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**Characterisation of food product innovation with reference to bioactive functional food
product development: an Asia-Pacific study**

A thesis presented in partial fulfilment of the requirements for the degree of
Doctor of Philosophy at

Institute of Food, Nutrition and Human Health

Massey University, New Zealand

by

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DECLARATION

The thesis entitled, “*Characterisation of food product innovation with reference to bioactive functional food product development: an Asia-Pacific study*” is submitted to Massey University for the degree of Doctor of Philosophy. I, Rao Sanaullah Khan, declare that this thesis is the outcome of my research work. The material used from other sources is acknowledged. I also certify that the work contained in the thesis, or any part thereof, has not been previously submitted for a degree, diploma or other qualifications.

Signed.....

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Publications

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Conference

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Abbreviations

NPD= New Product Development

FFPD= Functional food product development

FF= Functional foods

MNE= multinational enterprise

MO= Market oriented

PDO= Product oriented

PRO= Process oriented

ORO= Organisational oriented

IRGS= To increase range of goods/services

IMS= To increase market share

ENMO= To exploit new market opportunities

IRC= To increase responsiveness to consumers

RC= To reduce cost

IKSC= To increase knowledge sharing with consumers

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Abstract

Functional foods, being one of the major food categories of the global health and wellness market, are becoming a major focus of new product development (NPD) in the food industry. These food products are associated with a higher return on investment by securing competitive advantage. The development of functional foods is more complex than traditional food New Product Development (NPD), calling for a concerted effort from researchers and NPD experts to explore and understand the functional food product development (FFPD) process in more detail. The current review in this field has reported that there is a need to evolve from a traditional NPD approach, towards an integrative and innovative approach involving cooperative networks and techniques of commercialization. However there is little practical evidence on how much progress has been made to date. Therefore this research was designed to investigate the food product innovation process of food manufacturing in the Asia-Pacific region (New Zealand and Singapore) with reference to functional foods development by applying a mixed-method approach i.e., quantitative and qualitative techniques.

Results showed (22% response in New Zealand) that overall a market oriented NPD approach dominated most of the factors of the innovation process in the food manufacturing sector. Major aims and mode of product development indicated a closed NPD approach (>80% NPD done alone) where increasing the range of goods and service to increase the responsiveness to customers and consumers was ranked the highest. Similarly cooperative networks seem to be dominated by ingredient suppliers and customers. These kinds of approaches are again an indication of a traditional NPD approach which was also evident in the commercialization strategies of NPD where a lower preference for protecting intellectual property rights existed. Attaining competitive edge and creating market opportunity are major drivers for FFPD. This is reflective of the business challenges in domestic markets as well as international markets where most food manufacturers fall short of attaining and maintaining competitive edge due to fierce competition in rapidly changing food markets.

A comparative account of NPD practices between registered New Zealand food companies that are doing some sort of functional foods development (Group 1) and those that are not (Group 2) showed a significant difference ($P < 0.05$) in the aims and mode of NPD between Group 1 and Group 2. Further it was observed that food companies in Group 1 have significantly ($P < 0.05$) more diverse external collaborations with broader aims to collaborate,

in comparison with food companies in Group 2. This is a positive step toward developing an external resource base, which is essential in developing functional foods. This attitude should be encouraged in future innovation policies as being critical to value-added food product innovations in New Zealand. Apart from these differences, food companies are still pursuing a traditional NPD approach (independent and closed NPD); with loose Intellectual Property (IP) protection practices irrespective of type of innovation activity. Similar comparative analysis showed that there was no difference in the innovation process of food companies in Singapore. Hence it can be inferred that in New Zealand and Singapore the food manufacturing sector needs to identify the factors of sustained competitive advantage. According to a resource-based view (RBV) of attaining competitive advantage, heterogeneity in resources and capabilities is essential at a national level of innovation system to create competitive behaviour among stakeholders. The prevalent scenario of homogeneous resources and capabilities can be changed by facilitating the development of technological collaborations among the stakeholders at a national level. In relation to this change, there is a need to create awareness among the stakeholders about the factors needed for developing unique and inimitable resources, and dynamic capabilities in food manufacturing.

Overall it can be concluded that the current closed NPD model is suited to incremental innovations and is exposed to exploitation by the powerful retailers (customers). Further the emerging health wellness market segment requires a change in NPD attitude where futuristic needs and demands of consumers are met through understanding consumer attitudes towards foods and their life-style. Therefore a change in NPD approach from a closed and linear model to an open and interactive NPD model is suggested to perform better in future. Research-oriented collaborations need to be strengthened in their scope and content to develop the innovative capabilities and capacities of Small & Medium Enterprises SME's with future value-added food production. However, this is a challenging task for food companies who are small enough to employ NPD professionals to develop that interactive NPD model where internal capabilities are leveraged with external resources to enhance the novelty of product innovations. Government may have to work in close collaboration with manufacturers of functional foods to evolve a regulatory framework that is compatible with domestic and international market regulations.