

OPEN INNOVATION WITHIN LOUGHVIEW TIMBER: HOW KNOWLEDGE TRANSFER IS OPENING DOORS TO NEW MARKETS

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Open Innovation (OI) presents an opportunity for small to medium enterprises (SMEs) to gain a competitive advantage over their peers in their respective markets. This study aims to determine the effectiveness of adopting an open innovation model in the context of SMEs. In doing so, Loughview Timber; a small manufacturer and supplier of timber external door sets, fire rated doors, staircases, windows, based outside of Gilford in Northern Ireland, is used as a case study. They have partnered with the University of Limerick in a knowledge transfer project on product development, using open innovation as a vehicle. Using existing processes and procedures as a base, the study aims to analyse the need for open innovation within Loughview Timber; thus, analysing the effect open innovation would have on the organisation whilst providing recommendations for the company's innovation practices. Based on a review of existing literature, a questionnaire and subsequent review of Loughview Timber's internal documents and market reports, findings emerge. It is recommended that Loughview Timber continue to exploit the benefits of knowledge transfer available, in this case, in the form of InterTradeIreland's FUSION programme, while also looking for further opportunities to partner with other third level educational institutions. Further research is required across a wider range of SMEs to more accurately determine the effectiveness of open innovation on supporting SME's product development activities.

Keywords: industry, FUSION Programme, InterTradeIreland, Open Innovation

INTRODUCTION

Open innovation (OI) involves leveraging residual expertise from outside the organisation to support and improve the process of internal innovation, increasing organisational competitiveness (Chesbrough and Crowther 2006a). 78% of large US and European firms have adopted some form of OI, and of this 82% have stated that they were practising OI more intensely at that time than the three years' prior (Chesbrough and Brunswicker 2015). Although OI is prominent in large organisations, in Northern Ireland (NI), small to medium sized enterprises (SMEs) account for 75% of employment and 80% of these SMEs stated their intentions for future growth, highlighting the importance of innovation for these companies

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(Federation of Small Businesses 2015). Traditionally SMEs adopt an inside-out approach to OI, by supplying excess knowledge, ideas and resources to larger organisations, in return for some form of payment. However, recent trends show growing numbers of SMEs adopting different forms of outside-in OI to support growth and competitiveness (Van de Vrande *et al.*, 2009). Despite this trend, there is still limited research into the effects and challenges of adopting OI in SMEs, with existing research in this area focusing on high-tech industries (Spithoven *et al.*, 2012). Based on this, the aim of this paper is to investigate the effects of OI on SMEs, with a particular focus on manufacturing, to judge the impact of outside-in OI on a small firm's innovation process. In doing so, a case study subject is identified; Loughview Timber Ltd. Based in Banbridge, Northern Ireland; a privately-owned SME, employing 28 people. Loughview produces a range of specialised products including staircases, windows and pre-hung fire door-sets. These pre-hung fire door-sets provide Loughview with a distinct market advantage and unique selling point, due to the benefits they provide to industry.

To tackle pending legislation and to capture market share in line with the company's growth strategy, Loughview has adopted an OI model to accelerate the process of innovation and develop a range of fully certified fire door-sets. After an internal analysis, Loughview discovered skills, financial and knowledge gaps. To address these gaps, Loughview partnered with the University of Limerick under the InterTradeIreland, FUSION programme. This programme linked Loughview with an academic knowledge base and subsequently, a graduate, filling the skills and finance gaps in the organisation. The aim of this partnership is to address five key objectives within the company, all of which are included in the discussion.

Subsequent to this, the project will critically analyse OI within traditional industries such as manufacturing and passive fire safety; thus, acting as an academic resource for SMEs operating in these industries which may consider the implementation of an OI. This is an area of research yet to be fully explored; therefore, this project will aim to partially fill this research gap. Secondly, the project will aid Loughview in the implementation of OI. This will support increased levels of innovation across the organisation, which should positively impact organisational competitiveness (Kumar *et al.*, 2013). Finally, this project will support the development and production of high quality and fully third-party certified door-sets.

