Servitization in the Downstream Supply Chains

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Abstract

This paper investigates the servitization in the flow of processes defined at the manufacturer-distributor (M-D) dyad. A model linking servitization, satisfaction, loyalty, competitive advantage and organizational performance is proposed. Data collected through a survey of 339 manufacturing organizations in India are used to assess the model. Partial-least-square structural equation modeling has been used for data analysis. Scales to measure internal and external servitization at the M-D dyad is presented. It is inferred that delivery of integrated solutions results in satisfaction of distributor's satisfaction and loyalty which in turn culminates into manufacturer's competitive advantage and organizational performance.

Keywords: Manufacturing, Servitization, Supply Chain

Introduction

Manufacturing organizations are creating value by embedding services in the underlying supply chain processes. In the supply chain context, service processes provide operations as well as relations intensive service delivery system. Relationship offerings among various actors at each dyadic stages of a manufacturing supply chain involve manufacturing as well as service functions, the strength of which not only benefits both the actors but also the whole supply chain (Kaynak and Hartley, 2008). In the literature service paradigm focussing on customer relationships and manufacturing paradigm focussing upon transformation are operationalized differently, however, both the paradigms is amalgamated together (Johns, 1999) to form a servitization strategy (Baines et al., 2009) which offer integrated solutions (Bastl et al., 2012). A servitized supply chain involves synchronized delivery of products as well as services. This paper aims to explore a manufacturer's adoption of servitization of supply chain processes and the associated implications for the relationship with a distributor. Research questions pertain to exploration of servitization at the manufacturer-distributor (M-D) dyad of the manufacturing supply chain and investigation of the relationship of servitization with satisfaction, loyalty, competitive advantage and organizational performance. The analysis is from the perspective of the manufacturer. Subsequent sections present literature, conceptual model, methodology, results and discussion, and conclusions.

Review of Literature

Distributors serve as a link between production and consumption (Merritt and Newell, 2001), and act as marketing intermediaries (Das and Tyagi, 1994). Instead of performing marketing and distribution themselves, manufacturers are increasingly

engaging distributors for distribution and marketing activities (Merritt and Newell, 2001), while maintaining their focus on their own core competencies (Sink and Langley, 1997). Distributors create value for manufacturers by achieving a high quality-to-cost ratio in the various functions that they perform (Cavusgil et al., 2004). Distributors also create value through activities such as customer relationship management, production and operations management and knowledge management (Mudambi and Aggarwal, 2003). Long-term, collaborative and reciprocal relationships between distributors and manufacturers result in higher level of performance for both the partners (Cavusgil et al., 2004). Supply chain activities defined at the M-D dyad such as information flow, customer relationship, demand management, order delivery, financial flow, products returns, and risk sharing flow as a process (Johnson and Mena, 2008). In this flow of processes, customers are buying offerings which are bundle of intangible elements of service as well as that of tangible elements of product. Value of integrated solutions lies on the way tangible and service components are fused together (Slack et al., 2004) in a complimentary manner.

Service Concept and Servitization

Services are deeds, processes and performances (Vargo and Lusch, 2004) which manifest as intermediate activities (Crespi et al., 2006) and refer to a performance linked offerings (Baines et al., 2009). Service is viewed as a system of interacting parts whose components include people, technology and business (Chesbrough and Spohrer, 2006) in which the customer acts as co-creator of value with the manufacturer (Vargo and Lusch, 2004). Servitization (Vandermerwe, and Rada, 1988) refers to bundles of customer focussed combinations of goods, services, and knowledge and add value to the underlying core tangible product.

Servitization in the Supply Chain

At various dyads of a supply chain servitization involves forward and reverse flows of service. As a forward flow at the M-D dyad, manufacturer's servitization may be described using following dimensions. Reliability refers to the ability to perform the promised service dependably and accurately (Berry, 2009). Trustworthiness refers to the ability to show trust and confidence (Grönroos, 1990). Attitude and communication reflect the ability to share and fulfill information needs (Ghobadian et al., 1994). Agility describes the manufacturer's ability to respond to sudden changes in demand and external disruptions in a cost-efficient manner (Lee, 2004), and involves timely and prompt service towards the distributor (Mersha and Adlakha, 1992). Alignment & adaptability reflects their ability to evolve with dynamic environment and aligning business interests with their distributor (Lee, 2004). Accessibility reflects the ability to share relevant information (Grönroos, 1990). As a reverse flow, distributor's servitization may be described using following dimensions. Integrity refers to the ability to perform error free and dependable service (Parasuraman et al., 1988). Responsiveness reflects willingness to help its manufacturer and provide prompt service to them (Parasuraman et al., 1988). Customization reflects ability to perform service as per the need of the manufacturer (Ghobadian et al., 1994). Credibility reflects ability to provide honest, dependable service to the manufacturer (Ghobadian et al., 1994). Tangibles reflect the ability to prepare accurate purchase orders and other correct technical specifications, (Parasuraman et al., 1988). Accuracy and agility reflects distributor's ability to respond to sudden changes in supply, demand and external disruptions in a cost-efficient manner and sharing information with their manufacturers.

Servitization and Performance

Servitization specific performance criterions such as buyer-supplier partnership level, quality of documentation (Gunasekaran et al., 2001); customer satisfaction, employee satisfaction, training of employees (Brignall and Ballantine, 1996) and logistic service indicators (Grimaldi and Rafele, 2007) have been used for measurement of service elements across supply chain processes defined at the M-D dyad.

