The Antecedents of Service Innovation and Its Impacts on Manufacturing Firms' Performance

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Abstract

Service innovation becomes a strategic source of competitive advantage to companies in manufacturing sectors. However, despite extensive researches on it, many manufacturing firms are still struggling with it due to lack of insights provided to them. The purpose of the study is to provide insights into the nature of service innovation in the manufacturing context, by testing its antecedents and its impacts on firm performance. An empirical research with an online survey was conducted with manufacturers in China. The results indicate that service innovation has a positive influence on firm performance. All three factors have positive impacts on service innovation.

Keywords: Service Innovation, Firm Performance, Manufacturing Sector

Introduction

More and more manufacturers realized that developing and providing integrated product-service offers may contribute more to gain competitive advantage, such strategy is referred to as "servitization of manufacturing" (Baines *et al.*, 2009; Vandermerwe and Rada, 1988). This also drivers manufacturing firms to change their logics of doing business: shifting from goods-dominant logic to service-dominant (S-D) logic, which regards the services as the basis of business exchange but not the goods (Vargo and Lusch, 2004; 2008; 2014).

However, despite there are bunch of researches on service innovation (Carlborg et. al., 2014; McDermott and Prajogo, 2012), many manufacturing firms are still struggling with service innovation due to lack of insights provided to them (Chae 2012; Gremyr *et al.*, 2010; Kindström and Kowalkowski, 2014).

Thus, the purposes of this study are to provide insights into the nature of service innovation in the manufacturing sectors, and to explore its impact on firm performance. The research questions are defined as:

RQ1: What are the factors influencing service innovation in the manufacturing sector?
RQ2: What are the impacts of service innovation on firm performance in the manufacturing sector?

The paper is structured as follows: the next section provides some background on service innovation. The third section presents the research methods. The fourth section illustrates the findings of the structural equation modelling (SEM) analysis over the collected data. Finally, some concluding remarks and future research directions are discussed in the last section.

Literature Review

In the past decades, there emerges a growing body of service-related academic research. In this research, we focus on service innovation in the manufacturing and service sectors.

Service innovation and firm performance
The early discussions on service innovation could be traced back to 1990s (Miles, 1993), now this conception has been developed in the past 2 decades, and it has been increasingly and worldly acknowledged (OECD, 2005; IfM and IBM, 2008; European Commission, 2009). There are many definitions of service innovation with different angles, but it mainly focused on service product, service processes, and service firms. Regarding the service firms, now the conception of service innovation is not only discussed in service firms (McDermott and Prajogo, 2012), but also widely applied in manufacturing firms (Gremyr, *et al*., 2010; Ettlie and Rosenthal, 2012; Kindström and Kowalkowski, 2014).

However, many firms particular from the manufacturing sector struggle to earn the promised benefits from service provision (Baveja *et al*., 2004; Stanley and Wojcik, 2005), such that service innovation creates benefits for customers and channel partners, whereas the developer might suffer from sacrifices that exceed its modest benefits. For innovation to be economically sustainable, manufacturers must be able to capture an equitable share of the value created.

In this research, we aim to address the difference of service innovation in manufacturing and service sectors. The first part of this is to investigate the relationship between service innovation and firm performance in both manufacturing and service sectors. In terms of the firm performance, since customer plays a much more important role in service innovation (Gustafsson, *et al*., 2012; van Riel, *et al*., 2013), we will measure the firm performance with two dimensions, including not only financial performance but also customer performance. Therefore, the following hypotheses are developed:

H1: Service innovation has a positive impact on firm's financial performance in manufacturing sector.
H2: Service innovation has a positive impact on firm's customer performance in manufacturing sector.

Service-dominant logic and service innovation

In order to understand firms' driving forces to service innovation, this research adopted the service-dominant (S-D) logic to observe service innovation. The development of the S-D logic is based on the understandings of the changing focus of marketing theory, from tangibles to intangibles, from producers of physical goods to consumers as co-producer (Vargo and Lusch, 2004; more details about the S-D logic, please refer to Vargo and Lusch, 2014). The S-D logic has been regarded as an especially suitable way for examining service innovation (Ordanini and Parasuraman, 2011; Edvardsson and Tronvoll, 2013).

Based on reviewing current literature on service innovation from the perspectives of the ten foundational premises (FPs) of the S-D logic, this research summarized 3 antecedents of service innovation, which is presented in the Figure1.

