

<b>Institution:</b> Durham University		
<b>Unit of Assessment:</b> 17 Business and Management Studies		
<b>Title of case study:</b> The Implementation of Stakeholder-Driven Supply Chain Integration		
<b>Period when the underpinning research was undertaken:</b> Between 2004 and 2020		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Prof Christos Tsinopoulos	Professor	2004 - present
Prof Nick Ellis	Professor	2011 - present
<b>Period when the claimed impact occurred:</b> Between August 2013 and December 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<p><b>1. Summary of the impact</b></p> <p>Durham University's research in marketing and management has enhanced supply chain management (SCM) by several UK firms. The impact on these particular firms is important as they comprise a variety of actors including larger firms and SMEs in the manufacturing sector; and thus the benefits they accrue will have further impact on suppliers and customers in their respective supply chains. The impact involves facilitating significant changes in practice to: (i) radically improve processes of analysing the marketplace and customer relationships; (ii) develop new work practices for managing these relationships, reflecting an improved marketing orientation; (iii) improve manufacturing firms' effectiveness in providing customer value; and (iv) develop and implement more responsive operational processes. As a result of the research, organisations have been able to more systematically engage with their supply chain partners and hence improve their performance. The impact has spread from original studies of manufacturing excellence across several organisations to funded projects including a Knowledge Transfer Partnership (KTP) and an ESRC impact acceleration award, thereby combining what was initially a broad level of engagement with more highly focused outcomes. Specific improvements include: better generation of ideas for new product development (NPD); greater effectiveness of shared processes across the supply chain; identifying and mobilising partners to contribute value to customer solutions; and the development of a data classification policy which facilitates different supply chain configurations. The impact resulted in significant performance improvements, e.g. for one company, PSP Architectural, turnover increased by approximately 28% and staff headcount by 50% over 2 years.</p>		
<p><b>2. Underpinning research</b></p> <p>The research that underpins this case study falls into the closely linked areas of supply chain integration and business-to-business (B2B) marketing. The former refers to the degree to which a manufacturer strategically collaborates with its supply chain partners and jointly manages intra- and inter-organization processes; the latter refers to the management of market-based relationships between organizations, including buying and selling. The research explores how integrating such processes for developing new offerings and planning production can improve organisational performance.</p> <p>During the current REF period, Ellis and Tsinopoulos led a programme of engagement activities which generated impact, through improved business performance, and new research, through the generation of data and business driven research questions. Both the impact and the research focus on the customer and supplier sides of integration, and on the balancing of a strong internal focus (e.g. on manufacturing processes – R1, R2) with external awareness (e.g. the wider industrial network in which inter-firm relations are embedded - R4). The research which underpins the impact falls under three streams.</p> <p>In the <b>first stream</b>, the research has compared the integration practices of lead users (customers with specific needs and innovative skills) with those of suppliers. Findings indicate that integration</p>		

with the former is superior to the latter (e.g. R1 & R3) and has therefore guided choices on the direction of integration. The **second stream** has examined the underlying dimensions of supply chain integration. It has argued that different combinations of product newness and process structure will determine how a manufacturing organisation will benefit from integrating with customers and suppliers (R2 & R6). These two streams are novel due to their combination of the study of supply chain integration practices with those internal to the firm. This has facilitated the explanation of influences on, and barriers to, integration in greater depth than hitherto, including the significance of product newness. Finally, the **third stream** has explored how marketing and purchasing managers in different B2B contexts socially construct boundaries as well as notions of value; and the implications of these constructions for the management of inter-firm relations (R4 & R5). This stream is novel as such relationships have largely been studied from a quantitative perspective rather than this more nuanced interpretive approach.

The specific research findings that have led to impact are as follows:

- Integration of NPD and production processes between suppliers and customers is multidimensional (R3, R6).
- The integration of procedures and decision making for NPD and processes that can add value will depend on (i) the newness and familiarity of the products and processes (R6); and (ii) the type of process structure used by the focal organisation (R1, R2 & R6).
- Managers' inter-personal behaviours can help the development of inter-organizational relationships (R4).
- The efforts of more peripheral actors beyond the core buyer-supplier relationship can result in network value creation (R5).
- Firms should seek to balance external and internal perspectives when developing supply chain strategy (R4 & R5).

### 3. References to the research

#### Publications:

1. McCarthy, IP, **Tsinopoulos, C**, Allen, P & Rose-Anderssen, C (2006) New Product Development as a Complex Adaptive System of Decisions. *Journal of Product Innovation Management* 23(5): 437-456. DOI: 10.1111/j.1540-5885.2006.00215.x
2. **Tsinopoulos, C** & Bell K (2010) Supply chain integration systems by small engineering to order companies: the challenge of implementation. *Journal of Manufacturing Technology Management* 21(1): 50-62. DOI: 10.1108/17410381011011489
3. Al-Zu'bi, Z & **Tsinopoulos, C** (2012) Suppliers vs Lead Users: Examining Their Relative Impact on Product Variety. *Journal of Product Innovation Management* (29)4: 667-680. DOI: 10.1111/j.1540-5885.2012.00932.x
4. Schepis, D, Purchase, S & **Ellis N** (2014) Network Position and Identity: A Language-Based Perspective on Strategizing, *Industrial Marketing Management*, 43: 582-591. DOI: 10.1016/j.indmarman.2014.02.009
5. Rod, M, Lindsay, V & **Ellis, N** (2014) Managerial Perceptions of Service-infused IORs in China & India: A Discursive View of Value Co-creation, *Industrial Marketing Management*, 43: 603-612. DOI: 10.1016/j.indmarman.2014.02.007
6. **Tsinopoulos, C** & Mena, C (2015) Supply chain integration configurations: Process structure and product newness. *International Journal of Operations and Production Management* (35)10: 1437-1459 DOI: 10.1108/IJOPM-08-2013-0369

