A Consumer-Centric Open Innovation Framework for Food and Packaging Manufacturing

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ABSTRACT

Closed innovation approaches have been employed for many years in the food industry. But, this sector recently perceives its end-user to be wary of radically new products and changes in consumption patterns. However, new product development involves not only the product itself but also the entire manufacturing and distribution network. In this paper, we present a new ICT based framework that embraces open innovation to place customers in the product development loop but at the same time assesses and eventually coordinates the entire manufacturing and supply chain. The aim is to design new food products that consumers will buy and at the same time ensure that these products will reach the consumer in time and at adequate quantity. On the product development side, our framework enables new food products that offer an integrated sensory experience of food and packaging, which encompass customization, healthy eating, and sustainability.

Keywords: Consumer-Centric New Product Development, Food and Packaging Manufacturing, Information and Communication Technology, Knowledge Driven Manufacturing, Open Innovation

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1. INTRODUCTION

Two of the key challenges that face the food manufacturing industry include the ability to identify market segments that have different sensory needs, and the ability to respond quickly to these segments. Nowadays, new food products must offer an integrated sensory experience of food and packaging, which encompass customization, healthy eating, and sustainability. Although, one could argue that the food industry is an active industry, with roughly 3,500 new products reaching the UK retailer selves every year, at the same time, it suffers from massive Research and Development waste, as 80% of those new products are expected to fail within the initial two years since their launch onto the market and hence, they cannot provide a decent return on development investment (DEFRA, 2009). A key reason is that traditional New Product Development techniques do not obtain unbiased inputs from consumers who are not involved in the loop of those techniques (Miranda and Bañegil, 2002; Monsef et al., 2012).

By embracing Open Innovation models to interact with consumers at the place of product consumption, we can discover new market segments and understand their needs. Then, by integrating new product design, production and business systems in an ICT (Information & Communication Technology) platform, food manufacturing networks can be established and enabled by rapidly configuring on-demand the structure of the network according to particular product line requirements. This integration will also allow the allocation of production demand dynamically responding rapidly, economically and sustainably to the needs of new market segments identified.

In this paper, we present such a framework for the capturing and integration of consumers’ needs, with new product development and manufacturing into a seamless process. Simulation and optimization models can then be used to enable expert users to discover the manufacturing capacity of any available installation, configure manufacturing networks and processes, select appropriate suppliers and assess risks associated with particular process and network configuration decisions in responding to those new market segments. Embedded in the models will be sustainability considerations such that compliance with environmental as well as business strategy is attained.

2. APPROACH/MODEL

The food industry is a mature and slow-growing one and is typically very conservative with the level of investment in new technology (Monsef et al., 2012). At the same time, it is a very active industry constantly seeking to identify and address the needs of new market segments, although innovation is restricted to incremental improvements of existing products (Sarkar and Costa, 2008).

The traditional closed innovation has been used for many years within the food industry. But, this sector recently perceives its end-user to be wary of radically new products and changes in consumption patterns (Sarkar and Costa, 2008). Such perceived wariness, together with the restricted legal requirements related to food safety, transforms food industry’s innovation process into a highly complex, time-consuming and risky “odyssey”, and hence one not to be lightly undertaken.

However, these recent important changes in the nature of both food demand and supply, coupled with an ever-increasing level of competitiveness, and the high volatility of global markets caused by the global financial crisis, have rendered innovation not only an unavoidable corporate activity, but also one that is increasingly vital for overall profitability and survival (Sarkar and Costa, 2008; Bigliardi and Galati, 2012).

2.1. Challenges of the Food Industry

According to UK Cabinet Office (2008) and DEFRA (2009) the UK Food Industry contributes GBP 80Bn to the UK Economy and represents 7% of the UK’s GDP. Furthermore,
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