

**External collaboration for innovation can alleviate the effect between the past innovation abandonment and future innovation introduction among SMEs**

Dr Judy Matthews

*School of Management, Queensland University of Technology, Brisbane, Australia*

Email: [jh.matthews@qut.edu.au](mailto:jh.matthews@qut.edu.au)

Dr Sukanlaya Sawang

*School of Management, Queensland University of Technology, Brisbane, Australia*

[s.sawang@qut.edu.au](mailto:s.sawang@qut.edu.au)

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### **ABSTRACT**

*This study investigates the links between product innovation and external collaboration and between future product innovation and past abandonment in small and medium sized firms. Our findings from 449 manufacturing firms indicated firms that sought ideas or solutions from an external network such as suppliers, or business partners reported higher levels of new product introduction than firms without any external collaboration. Further, firms with past abandonment experiences reported higher levels of new product introduction than firms without such experience. Additionally, the findings indicated that firms with external collaboration were more likely to introduce new products even if they had previously experienced abandonment of a product innovation than firms without external collaboration. Implications, limitations and future research are outlined.*

Key words: innovation, collaboration, small and medium enterprises, abandonment, manufacturing, survey

### **INTRODUCTION**

Innovation has been consistently identified as essential to firm's sustainable competitive advantage (Barney 1991, 2001; Peteraf & Barney 2003) and engaging in collaboration and cooperative activities have often provided opportunities to access complementary resources (Ahuja 2000). Small and medium sized firms also engaged in linking and collaborative processes (Rothwell & Dodgson 1991) sharing resources and sometimes co-production (Bönte & Keilbach 2005). Some researchers argue that the boundaries of the firm are moving to increase corporate partnering, collaboration and an open innovation model (Chesbrough 2003; Lee, Park, Yoon & Park 2010; Laursen & Salter 2006). These more open relationships are also found with small and medium- sized firms (van de Vrande, de Jong, Vanhaverbecke, & de Rochemont, 2009).

The importance of innovation for the Australian economy and the importance of collaboration as an enabler and enhancer of innovation has recently become a current focus of concern, with the recognition that the Australian innovation system consistently underperforms on most measures of collaboration and networking (Australian Innovation Report 2010). In 2007-08 the number of innovating firms increased to 39%, where manufacturing was one of the top three innovating sectors

with 45.6% of those firms innovating, where 80% of innovation-active businesses had no collaborative arrangements in 2006-07 (Australian Innovation Report 2010: p1).

Business innovation acknowledged to be of crucial importance for innovation includes turning ideas into new products and processes, where the proportion of non-technological innovators in the manufacturing sector almost 32%.

It is not surprising that being innovative is generally considered to be one of the key drivers of organizational success (Schillewaert, Ahearne, Frambach, & Moenaert, 2005). New product and service development may require firms to cancel their innovative projects before they are launched in the market. About 15% of all new product development are cancelled before completion and some companies have to face with devastating consequences (Iacovoc & Dexter 2005).

SMEs are critical to almost every national and local economy. Not only do they directly provide a major component of manufactured output; they also are the essential seeds from which larger businesses grow (Duan & Kinman 2000). Although large and small businesses deal with many of the same issues, smaller enterprises also deal with unique size-related issues (Woodcock, Mosey & Wood 2000). In particular small to medium sized firms which have a limited resources are vulnerable in striving for innovation. Small to medium firms can overcome the resources limitation through a collective innovation, i.e. a collaborative process that generates, develops, prioritizes, and engages in for explorative or exploitative innovation (Benner & Tushman 2002). Based on the problems faced by SMEs attempting to sustain or increase their market share, strategic planning related to innovation issues need to be addressed. This study aims to examine the impact of innovation collaboration and the level of product innovation among small to medium enterprises (SMEs) and the level of abandonment of product innovation.

The paper is structured as follows. First we briefly examine notions of innovation and its relationship to collaboration and frame some research hypotheses. Secondly we analyse data collected through a large government survey of small and medium enterprises. Finally we discuss implications of these findings and outline future research directions.

It is broadly recognised that firms need to engage in innovative activities to participate in the global marketplace (Adams, Bessant & Phelps 2006). In the Australian context, around 2 million small and medium enterprises employ 42% of population and contribute 16% of gross domestic product (Australian Bureau Statistics, 2009). In 2006 small sized firms represented 99.4% of all enterprises in Australia (AIS report 2010). In 2007-08, more than one third of Australian businesses reported implementing some form of innovation (AIB 2009). The Australian government is concerned to encourage more effective dissemination of new technologies, processes and ideas to increase innovation across the economy, with a particular focus on small and medium-sized enterprises (AIS report 2010: p11).

This study defines innovation as the implementation of a new or significantly improved product (good or service) in business.