Moving from Closed to Open Innovation

Historically, organisations adopted a form of 'closed innovation', creating new products or services, from ideation and development to marketing and sales, using only the resources available internally (Bae and Chang 2012). The concept of closed innovation is centred on the idea that innovation requires the highest levels of control within the organisation and is derived from a reliance on internal staff members for innovation activities (Alawamleh *et al.*, 2018). In closed innovation, organisations heavily invest in research and development and hire whom they believe to be the smartest people, to develop new products at a rate which allows them to reach the market before their competitors (Mayle 2006). Despite the early popularity of closed innovation, with the advent of new technologies and the increasing mobility of the 'knowledge worker', the closed innovation model began to erode as firms struggled for control of their intellectual property and internal knowledge (Mayle 2006; Bogers *et al.*, 2018). These difficulties led to organisations realising that 'not all the smart people work for us' (Chesbrough 2003a); thus, leading to a paradigm shift for

innovation towards a more open model; Open Innovation (Chesbrough 2012). Open innovation is often described as the process of altering something already established, to make a significant positive change (Berkun 2010). More specifically, innovation is a tool used to exploit change as an opportunity, aiming to support the development of new and improved products and services (Drucker 2014). Additionally, innovation is the process of ongoing learning, resulting not only in new products and services, but also new organisational structures, techniques and markets (Lundvall 1995). Although the history of OI is often disputed, with sources claiming it has roots ranging from Xerox's Palo Alto Research Centre (Chesbrough *et al.*, 2006) to the music creation process of The Grateful Dead (Diasio 2018), there is limited dispute over the founder of the theory, Henry Chesbrough. Open innovation was first investigated by Chesbrough (2003a; 2003b; 2003c) over 15 years ago, and research has since developed and expanded into countless areas and disciplines (Randhawa *et al.*, 2016; Dahlander and Gann 2010).

Chesbrough (2006) defines open innovation as the purposeful use of outflows and inflows of knowledge to accelerate the process of internal innovation and expand the markets for the external use of innovation. Therefore, OI is based on leveraging external knowledge and expertise, to assist internal innovation activities (Chesbrough and Crowther 2006). Key to this is that OI allows for the mutual and equal exploitation of benefits for both parties involved, either through the exchange of resources or knowledge. Central to Chesbrough's definitions is that OI is an approach supported by the organisations business model (Gobble 2016) and a set of tools and processes created to facilitate relationships (Slowinski and Sagal 2003). In recent years, the OI model has been steadily increasing in popularity. A recent study of large firms across the US and Europe (more than 1000 employees) found that 78% of companies reported practising some form of OI, and of these, 82% stated that they were practising it more intensely than the previous three years (Chesbrough and Brunswicker 2015). Despite this, research suggests that many SMEs do not adopt OI, choosing instead to conduct R&D internally. This is likely due to the challenges associated with OI and its implementation (Kang 2012; Jeon and Degraevl 2019). These results, along with the limited existing research in the area, has led to calls to further explore the implications of OI for SMEs and their ability to overcome the associated challenges (Gassmann *et al.*, 2010).

In the context of the construction sector, as a more traditional industry, often needs assistance in this area (Spithoven *et al.*, 2010). However, as Pöyhönen *et al.* (2016) argue, the adoption of innovation in the construction sector and in particular, management systems to support its development, is lacking. Steninger (2014) concludes that the leading barriers for the adoption of OI in the construction sector is averse to change due to culture, strategy and perceived risk of losing proprietary knowledge, jeopardising quality and safety, and intellectual property, among others. In the construction section, Steninger (2014) outlines the benefits of overcoming these barriers and adopting OI includes integrating external key competencies for problem solving, opening a company to culture of innovation and 'thinking outside the box', building long-term relations with external strategic stakeholders and advisors, providing motivation and incentivisation for adopting new and unique approaches to addressing inherent problems, and also revisiting traditional norms in favour of more strategic and innovative approaches to undertaking more traditional practices, while minimising risk and extrinsic market shocks.