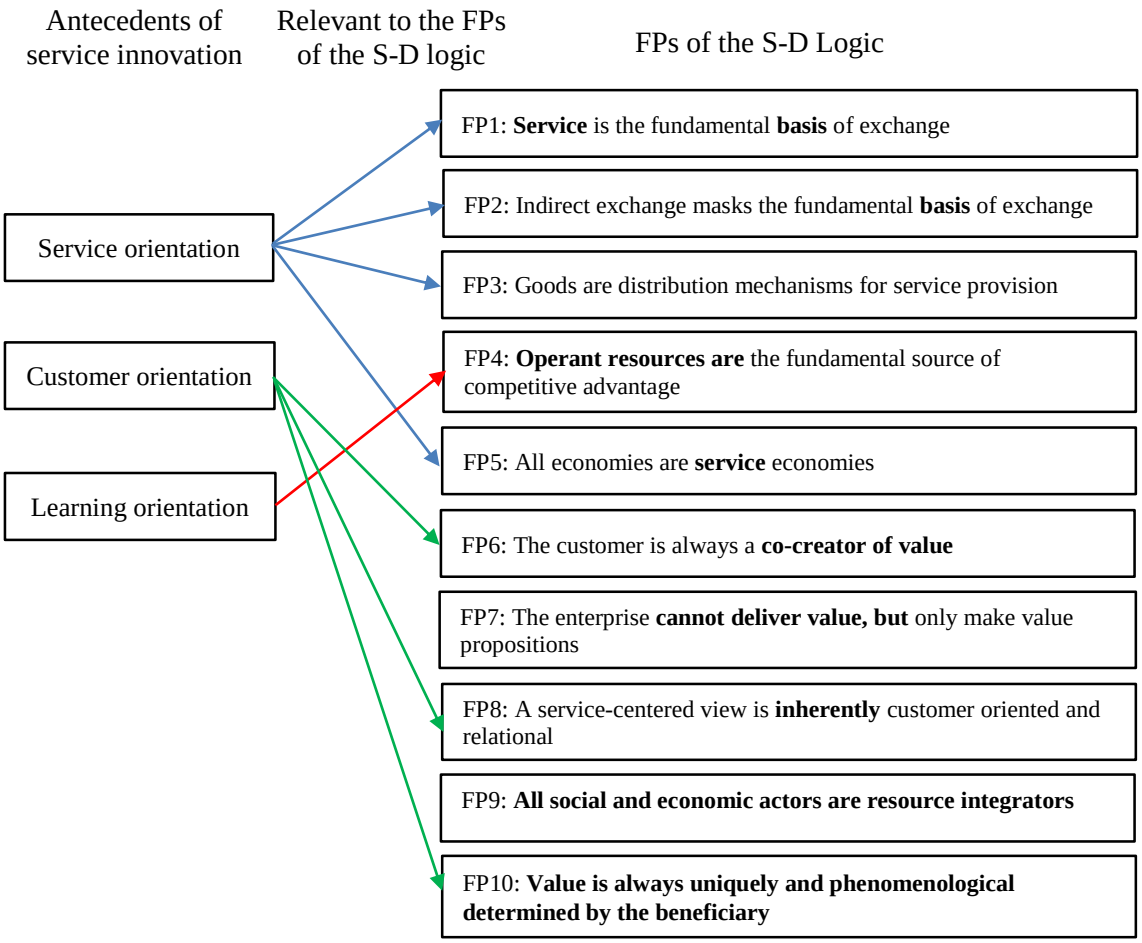

Figure 1 - Framework of service innovation from the perspective of the S-D logic

Service orientation: According to the S-D logic (Vargo and Lusch, 2014), service is regarded as the fundamental basis of exchange (FP_1), while goods are defined as a distribution mechanism for service provision (FP3), not the basic unit and focus of exchange as found in the G-D logic. Establishing a service orientation should contribute to service innovation. From an organization view, high-level orientation towards service will positively contribute to the organizational performance according to the results

from a research conducted in the retail banking industry context (Lytle and Timmerman, 2006), and also a research in business-to-business (B2B) e-commerce environment (Oliveria and Roth, 2012). The complexity of the relationship between service strategy and service innovation has been highlighted by Lightfoot and Gebauer (2011). In this research we aim to investigate the differences of the service orientation' impacts on service innovation between manufacturing and service sectors. Hence, the following hypothesis is defined.

H3: Service orientation has a positive impact on service innovation in manufacturing sector.