The University's REF review process has confirmed that all the above publications are rated as at least 2\* level in quality: internal reviews scored the publications as 2\* (R2), 3\* (R4,5 & 6) and 4\* (R1 and 3). All six are published in internationally recognised peer-reviewed journals.

#### Supporting Grants:

1. A KTP from Autumn 2013 to Autumn 2015 was awarded to Profs Ellis and Tsinopoulos, addressing marketing orientation and supply chain management with PSP Architectural Ltd worth GBP131,855 co-funded by the ESRC and the TSB, and the participating company. The

partnership was evaluated on completion as 'Very Good' and the Associate was nominated for the 'Business Leader of the Future' KTP Award.

2. A project co-funded by the ESRC's Impact Acceleration Account (IAA) and PWS Distributors was awarded to Prof Tsinopoulos: 'Develop and implement a strategy of proactive information provision and data analysis, across the distribution and manufacturing business, to facilitate business growth'. The project's value was over GBP45,000 (including GBP34,659 of external funding), and it ran from August 2016 to May 2018.

#### 4. Details of the impact

Overall, the impact consists of improvements in the performance of several UK manufacturers through more effective management of supply chain relationships for understanding customer needs, developing new products and improving decision making. Reach and significance of the impact was achieved by engaging with two groups of companies. The first (project 1), includes a high number of manufacturers that received detailed research-led guidance on improving their supply chain integration practices. It includes the manufacturers that participated in the Institute of Mechanical Engineers' (IMechE) Manufacturing Excellence ('MX') awards (project 1). The second (projects 2 and 3) includes two organisations with whom the research team engaged closely to significantly improve the processes used to manage their supply chain relationships (PWS Distributors (2018 GBP63million turnover) – see E3 & E9; and PSP Architectural (2018 GBP9million turnover & 100 staff)) (E8).

##### Project 1 - Reach: MX Benchmarking project

The 'MX' award scheme has served as the basis for increasing the reach of the impact by guiding the change of processes and thus improving the business performance of about twenty UK manufacturers per year (E1). MX's aims have been to: i) recognise the best manufacturing practices in the UK; and, ii) improve participants' business performance by providing detailed world leading and research-led recommendations for process improvement. Prof. Tsinopoulos has been a key member of the award design team (2000-11) and then member of the executive committee (2011-16) of the awards. He was in charge for the provision of feedback (benchmarking) to the participating organisations up to 2016.

This has been an iterative engagement during which: i) Tsinopoulos has used the data submitted by organisations to generate research (R6); and ii) the participating organisations used the feedback to improve how they manage their processes. It is here that we have seen '*the positive impact which this programme has had on the UK manufacturing companies who have participated*' (E1).

The feedback (benchmarking) reports, that all manufacturers received, built on the Durham team's research and explained what they each needed to do to improve their supply chain relationships so as to enhance their business performance (i.e. R3 & R6). For instance, when a manufacturer reported weak integration practices, the report would provide detailed guidance on how to improve them, e.g. by classifying suppliers so as to streamline information sharing and improve decision making (R6). Such guidance was based on the second stream of work. Similarly, when a manufacturer reported weaknesses in the generation of ideas, for NPD, the report would provide detailed guidance on how to engage with suppliers and/or lead users to develop product solutions which are technically feasible and marketable. Such guidance was based on the first stream of work.

Manufacturers have used this research-led guidance to improve the integration with their suppliers on the most appropriate dimensions (E1). For example, ZF Lemforder Ltd (2018 turnover: USD296million (12-2018, E2)), who improved their competitiveness by achieving '*standardisation between our assembly lines, departments and processes*', both internally and externally (E4). These improved practices *have had 'a direct influence on our quality, cost and delivery'* (E4). Since 2017, ZF have worked with a key customer organisation to '*design the assembly for ease of manufacturer and reduce the risk of mis-builds*' (E4). Similarly, AGFA Graphics, who participated multiple times, (2018 turnover: USD89million (12-2018, E2)) have provided clear indications of where the feedback has been used to reduce '*cost and quality risks*' from holding '*excess material*' between sites (E5). This includes the development of process improvements across the supply chain which led to the survival of a plant: '*without MX participation, the Leeds factory would probably have been closed down*' (E5).