Research Design

The focus of this paper is to ascertain the viability of OI within manufacturing SMEs with Loughview being identified as the case study. To address research bias, a two-stage process was used in the identification of the case study. Firstly, the case study had to be an SME, and secondly, they had to be open to discussing and subsequently engaging in the adoption of OI within their organisation. Furthermore, the interviewees were selected from a pool of potential candidates, not just from within the company, but those who are external to, but are aware of the company's practices. To complement this, a desk-based research is being used as a secondary data collection method. Additionally, it will act as a support mechanism for primary data collection by validating samples, ensuring they are representative. To provide relevant background information and validating materials, four areas were chosen;

Firstly, academic literature relating to OI, as this provides a general overview of OI and its development as a business model approach. Secondly, previous studies and research are reviewed to ensure there was no overlap in research, allowing this research to build on previous work in the field. Thirdly, company documents, such as Business Plan, Minutes of Meetings, etc. are reviewed, to provide an in-depth analysis of Loughview, allowing for a review of existing organisational resources, which supported the development of recommendations relating to the introduction of OI. Fourthly, secondary business data in the form of market reports and analysis are reviewed, to support the creation of short, medium and long-term innovation plans for the organisation, by highlighting industry trends.

To complement this, six semi-structured interviews are conducted. As this is an exploratory research project, semi-structured interviews were used. With this interview type, several key questions are addressed; however, their order and use may vary between interviews, depending on the flow of the conversation (Saunders, *et al.*, 2016). The interview respondents were chosen from across the OI project, to provide a broad scope of experience and knowledge relating to both sides of the OI process (DeJonckheere and Vaughn 2019). The interviewees included; Loughview Timber' Managing Director (#1), University of Limerick Academic (#2), InterTradeIreland FUSION Consultant (#3), and Loughview Timbers Management Consultant (#4). To limit the potential for positive bias from those involved in the OI project, two employees from Loughview with no involvement were also chosen as respondents; the Business Development Manager (#5) and Estimator (#6).

Face to face interviews were chosen, as respondents are grouped closely together geographically, as well as facilitating effective communication, allowing for both verbal and non-verbal communication between the interviewer and interviewee (Daft and Lengel 1986). During the interview, respondents were asked open-ended questions, which followed no particular order. Interviews were conducted in the order of availability of respondents. After all interviews had been completed, the qualitative data was reviewed and collated, trends highlighted and compared to secondary data sources, to draw appropriate and accurate conclusions and recommendations.

RESULTS

Taking a thematic analysis approach, themes and patterns that occur across the qualitative data set and is related to the research question are identify (Saunders *et al.*, 2016). This offers a systematic and flexible approach to analysing large sets of qualitative data in a logical way (Braun and Clark 2006). As this research project has

taken a deductive approach, the research question has been firmly established in existing work and a thematic analysis will allow a focus on particular parts of the data which are applicable to research, rather than take an indiscriminate approach to analysing the data set (Saunders *et al.*, 2016). The results are structured around response themes from interviewees.

The opening question to all interviewees focused on their previous knowledge of OI. In all cases, participants had some previous knowledge of OI models, with respondents two (#s 3 and 4) having detailed knowledge of the subject. One of those respondents noted that much of their work resonates around OI by holding “companies, to ‘look outside the box’, when considering and implementing new ways of working and solving problems”. To further explore the respondent’s exposure to OI, an additional question was posed to determine how many OI structures they had previously partaken in. Of the respondents, four declared participating in between two and four previous structures, with two respondents claiming to have participated in more than fifteen previous OI models (#s 2 and 3). However, of the fifteen, these respondents noted that the majority were through similar projects to that of the InterTradeIreland FUSION programme. As a follow up question, interview participants were asked how many of the OI models took place in manufacturing SMEs. Excluding Loughview, only two respondents claimed to have participated OI structures within manufacturing SMEs. As all respondents had experience and knowledge of OI models, they were then asked about their views on the difficulties associated with implementing an OI model. Although several difficulties were highlighted, including three participants noting cultural change issues and participant one discussing a lack of resources, all participants except respondent #5 noted ‘management buy-in’ as a major difficulty. Participant #2 stated that “getting management level buy-in to considering developing and implementing a new approach outside of what would be the normal” was the greatest difficulty. When asked how this should be managed, key responses included the need to “clearly present the benefits of OI and manage expectations” along with “gaining early ‘wins’ and having constant channels of communication”.