Customer orientation: The logic highlights the customer as co-creator of value (FP6) and final perceiver of the value (FP10; Vargo and Lusch, 2011). The S-D logic emphasizes the value co-creation process (Gummesson and Grönroos, 2012) and highlights the customer as the co-creator of value (FP6). The S-D logic also argues that enterprise can only propose value, but not create and deliver it (FP7). From this view, service innovation should be customer oriented as it has been directly indicated in FP8. Customer orientation plays an important role in service innovation (Ordanini and Parasuraman, 2011). Building a close communication with customer is regarded as a determinant of the success of service innovation (Gustafsson, *et al*., 2012). A survey results show that customer orientation together with future market focus will increases the willingness to cannibalize existing technology, service portfolio and routines, which in turn stimulates firm innovativeness (Hillebrand *et al*., 2011). Hence, the following hypothesis is defined.

H4: Customer orientation has a positive impact on service innovation in manufacturing sector.

Learning orientation: The S-D logic reflects the shift from tangible operand resources in exchange to intangible and dynamic operant resources for competitive advantage (FP4). Operand resources are those that need to be acted upon (e.g. natural resources), and operant resources are those that are able to act (e.g. knowledge and skills) (Vargo and Lusch, 2011). It is believed that organizational learning and learning orientation contribute a lot to service innovation (Melton and Hartline, 2012). Organizational learning has been proved to be able to foster innovation (Jiménez-Jimenez *et al*., 2008; Sanz-Valle *et al*., 2011). Hence, the following hypothesis is defined.

H5: Learning orientation has a positive impact on service innovation in manufacturing sector.

Methodology

The conceptual model

Following the fundamental premises (FP) of the S-D logic, this paper proposed three antecedents (service orientation, customer orientation, and learning orientation) that are hypothesized to influence service innovation.

A conceptual framework is defined as shown in *Figure 2*, and the hypotheses are developed below.

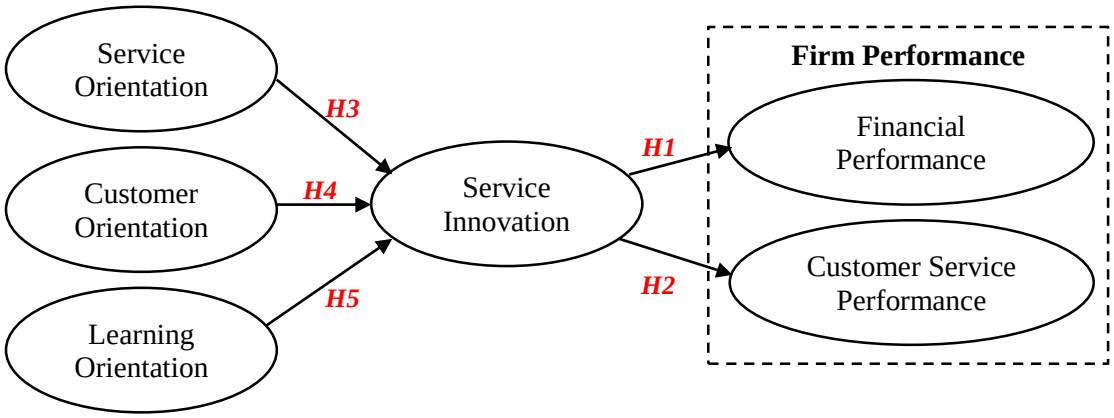

Figure 2 - Conceptual research framework

Measurement scale

The measurement instruments used in this research were generated from an extensive literature review.

Service Orientation (SO) is measured with items adopted from Lytle and Timmerman (2006). Customer orientation (CO) is measured with items adopted from Grawe *et al*. (2009). Learning orientation (LO) is measured with items from Sinkula *et al*. (1997). Service Innovation (IO) is measured with items adopted from Daugherty *et al*. (2011); Grawe *et al*. (2009); Yen *et al*. (2012); Thakur and Hale (2013). Firm performance is measured through financial performance (Ngo and O'Cass, 2012) and customer service performance (Yang *et al*., 2009).

All construct items were measured on a seven-point Likert-like scale, ranging from 1 (=strongly disagree) to 7 (=strongly agree).

Data collection

An online questionnaire was designed and distributed to 600 members of an industry association in South-Eastern China. In total, 364 samples are collected (respond rate is 60.7%), 231 of them completed all questions, and the valid rate of the respondents is 63.5%. *Table 1* shows the basic characteristics of the 231 respondents.