### **Project 2 - Significance: KTP with PSP Architectural on the development of closer integration with customers and suppliers**

During this Knowledge Transfer Partnership (KTP), PSP, a Shildon-based manufacturer of rain-screen systems and metal fabrications, was provided with *'the knowledge and expertise that PSP lacks'* (E6) to integrate its marketing and supply chain and improve how managers make decisions.

The company worked with Profs Ellis and Tsinopoulos to significantly change its processes to better configure its supply chain partnerships (R4). This entailed better appreciating where and how value is created across the supply chain (E6 & E7). This understanding was based on findings reported in R2, R4, R5 & R6. As a result, the company has been able to identify better product opportunities in its trading relationships and added-value services (R5). This has promoted a more partnership-based approach to the management of its supply chain, thereby managing its integration efforts more effectively. Resulting strategies acknowledged the significance of customers, competitors and other stakeholders. Indeed, PSP states that *'the biggest impact was on the structure within the company and how we communicate internally and externally'* (E8).

Prof Ellis and the KTP Associate conducted extensive qualitative research (underpinned by the methods in R4 & 5) into managerial perceptions within the construction industry network (E7). Based on these studies, PSP set up and implemented processes and systems for customer acquisition and the subsequent management of relationships with the key network actors that contribute to value creation within the sector. This enhanced approach to managing its B2B relationship portfolio included the appointment of new senior personnel with *'significant experience with project work and a greater understanding of site construction'*. The company states that this has *'improved both the communication and project control within the business resulting in orders being received regularly from much larger clients'* (E8). PSP has also set up a design operation to add value to customers, thus ensuring that the external identity of 'solutions' supplier that it was projecting to the marketplace was mirrored by internal practices. By thereby offering a service that many competitors do not, *'this assists significantly in securing projects'* (E8).

As a result of using improved knowledge of changing customer needs, the transformation in the company's network positioning, marketing orientation and supporting operations has manifested itself in an increased level of enquiries from potential clients. This has enabled PSP to select higher margin opportunities from a more comprehensive relationship portfolio; opportunities it was better able to serve thanks to closer relations with suppliers. The impact on the company was extensive: sales have increased such that turnover in the year 2017-18 was GBP9million, from GBP7million in 2014-15, and staff headcount increased from 66 to over 100 (E7 & E8).

### **Project 3 - Significance: PWS Distributors and ESRC Impact Acceleration Account**

PWS in Newton Aycliffe is a supplier of kitchen components and work surfaces. Contrary to PSP above, PWS's products are relatively high volume and standardised, a configuration which dictates a different way of integrating with customers and suppliers. Facilitated by matched funding from the ESRC's IAA, Prof Tsinopoulos was able to guide the firm in significantly changing its integration practices and in developing and implementing a strategy for business growth. The project applied the findings of his research on supply chain configurations and customer identification (R1 & R6) to develop and implement a methodology of proactive information provision and data analysis for the firm. It encouraged the development of a culture of data-driven decision making which considered modes of supply chain integration on one hand and the way marketing decisions were made on the other, thereby maximising customer value. As the firm puts it, *'This was achieved by implementing product and customer segmentation within a business intelligence (BI) system, as identified by a program of engagement with stakeholders'* (E9).

They add, *'The project achieved success in allowing individuals to validate their intuitions as a data-driven assessment via the BI system'* (E9), for example in comparing the cost/benefit of a new carrier's better delivery rate in relation to warehouse work rate and different packing methods. Service improvements were also noted, for instance *'by adopting a rigorous customer segmentation approach within the warehousing section, customers can receive a service offering which is appropriate for their customer type and position within the supply chain'* (E9). This included alternative delivery methods and the need for goods to be labelled and consigned



individually, *'including their end consumers' preferences'* (E9). Moreover, the effects of service changes are more apparent with the improved processes and systems, so that *'when moving a customer onto a premium service method, the effects upon credits can be seen sharply from that point onwards'* (E9). PWS believe that the impacts of implementing research findings were seen amongst stakeholders throughout the supply chain (as suggested by R2, R4 & R5), for instance in: *'helping suppliers to optimise their production'*; *'helping increase customer value by enabling carriers to achieve a reduced damages rate'*; *'helping warehousing to function more efficiently'* by examining failure data; and *'helping customers to increase the value of their business by reducing their failure rates'* (E9).

#### **5. Sources to corroborate the impact**

- E1. Testimonial from the Institution of Mechanical Engineers, regarding Manufacturing Manufacturer Excellence Awards (dated 17 May 2019).
- E2. ORBIS data for AGFA Graphics and ZF Lemforder Ltd.
- E3. 2019 Annual Report for PWS Architectural Ltd (dated 30 April 2019).
- E4. Testimonials of participating organisations in MX awards: ZF Lemforder Ltd (dated 3 October 2018).
- E5. Testimonials of participating organisations in MX awards: AGFA Graphics (received via email on 7 August 2019).
- E6. KTP Grant Application & Proposal Form 2013 (PSP Architectural Ltd).
- E7. KTP Final Report 2015 (PSP Architectural Ltd).
- E8. Testimonial from Chairman of PSP Architectural Ltd (dated 13 September 2018).
- E9. Testimonial/project assessment from PWS Ltd IT Manager (received via email on 28 January 2019).