which is an important tool, and the fact that partnerships between the companies and the related institutions can impact well to the food companies, since there will be diverse platform in the knowledge being shared among them. The open innovations made are cost effective with creativity attained benefiting the company [14]. Issues such as determining the safety standards of the food material and that of the application methods that are proven to be safe are essential in the food industry and these are the roles carried out through the institutions partnering with the food industry sectors.

2) The SMEs and technology-based firms

The small and medium enterprises (SMEs) are actively involved in the food industry, and they have embraced innovation in their organizational and cultural issues. Studies have indicated that SMEs are practicing open innovations in their practices; they are opening their innovative processes due to the need of external resources for purposes of developing and commercializing the new products. The SMEs are motivated to establish relationships and networking with the larger companies for purposes of acquiring knowledge and improving their activities [15]. They are used to following more of the informal and unstructured practices like the involvement of the customers which does not require a lot of investment to be carried out [16]. The technology based firms are on the other hand are actively involved in the adoption of any latest technology that will be aimed at improving services in the food industry. The firms are actively partnering with the large firms and the SMEs for purposes of bringing about innovations where necessary. The SMEs and the technology-based firms have contributed to innovations in various ways such as they have increased the mobility and availability of their skilled workers who have gone ahead to practice various innovations in their ventures into coming up with effective innovations applicable to the food industry sectors. The flexibility and opportunities offered to their employees can be attributed to be the main source of improved innovation for the companies themselves increasing their capacities to various operations like their supplies, thus contributing to innovations being made to cater for such increases [17]. These companies have also been involved in the ventures for new markets; a factor that has brought out company creativity and driven further innovations in the food industry sector. The increasing competition for market share has proved to be extremely intense in the food industry sector, and thus, companies are giving all their effort to come up with innovative ways of carrying out their operations.

Open innovation provide SMEs and technology-based firms with an opportunity to share the cost. Rather than all firms incurring innovative university cost on their own, one

firm may incur this cost. As a result of successfully gaining innovative method in food processing, this firm may share this innovation lowering overall cost. Although open innovation is beneficial to all firms, it puts firms in a compromising situation. Particularly, it is tricky for firms to determine how to compromise specific knowledge for a firm [18]. However, open innovation have had positive impacts in the industry.

3) Intellectual property and technology transfer issues

The research being carried out by companies in the food industry will have them come up with creative and innovative ways in handling their operations. The innovative techniques that they come up with will, therefore, mean that they would own that technology, and any sharing or use in different areas will be dependent on their permission. Technology transfer, on the other hand, is aimed to assist competitive business development and their market opportunities through developing the capabilities of the people in the food industry [19]. The issues involved in the technology transfer of the food industry will mainly include matters associated with reductions in cost of production or services, efficiencies attained through adoption of the technologies, and the protection that the company gets from their investment in the research to coming up with ways which they can apply in their operations or share them out for the open innovation markets.

The purpose of the association in the companies for the transfer of technology is important because it can help to increase the speed and quality of innovation being carried out within the companies in the food industry. The spending in the research and development will also be well-coordinated since there would be the focus on the field to concentrate the research efforts, and this is an effort that will involve all the stakeholders and industry players in carrying out such activities [20]. The transfer in technology will improve competition between the various sectors in the food industry, and these will contribute to a healthy society since the consumed foods will be of high standards and requirements. The competition will have companies fight to give out the best products to the market and have loyalty to the companies that give out their best. The competitive carriers and personnel in the food industry will also become innovative enough to have the best measures and strategies put in place for efficiency being attained in the food industry.

F. Recommendations

Innovation is seen as an important tool for companies to meet the needs of customers and to improve their productivity while standing out from its competitors. Based on discussion above, the following measures are recommended to further enhance innovation in the food industry:

- 1) Creativity and innovation should be encouraged in different food industry sectors with measures being put in place to have developments of personnel skills and carriers for the people who would want to develop their skills more and contribute towards the food sector [21]. This might include development of universities and other research institutions to act as a platform where the creativity can be carried out.
- 2) Companies should therefore heavily invest in the research and innovation techniques in the food sector

since it makes it as one of the major contributors to sustainability of most economies. The investment in research will mean that operations will be carried out smoothly within the food industry and that there would be increased productivity from the other sectors in the economy.

- 3) The continued innovation should have companies invest in the markets for the food products so that the effort made on the innovation strategies will be rewarded. The innovations made will result to higher productivity and thus it is important that companies find markets for such products for purposes of their profitability and to boost the confidence of the personnel involved for more innovations to be carried out.
- 4) The necessary machineries and loan facilities should be provided to the food industry sector to encourage them carry out more innovations and productivity for their products. Linkages should also be established between the small and big companies to encourage sharing of knowledge and ideas on ways of achieving high productions through creative innovation strategies.

III. CONCLUSION

This paper discussed how the open innovation business model works and highlights the determinants that play a key role in promoting innovation in the food industry. Further, it enhances efficiency and sharing of information with external players like suppliers, research firms and Universities. These institutions are a source of innovation through research and laboratory test. In this paper it is shown that open innovation has significantly improved food processing industry. Through collective sharing of knowledge, firms have been able to achieve dramatic customer satisfaction which is critical in the prevailing competitive markets. Open business model has enabled external player to participate in companies operation. This is essential, as without involving customer and suppliers, companies will hardly achieve their objective. Food industries should cooperate with external player to enhance tapping new technologies. Some measures are also recommended to further promote open innovation in the food industry.

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