Reliability and validity

After data collection, a series of analyses were performed to test the reliability and validity of the constructs based on the sample of 231 respondents. Reliability of the measurement scale is measured by Cronbach's α (Nunnally, 1978). Cronbach's α value (see *Table 2*) for all four measurement scales are greater than the recommended minimum value of 0.70 (Garver and Mentzer, 1999), which shows good reliability of the measurement scales, and also it demonstrates that the measurement scales have high reliability (Garver and Mentzer, 1999).

Since all scales were directly adopted from prior research (see Appendix 1), content validity is assumed. In order to ensure the adequacy of the measurement model, discriminant validity should be evaluated in order to ensure that individual items intended to measure one latent construct do not at the same time measure a different latent construct (De Vellis, 1991). Chi-square difference tests for pairings of each scale

with other study scales showed a significant difference at the 0.01 level, indicating sufficient discriminant validity for all scales (Garver and Mentzer, 1999; Gerbing and Anderson, 1988).

Table 1 - Basic characteristic of the respondents

Category	Number of firms	Percentage	Measurement source
Firm type			(Grawe *et al*., 2009)
State-owned	33	14.3%	
Private	120	51.9%	
Joint-Venture (with foreign investment)	42	18.2%	
Joint-Venture (without foreign investment)	26	11.3%	
Unidentified	10	4.3%	
Company history (Years)			(Lin, 2007)
0-5	27	11.7%	
6-10	35	15.2%	
11-15	42	18.2%	
16-20	32	13.9%	
>20	95	41.1%	
Number of employees			(Lin, 2007)
<=50	14	6.1%	
51-100	19	8.2%	
101-3000	28	12.1%	
300-500	24	10.4%	
>500	146	63.2%	
Capital (in million RMB yuan)			(Lin, 2007)
<1	5	2.2%	
1-5	11	4.8%	
5-10	15	6.5%	
10-50	24	10.4%	
>50	176	76.2%	
Annual sales (in million RMB yuan)			(Grawe *et al*., 2009)
10-100	6	2.6%	
101-1,000	30	13.0%	
1,001-10,000	48	20.8%	
>=10,0001	38	16.5%	
Unidentified	109	47.2%	
R&D department			(Lin, 2007)
Yes	116	50.2%	
No	115	49.8%	

Table 2 - Data reliability

	CO	LO	SO	SI	FP	CSP
Cronbach's *α*	0.893	0.959	0.982	0.973	0.903	0.947

Data analysis method and process

In this research, structural equation modelling (Anderson and Gerbing, 1988) via AMOS 20.0 was the main statistical analysis tool used; the analysis is based on the sample of 495 respondents. For the structural model, the overall model fit (by using indices from various families of fit criteria: chi-square and normalized fit chi-square, root mean square residual (RMR), and root mean square error of approximation (RMSEA), goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), normed fit index (NFI), and incremental fit index (IFI)) was assessed to evaluate how well the structural model fit the data. The structural coefficients were then examined in terms of statistical significance in order to determine whether the proposed hypotheses were accepted.

Empirical analysis and findings

Structural equation modelling results

Figure 3 presents the structural equation modelling results specified in the AMOS 20.0 output. The results relating to the fit of the structural model generally support a claim of good fit. Table 3 provides a summary of the goodness-of-fit statistics.