Moving on, the focus on the ongoing difficulties associated with managing OI and the benefits of OI for all parties involved was discussed, where two key themes emerged. Firstly, all respondents noted that the major benefit of utilising an OI model was the limited amount of resources required for innovation to occur. Whilst some respondents focused on the financial resource efficiency of the process, the majority focused on the human resource and time efficiency elements of OI models. Secondly, five of the six respondents discussed the benefits of OI based on an ‘outside-in’ process, focusing on the leveraging of external resources rather than allowing excess internal resources to be used externally. Also, despite the phrasing of the question asking participants to focus on the benefits for ‘all parties involved’, only respondent #2 provided a clear example of the benefits for the second party stating, “For the university, it demonstrates the applicability of research in industry, with tangible results”. Regarding the difficulties associated with OI management, three respondents discussed the difficulty associated with managing the process and the potential for culture clashes between partnering organisations. However, the management of Intellectual Property (IP) was the biggest concern among respondents, with five of the six noting this as an ongoing difficulty.

Although all respondents noted difficulties associated with both implementing and managing an OI model, when asked about its effectiveness in supporting the

achievement of organisational goals, all participants agreed that OI was an effective model for innovation with one respondent stating “All projects (I have) completed to-date exceeded expectations and resulted in significant returns on the investment of time and money included in the project” and another noting that “if the big guys like Google and Samsung are using this effectively, why shouldn’t we?”. Finally, all respondents were asked to reflect on the previous OI models they participated in and consider how effective a CI model would have been in those cases. Respondents one and six noted that in their cases, CI would have been inefficient due to the limited available resources. However, the remaining candidates stated that in certain situations it may be more effective to utilise a CI system. One participant noted “CI may have a place in industry, particularly those where IP/user rights are an issue. It really depends on the topic and in the innovative aspects being considered.” Despite this, all participants agreed that OI was the most effective model to use at Loughview.

Excluding the academic literature discussed, desk-based research focused on internal company documents and market reports. From these, several key results emerged. Firstly, Loughview has experienced steady growth in recent years with support from their strategic plan. The company growth follows the general trend of the passive fire safety market, which grew by 23% between 2013 and 2015, driven largely by increased construction activity (AMA Research 2018). However, with Brexit and the increasing potential for a recession, particularly in light of COVID-19, growth forecasts are subdued for both the overall market and Loughview. Secondly, Loughview’s growth is being slowed due to a lack of available labour. Due to their remote location and skills requirements, Loughview has struggled to find the staff to support an increasing client sheet and are now turning towards technology to facilitate increased productivity. To address this, Loughview have begun to segment the production process to reduce the complexity of tasks, making the positions more accessible to a wider group of people. Thirdly, despite a positive cash-flow and a healthy balance sheet, Loughview relies on funding from organisations such as Invest NI, to support some employment. Although cash reserves are available and the business has a positive profit outlook, there are limited reserves to support innovation activities in the business.

DISCUSSION

The first two objectives looked at critically evaluating OI, where the results of the research suggest that OI is an effective tool for innovation activities. SMEs have limited internal resources to support R&D activities internally, a point reiterated by two interviewees; however, the use of OI allows those SMEs to leverage external resources in an efficient manner providing a competitive advantage (Brunswick and Ehrenmann 2013). With the introduction of government schemes which aim to encourage the adoption of OI, such as InterTradeIreland’s FUSION programme, OI will become more accessible for SMEs as these programmes mitigate the difficulties associated with OI and provide funding and frameworks to support it. With that, we then considered examples where OI was applied within manufacturing businesses and SMEs. With 78% of large firms reported practising OI and many with increasing intensity (Chesbrough and Brunswick 2015), OI is placed to become more widespread, with support from leading universities, in its development and execution. As per the response from interview respondent three, SMEs could also achieve innovation success with OI if it is managed correctly. However, research in this area is limited, specifically for organisations with a primary focus on manufacturing;

therefore, a wider study is required across several organisations to determine OI's true effectiveness for manufacturing SMEs.

The third objective required an analysis of Loughview to ascertain if the levels of knowledge and resources within the company allowed for the use of closed innovation during this project. As discussed by several respondents and supported by previous literature, closed innovation can be an effective innovation tool in certain scenarios (Chesbrough and Euchner 2011). However, this innovation model relies heavily on the resources readily available to an organisation (Alawamleh *et al.*, 2018), and, as noted 'not all the smart people work for us' (Chesbrough 2003a); a sentiment echoed by the case study company, where they state that their specialism is in joinery and not innovation. Additionally, Bae and Chang (2012) state that organisations using a closed innovation model only use the resources available to them internally.

