Technological and Organizational Innovation in Food and Agricultural Firms: Case Studies on MBNQA Recipients

by Budi Harsanto

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Technological and Organizational Innovation in Food and Agricultural Firms: Case Studies on MBNQA Recipients

BUDI Harsanto

Dept. of Management and Business, Universitas Padjadjaran, Indonesia

budi.harsanto@unpad.ac.id

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Abstract. The rising demand for food and agricultural products encourages agricultural firms to innovate in both quantity and quality. The specific aim of this study is to investigate the innovation practices in food and agricultural firms. This study takes the case study method by using the cases of the Malcolm Baldrige National Quality Award (MBNQA) recipients engaged in food and agricultural products, namely Cargill Corn Milling (CCM) and Sunny Fresh Foods (SFF). The data is drawn mainly from Baldrige Application Summary, supplemented by other sources such as the company website as a compliment. This study suggests that innovation is strong in these two firms, both technologically and organizationally. It is indicated by the implementation of sophisticated technology such as automation and robotics and the implementation of organizational innovation in the form of i2i (ideas to innovation) R&D expertise in food products. This study offers important lessons learned on innovation for the agricultural firms to meet current demand while also developing the firm's capability to innovate.

Introduction

The growth of the world's population has consequences for increasing the need for food and agricultural products. It is estimated that the world's population will reach around ten billion people in the next three decades, directly correlated with the world's food needs [1]. The increasing demand for food has encouraged various companies engaged in food and agriculture to innovate to increase the quantity and quality of their products to serve these high needs best.

Innovations in companies engaged in food and agriculture are among those that are still little investigated in the literature. Innovation for this company is vital for the company, consumers, and the wider community. Innovation in the literature can be seen from various perspectives. For example, based on the nature of innovation consisting of technological or organizational innovation, the type of innovation consisting of product innovation, process innovation, and organizational innovation; or based on the level of novelty that can be distinguished into entirely new, significant improvement, or minor improvement and other categories [2].

The specific aim of this study is to investigate the innovation practices in food and agricultural firms. The main point of view used is the categorization of innovation based on technological and organizational innovation [3]. The case studies used are two companies engaged in the food and agricultural sector, recipients of the Malcolm Baldrige National Quality Award (MBNQA). Only these two companies from food and agricultural firms have received the award [4]. It indicates best practices and the rarity of companies from this sector that received this award. As of 2000, 12 manufacturing companies received this award, two of which are analyzed in this paper. For that reason, both of them are used as case studies in this paper. Although MBNQA has a US context, the analysis results are expected to be a lesson for similar companies from other contexts, both developed and developing economies.

This paper is composed of four sections. The first section provides a brief motivation of the study and the research aim. The second section deals with the expansion of the research approach, data collection and analysis technique. The third section presents the findings and discussion, focusing on innovation from the technological-organizational typology point of view. The final section is the conclusion.

Methods

This study uses a case study approach using best practices from food and agricultural companies that received MBNQA awards, namely Cargill Corn Milling (CCM) and Sunny Fresh Foods (SFF). The two companies are only two of the MBNQA recipient companies from the food and agricultural sector. Although some authors suggest a certain number of case studies, other authors suggest no fixed rule regarding the ideal number of cases [5]. In this paper, because only two companies are receiving MBNQA from the sector that is the focus of this research, thus it is not possible to increase the number of cases.

The data in this study were collected through searches, particularly from the National Institute of Standards and Technology (NIST) website, which is part of the US Department of Commerce, to obtain profiles, application summaries of companies, and other relevant documents [6]. Apart from the NIST website, information is also obtained directly from the company's website and grey literature such as newspapers or publicly accessible reports. Of the various types of data, the essential data is the MBNQA application summary. The data were analyzed qualitatively from the point of view of the innovation typology of technological and organizational.

Results and Discussion

The profiles of the two cases studied can be seen in table 1. Both of these companies received MBNQA in the period 2000-2010 to be exact in 2008 (CCM) and 2005 (SFF) [4]. After that, until now, in 2021, no food and agricultural companies have received the award.

Table 1. Company Profile

	CCM	SFF
Year of establishment	1967	1985
Products	Corn and sugar-based food, feed, and fermentation products	Egg-based products
Employee number	2300	620
Customers	3000	2000

Source: data processed

CCM and SFF were founded in 1967 and 1985 [7,8]. Although these two companies are different, they share the same holding company, namely Cargill. Cargill started its business more than a hundred years ago, in the 1860s, and today has hundreds of thousands of employees spread across more than fifty countries [9]. CCM focuses on corn and sugar-based food, which consists of three product groups: food (such as corn sweeteners, corn syrup, oil, dry corn ingredients, etc.), feeds (such as corn gluten feed or corn gluten meal, etc.), and fermentation (such as acidulants). , ethanol and industrial starch) [9].

In its history in 1967, the timing seems to have played a critical role for the growth of CCM [10]. At that time, the corn oil business was in decline. The price of corn fell, and the company was able to develop corn-based products that offered a wide range of possibilities from syrups to textiles and required by various types of consumers [10]. Before receiving the award in 2008, CMM had applied in 2002 but failed [9].