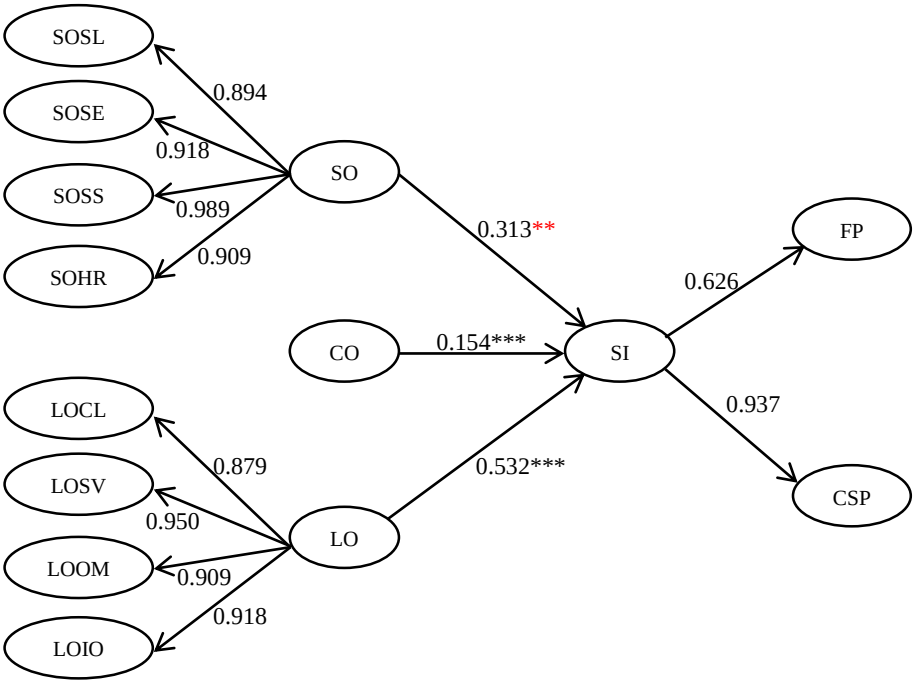

Figure 3 - Path diagram of the structural model

(**Notes:** * Significant at level $p<0.05$, ** Significant at level $p<0.01$, *** Significant at level $p<0.001$)

Table 3 - Fit statistics of the structural model

Fit statistics	**Overall fit measure**	
	Notation	**Model value**
Chi-square to degrees of freedom	$x^2/d.f.$	1.795
Root mean square error of approximation	RMSEA	0.059
Goodness-of-fit index	GFI	0.664
Adjusted goodness-of-fit index	AGFI	0.628
Normed fit index	NFI	0.805
Comparative fit index	CFI	0.902
Incremental fit index	IFI	0.903

As shown in Table 3, the relative chi-square (chi-square/degrees of freedom) value of 1.795 is less than the recommended maximum value of 3.00 (Bagozzi and Yi, 1998; Kline, 1998), which represents a good fit of the model. The RMSEA value of 0.059 is below the recommended maximum of 0.08 suggested by Brown and Cudeck (1993), also indicate that the measurement model fits well.

While the GFI value of 0.664 and the AGFI value of 0.628 are both below the 0.90 level recommended by Byrne (1998), these were heavily impacted by the small sample size. This research also used IFI and CFI to measure the goodness-of-fit of the model,

since IFI and CFI are more appropriate to measure goodness-of-fit when the sample size is small (Byrne, 1998). In this study, the IFI (0.903) and CFI (0.902) index values for the measurement model both exceed the recommended level of 0.90 (Byrne, 1998), which indicates an adequate fit of the model (Hu and Bentler, 1999). The NFI value of 0.805 also indicates a reasonable fit.

From all of the values outlined above, it is inferred that the structural model represents an acceptable fit.

Hypotheses testing and results

The results of the hypotheses test using the SEM technique are shown in Table 4.

Table 4 - Results of the hypotheses test for the structural model

Hypothesis	Path	Estimate	SE	CR	*p*
H1	**SI → FP**	**.626**	.052	8.720	***
H2	**SI → CSP**	**.937**	.059	14.999	***
H3	**SO → SI**	**.313**	.141	2.560	**
H4	**CO → SI**	**.154**	.050	4.242	***
H5	**LO → SI**	**.532**	.144	4.242	***

(**Note:** Significance levels are denoted as * $p<0.05$, ** $p<0.01$, *** $p<0.001$)

The findings of hypotheses both *H1* and *H2* both accepted indicate that service innovation has a positive influence on firm performance, including both financial performance and customer service performance. This is in line with previous researches on service innovation's impact on firm performance (McDermott and Prajogo, 2012).

As indicated by the acceptance of hypotheses *H3*, *H4*, *H5*, service orientation, customer orientation, and learning orientation have positive impacts on service innovation in the manufacturing sector. This is complying with the foundational premises of the S-D logic, and also this means the logic is valuable to explain the service innovation (Edvardsson and Tronvoll, 2013).

The interesting thing is that, hypothesis *H3* is accepted with significance at the level $p < 0.01$, whilst both *H4* and *H5* are accepted with significance at the level of $p < 0.001$. This result shows that service orientation is not that strongly impact on service innovation as customer orientation and learning orientation did on service innovation. In current literature, it has been discussed a lot on the importance of customer in the process of service innovation (Rubalcaba *et al*., 2012).

Conclusion

This research explores the influencing factors on service innovation from the perspectives of the S-D logic. The results provide management implications to manufacturing firms to build their strategic orientations in order to facilitate service innovation.

This research has tested the impacts of strategic orientation (including service orientation, customer orientation, and innovation orientation) on service innovation and firm performance in terms of finance performance and customer service performance. The results bring insights to both academia and practitioners on service innovation.

One of the future research directions is to collect data in different culture background to investigate whether cultural background will impact the research results here presented. Also firm size as a control variable should be tested in future research.

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