## **HYPOTHESIS DEVELOPMENT**

### **Collaboration for innovation**

The terms of “collaborative arrangement,” “cooperative arrangement,” “strategic alliances,” or “coalitions” are used interchangeably (Forrest 1990). Throughout this paper, we use the term “collaborative arrangement” or “collaboration” that focus on the product innovation. A number of studies indicated that collaboration is positively significantly related to level of product innovation among small to medium firms, but not to the larger firms (e.g. Hewitt-Dundas 2006; María & Lluís 2010). Small to medium firms often have to rely on the external resources or knowledge for product innovation. Small to medium firms employ collaboration as a mechanism to leverage market competitiveness and limitations for product innovation. As a result, we conclude that collaboration for product innovation may support small to medium firms’ capability to innovate. Our first hypothesis is:

*Hypothesis 1: Level of collaborative for product innovation will positively influence level of product innovation among small to medium firms.*

### **Innovation abandonment**

The development of new products and services is not a straightforward process. Firm's usually have some well defined processes for developing new products ranging from a stage-gate process with distinct decision making points (Cooper, Edgett & Kleischmidt 2003) to design based processes with prototyping and testing of concepts and prototypes (Thomke 2003) with combinations of existing products (Hargadon & Sutton 1997 ) before the launch of new products or services .

Recent studies have found that product innovation projects consistently *fail* at alarmingly high rates (Belassi, Kondra & Tukul 2007). Past studies indicated that the innovation abandonment was an innovation failure within a firm. Perhaps, this conclusion was legitimate. However, if firms decide to terminate their product innovation due to cost-effectiveness purpose, the termination could do well than harm to the firms. Anecdotally, firms start their multiple product innovation projects simultaneously. Sometimes the market shifts dramatically, and firms decide to terminate a current project due to the environmental uncertainty. Then, firms can allocate their resources to a new project rather than risking further commitment to the current product innovation project and perhaps face the failure to launch the product successfully in the market. As a result, innovation abandonment could be caused by management failure, technology failure, learning from market testing or environment uncertainty.

However, innovation abandonment may not always be associated with firms' innovation performance. Early termination of a new product development could allow firms to reallocate their resources to another new product innovation project. As a result, we argue that the innovation abandonment could positively influence the future new product introduction. Using stage- gate or design based development processes allows firms to develop, test and shape multiple possible products or services, potentially abandoning projects that are developed out of kilter with existing markets (Thomke 1998). Firms engaged in product or service innovation usually engage in a number of processes to test out their ideas before settling on a small number of product or service offerings. Research on sme's has

shown that a lot of experimentation can be found as firms work with existing and new customers and stakeholders (Thomke 1998).

*Hypothesis 2: A level of past abandonment of product innovation will positively associate with future new product introduction among small to medium firms.*

### **Collaboration can alleviate the effect between the past innovation abandonment and future innovation introduction**

Firms also learn by interacting, with diverse stakeholders, through their consultation with suppliers, customers, consultants and through deep knowledge of products and markets (Jensen, Johnson, Lorenz & Lundvall 2007; Matthews & Becker 2009). Their external collaboration provides a rich source of information about competitors as well as customers and shapes the potential for future projects and opportunities. Some research indicates that firms who benefit from external collaboration often have well functioning internal collaboration and integration of knowledge and information which processes the additional information to create value (Miles, Miles & Snow 2005).

A positive experience of product innovations will have knock-on effects to future innovations. Many innovation researchers (Damanpour 1991; Frambach & Schillewaert 2002; Lehman, Greener & Simpson 2002) have identified positive beliefs as a facilitator of repeat product innovation. Some firms experience the innovation abandonment (negative experience); they may delay to adopt a future product innovation project. We propose that external collaboration can alleviate the negative experience of innovation abandonment and level of innovation among firms. That is, external collaboration would influence firms that demonstrate a high level of innovation abandonment introducing more product innovation projects than firms (with abandonment experience) without external collaboration.

*Hypothesis 3: There will be a significant three way interaction among innovation abandonment, collaboration and level of introduce product innovation.*

## RESEARCH DESIGN AND METHODS

### Sampling

We analysed data from the most recent Business Longitudinal Survey (BLS) 2009 which was undertaken by the Australian Bureau of Statistics (ABS) during 2005-2007. Data were collected using self-administrated, structured questionnaires predominantly using closed questions. The sampling frame was all businesses on the business register employing less than 200 employees, excluding primary industries other than mining, government enterprises, utilities and public services. The BLS survey achieved a high response rate (>90%) which is much higher than in the academic research. The BLS data contains 2,732 small to medium sized enterprises (SMEs). This paper focuses on the manufacturing SMEs which represent 16.43% (449 firms) of all firms contained in the BLS data and we selected the questions which were related to innovation for our examination. The BLS included most of these additional innovation related questions for the first time in its survey in 2007, thus cross-sectional analysis is employed.

### MEASURES

The measures used in this study are categorical data (i.e. yes/no) and they are distribution free and robust. Thus, we employed nonparametric statistical techniques to examine the hypotheses (Hair, Anderson, Tatham, & W.C., 1998). Specifically we examined data from questions on new product introduction, innovation abandonment and external collaboration.