SFF, which has been operating since 1985, is the legacy of The Wright Co., founded in the 1920s [11]. The products offered by SFF are egg-based products which consist of more than 100 products such as pasteurized eggs, pre-cooked eggs, scrambled eggs, cholesterol-free egg products, fat-free egg products. It also covers various businesses such as food ingredients, protein and salt, or animal nutrition [11,12]. Before MBNQA 2005, SFF also received this award in 1999; the company's performance has been maintained with increasing revenue and market share [8].

For technological and organizational innovation analysis, the summary can be seen in table 2. Both companies practise sophisticated innovation in both technological and organizational innovation. Technological innovation practised by the two companies includes technologies such as automation, predictive and real-time equipment, technology for energy usage efficiency, and robotics.

Table 2. Example of technological and organizational innovation in CCM and SFF

	Technological	Organizational
CCM	• Predictive and real-time equipment (PR p. 1) • Careful energy usage (PR p. 1) • DVD annual report rather than paper since 2000 (AS p. 3) • Advance computerize system for production and distribution control (PR p. 2)	• i2i (ideas to innovation) process (AS p. 3) • replace formal presentation to team discussion (AS p. 4) • Superior implementation of HACCP, GMP, and quality as recognized by American Institute of Baking (AS p. 41; PR p. 2)
SFF	• Automation to maintain superior food safety (JA p. 46) • The use programmable logic controller or PLC for the control system (JA p. 46) • Robotics to improve efficiency in production lines. (NP p. 46)	• SFF's Four Absolutes of Quality (AS p. 3) • Eggceptional Internal Newsletter (AS p. 7) • R&D expertise in food products, including ingredient expertise to develop taste and appearance. (WS)

Source: data processed.
Note: PR = Profile, AS = Application Summary, JA = Journal Article [13], WS = Website

An example of technological innovation practised by CCM is the use of predictive and real-time equipment to monitor its plants [7]. The use of technology like this continues to be developed until now, for example, when collaborating with Azima to diagnose various mechanical failures during the production process remotely [14]. The machine health monitoring process is massive because it involves thousands of machines at different sites.

Another example of technological innovation from CCM is reducing the negative impact on the environment through various strategies such as recycling water or using sawdust and eucalyptus wood chis as fuel [15]. This type of innovation is known as eco-innovation, which is part of sustainability-oriented innovation [16–20]. Moreover, CCM also pays attention to the behaviour of its employees to improve their energy performance through the mechanism of behaviour-based energy management (BBEM) [15]. BBEM directs employees' daily behaviour to contribute to saving water and energy, which is good for business and the environment and society. Another practice uses an electronic annual report rather than paper since the 2000s when the electronic version is not as popular as it is now [21]. The use of advanced computerization systems beyond production also implemented to maintain excellent distribution to distributors and consumers.

At SFF, the technological innovation that is practised, for example, is automation to maintain superior food safety considering the high standardization of processes that involve strict standards such as those from the FDA and USDA. SFF is also maintaining high compliance with global industry standards known as HACCP (hazard analysis critical control point) [13]. In addition, the technology applied is PLC or programmable logic controller in all plants to ensure a consistent production process in quality [13]. Robotics are also used to minimize injuries and improve efficiency [13].

In terms of organizational innovation, applying unique approaches in both companies targets various aspects of innovation management, especially strategy, process, and learning [22,23]. CCM has a CCM leadership system as a systematic step to create distinctive value for the company, namely growing profits, satisfied customers, engaged employees and enriched communities [21]. From the process side, CCM has i2i (ideas to innovation) as a mechanism to process creative ideas into reality [21]. The replacement of a formal presentation into a team or department discussion is an example of organizational innovation in learning that helps the flow of knowledge be more fluid [21].

At SFF, organizational innovation that is practised is based on the philosophy that everyone in the company lecturers does well when the company does well. The LFF leadership system is an innovative internal system that serves as a mechanism for company presidents and their direct reports in preparing long-term directions and performance [12]. SFF has an innovative approach in the daily

communication process, for example, through an internal newsletter called Eggceptional to communicate various important messages (AS). Moreover, organizationally, SFF has its unique R&D division with high expertise in food products. SFF's R&D is specializing in technology for food manufacturing, packaging and ESL (extended shelf life), and expertise in managing taste and appearance, including product texture [24].

Conclusion

This study has shown that the two cases analyzed – CCM and SFF- which are MBNQA recipients engaged in food and agricultural products, are best practices for companies operating in similar fields. Both companies practice strong technological and organizational innovation in their companies. Technological innovations that are practised, for example, are automation technology, predictive and real-time equipment, technology for energy usage efficiency, and robotics. For organizational innovation, applying unique approaches in both companies targets various aspects of innovation management, especially strategy, process, and learning. This study will be of interest to firms engaging in food and agricultural products by offering important lessons learned on technological and organizational innovation to meet current demand while also developing the firm's capability to innovate.

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