Therefore, for closed innovation to be effective, organisations must have excess internal resources that can be leveraged for innovation purposes. However, after an internal analysis of Loughview, the results indicate that the firm had neither the knowledge, manpower nor finances to utilise closed innovation. Although the company has 28 staff and the finances to support recruitment, their remote location and the current job market has mitigated their ability to do so. Of those that are currently employed by Loughview, 22 work in skilled jobs which require training or education that is not suitable to the innovation activities required for this project; thus, limiting the available knowledge. Additionally, of those staff with appropriate training and education, all are currently working at capacity, leaving limited time to engage in internal innovation activities.

The fourth objective aims to analyse the effectiveness of introducing an OI model into Loughview for new product development. OI has been proven as effective at supporting innovation; however, as the literature and research data suggests, it can be both difficult to implement and manage. As stated by interview respondents, a key issue with the adoption of OI is gaining management buy-in. However, in the case of Loughview, senior management both developed and implemented this OI project; thus, nullifying this issue. An additional issue addressed by respondents was the potential for culture change issues. This presents a correlation between the data and existing research, but also the views of the interviewees, in which culture is seen as important for innovation activities (McAdams *et al.*, 2004) and a barrier to adopting a more open model of innovation (Mortara *et al.*, 2010). Although no issues have arisen within Loughview, management must be prepared to adopt a 'change management tool' if necessary. Regarding the ongoing management of an OI model, respondents noted the management of IP as an issue. However, Loughview can be seen to have mitigated this risk by adopting the use of a contract in their partnership with InterTradeIreland and the University of Limerick. Additionally, in the format adopted by InterTradeIreland, the graduate tasked with leading the project is labelled as the 'agent of technology transfer' and is tasked with controlling the flow of information between the company and academic institution. Overall, interview respondents believed OI to be effective for developing new products and is seen as preferable over the alternative. However, there were challenges in its introduction; namely, getting full buy-in from all internal stakeholders, and also acquiring the necessary knowledge.

CONCLUSION

Research and existing literature have supported the theory that OI is the most effective model for new product development within Loughview. The OI model provides

access to external resources including financial, human and knowledge, which are not readily available to Loughview internally, allowing effective leveraging of these to support innovation activities that would otherwise be unattainable. Despite its benefits, OI comes with several costs. Gaining the support of management can cause difficulties during the implementation process, and the potential for culture clashes and the issues associated with changing internal culture can further build on these problems. Despite Loughview's ability to navigate these initial issues, further problems can be expected throughout the innovation process. Although, Loughview has developed measures to counteract issues such as IP rights, flight of knowledge, a loss of internal focus and difficulties with the OI partnership, could lead to future problems. If Loughview continues to effectively manage the model of OI, it will continue to support the development of new products, providing competitive advantage. Contradictory findings on the effect of OI; however, warrant calls for further wider-reaching and in-depth studies into the effects of OI on SMEs.

From the results, recommendations for short, medium- and long-term objectives for the case study emerge. In the short-term, Loughview should continue to use the resources and support provided by InterTradeIreland and the University of Limerick, through the FUSION programme, to support their on-going product innovation. In the medium-term, Loughview should consider further government and academic supported programmes, to complement and develop further innovative products and services. In the long-term, Loughview should continue to leverage external resources, particularly within their supply chain. With the possible increase in available resources internally through efficiency creation, Loughview should develop a plan focusing on the creation of an R&D lab and test facilities. This would support further OI activities and innovation, potentially providing an additional revenue source, should Loughview decide to participate in 'inside-out' innovation activities, allowing these internal resources and test facilities to be used externally. There are also limitations. Given that this is an exploratory study considering the viewpoints of various actors within a specific company in Northern Ireland, the results are not generalisable either across geographic regions or the construction sector as a whole. This therefore then drives the further research agenda, where a more widespread investigation is warranted, getting the viewpoints of various organisations beyond that of the joinery sector. In concluding, this paper, using Loughview Timber Limited as a case study, demonstrates the use of, and benefits of applying OI and knowledge transfer, in this instance, using the InterTradeIreland FUSION Programme as the vehicle, with the University of Limerick as the knowledge base. This therefore demonstrates to other SME's within the manufacturing sector, to consider knowledge transfer as an introduction to, or to proceed with, further research and development.

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