*New product introduction.* This question examines if firms introduce a new product or service in 2006-2007.

*Innovation abandonment.* This question investigates whether firms had abandoned the introduced new product/service in the 2005-2006.

*External collaboration for innovation.* This question is asked to determine the firms' collaborative activity in relation to innovation during 2006-2007. This question is an aggregated measure which includes multiple forms of collaboration with clients, customers, and suppliers.

## RESULTS

A person chi-square test was conducted to assess whether firms' new product introduction associating with the external collaboration (H1). The results of the test were significant,  $\chi^2(1)=5.57$ ,  $p<.05$ . This seems to represent the fact that based on the odds ratio, firms with external collaboration were 3.1 times more likely to introduce a new product than firms that did not have an external collaboration.

Further, the person chi-square test was employed to assess a level of past abandonment of product innovation and the future new product introduction (H2). The results of the test were significant,  $\chi^2(1)=5.07$ ,  $p<.05$ . This seems to represent the fact that based on the odds ratio, firms with innovation abandonment experience were 2.44 times more likely to introduce new products than firms that did not have the abandonment experience.

The third analysis aimed to examine Hypotheses 3, the relationship among past innovation abandonment the new product introduction and the role of business collaboration. Loglinear analysis was employed to examine the three-way interaction due to the nature of categorical data (Field, 2005). The three-way loglinear analysis produced a final model that retained all effects. The likelihood ratio of this model was  $\chi^2(0) = 0$ , ns. This indicated that the highest order interaction (abandonment x external collaboration for innovation x new product introduction) was significant,  $\chi^2(1) = 3.93$ ,  $p<.05$ . The odds ratio indicated that collaborative firms were 4.30 times more likely to introduce new products even if they had previously experienced abandonment of a product innovation. However, non collaborative firms were only 0.58 times more likely to introduce the new product/service when they experienced the abandonment.

## DISCUSSION AND CONCLUSION

This study examined the role of external collaborators and product innovation among manufacturing SMEs in Australia. Additionally, this study also looked at the relationship between past abandonment of innovation and future product innovation. Our findings confirmed the positive relationship between (a) external collaborators and product innovation and (b) past abandonment and product innovation. We found that firms that sought ideas or solutions from an external network such as



suppliers, or business partners reported higher levels of new product introduction than firms that did not have any external collaboration. The importance of collaboration for depth and breadth of a firm's innovation confirms existing research regarding such benefits (de Faria, Lima & Santos 2010; van de Vrande, de Jong, Vanhaverbecke & de Rochemont, 2009).

Further, firms with past abandonment experiences reported higher levels of new product introduction than firms that did not have such experience. Additionally, the findings indicated that firms with external collaboration were more likely to introduce new products even if they had previously experienced abandonment of a product innovation, than firms without external collaboration. The importance of collaboration with the abandonment of new products recently introduced could be interpreted as a sign of the firm's ability to monitor the performance of new goods into the market and resist the undue escalation of unwarranted commitment that often follows bringing new products to the market. This abandonment may also indicate that such innovative firms may continually launch new products and services and abandoning products maybe a consequence of more recent variations or product improvements. Abandoning or "killing" existing products can be a sign of market knowledge and technological advancement and efficient and effective processes for new product and service development and experimentation.

Furthermore the ability of SMEs to benefit from both collaboration and the abandonment of some effective new product and service design and development and implementation processes shapes their capabilities for ongoing performance.

There are some limitations of this study. With small numbers in each category of collaboration it was necessary to aggregate all forms of collaboration under one. To some extent this has limited the identification of particular forms of collaboration, but these initial findings of positive results for the effect of collaboration indicates that further more detailed surveys of firms can target forms of collaboration in more detail.

The availability of the panel study with categorical data may have shaped some of the research possibilities of relationships between variables and has provided good quality data from large number of firms across many industries and the potential for further research possibilities in future.

Nonetheless, the findings from this study are significant for three reasons. Theoretically it provides support for the notion that innovative firms manage their innovation through managing knowledge and information flows as sources of innovation and market knowledge, which together may be components of broader dynamic capabilities of the firms.

The research is also important for practitioners. The findings suggest that outsiders can play a key role in influencing decisions about innovation projects and provide avenues for development. They collaborations may be closer to a more open approach to firm level innovation than was previously discussed.

Our results have implications for policy makers. The benefits of collaboration for firms in the value chain and with customers and distributors has been well established, and previously identified in research on large firms. Increases in the engagement of firms in more open models of innovation with collaboration with multiple partners provides rich sources of information and market access for small and medium as well as large enterprises.

Innovation in small and medium size manufacturing firms will continue to be an important area of research. Further investigation is planned to examine potential relationships between innovative firms and export activity, and patterns of change over time. The rich sources of data collected by government agencies and the potential for comparative research can be developed for further cross-sectional and longitudinal studies of collaboration and innovation in manufacturing SMEs.

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