Outcomes of Servitization

Distributor satisfaction involves his satisfaction with the quality provided vis-à-vis the benefits he is getting from the manufacturer. Satisfaction is linked with loyalty (Eggert and Ulaga, 2002) and is a long-term commitment to repurchase involving both a favourable cognitive attitude and repeat patronage (Stank et al., 1999). In B2B markets, nurturing relationship is considered to be linked with the market share and the profit (Chang et al., 2012). Criterions of cost, quality and reliability have shifted towards flexibility and innovativeness and service is an order winner (Johnstone et al., 2009).

Conceptual Model and Research Hypotheses

The interaction of frontline service employees and the customer drives the customer loyalty and profitability (Kamakura et al., 2002). Figure 1 shows the linkages of internal servitization (IS), external servitization (ES) and how these constructs are related with manufacturer's competitive advantage and performance through intervening variables of distributor's satisfaction and loyalty. Bagozzi's (1992) appraisal, affective response and behaviour framework has been used to develop interrelationships among these variables. Performance attributes such as financial gains and market share are the end results which are desired by the manufacturers. IS and ES are the elements of process quality which are concerned with everything that has to be ensured to achieve end results. Process quality comprises components of both technical process quality and a perceptual component (Harvey, 1998). Underlying factors of IS and ES variables constitutes the perceptual components and represent both standardized and customized service concepts (Ponsignon et al., 2011). Satisfaction and loyalty are affective responses linking servitization with performance measures. As shown in figure 1, following hypotheses represents the relationships among aforementioned constructs. Internal services create a network of linked functional units whose aim is to deliver servitization to internal customers which in turn is used to deliver it to external customers (Brandon-Jones and Silvestro, 2010). In order to become integrated solution provider, the creation of value must be understood from the eyes of the customer (Brady, 2005). Thus:

Hypothesis 1: A manufacturer's IS is a source of distributor's ES at the M-D dyad.

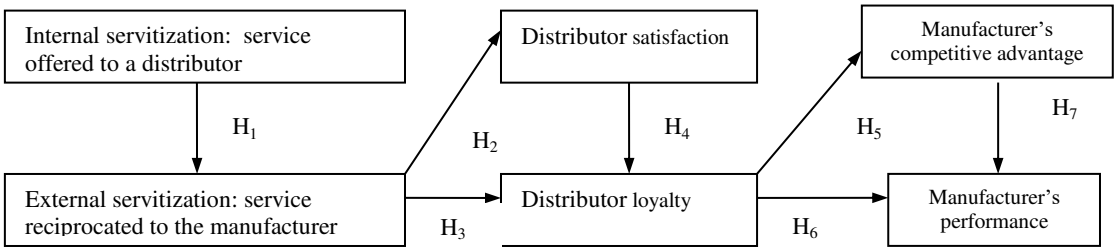

Figure 1: Conceptual framework of the study

Quality of services has a strong positive association between the employee and the customer satisfaction (Akdere, 2009). Service is considered predictive (Deng et al., 2010) or an antecedent (Buttle, 1996) which leads to satisfaction (Dabholkar et al., 2000) and purchase intensions. At the M-D dyad satisfaction includes satisfaction of distributors with the manufacturer (Seth et al., 2006) and also with the benefits received from the manufacturer (Heskett et al., 1997). Distributor loyalty is his long-term commitment to repurchase involving both a favorable cognitive attitude towards the manufacturer and its repeat purchase. Thus:
Hypothesis 2: ES is a source of satisfaction of the distributor at the M-D dyad.
Hypothesis 3: ES is a source of loyalty of the distributor at the M-D dyad.

Consumer concepts such as linkage of loyalty with repurchase behaviour (Daugherty, 1998) may be successfully transferred to the B2B context (Durvasula et al., 1999). Customer satisfaction is considered as a necessary condition for customer retention and loyalty (Jones and Sasser, 1995). Manufacturers who learn and adapt are able to achieve their distributors' enhanced loyalty (Sanchez et al., 2011). Thus:
Hypothesis 4: Satisfaction at the M-D dyad leads to distributor loyalty.

Loyalty is a source of competitive advantage (Bharadwaj *et al.,* 1993) which results in stability in sales growth (Mithas et al., 2005) and reduced cost of new customer acquisition (Cretu and Brodie, 2007). Loyalty of distributor is linked with enhanced level of manufacturer's performance (Speiteri and Dion, 2004). Organizational performance refers to the extent to which an organization achieves market-oriented as well as financial goals (Stock et al., 2000). Thus:
Hypothesis 5: Loyalty of distributors at the M-D dyad leads to competitive advantage for the manufacturer.
Hypothesis 6: Loyalty of distributors at the M-D dyad leads to organizational performance for the manufacturer.
Hypothesis 7: Competitive advantage derived from distributor's loyalty influences manufacturer's performance.

Methodology
Two new scales are proposed for the measurement of servitization at the M-D dyad. An initial set of 21 items to measure the IS and 27 items to measure the ES have been generated by reviewing the work of Seth et al., (2006) and Lee (2004). One item each has been used to measure overall IS, overall ES and overall satisfaction. The perception measurements have been used for analysis. In a confirmatory sense, items of questionnaire have been grouped under various underlying theoretical constructs. In addition to these, two items each are generated to measure distributor satisfaction and manufacturer's performance. Three items each are generated to measure distributor loyalty and manufacturer's competitive advantage. A five-point Likert-type scale anchored from 1 (strongly disagree) to 5 (strongly agree) has been used for measurement. The unit of analysis is the M-D dyad. Six hundred manufacturing organizations were approached and complete data were elicited from 339 respondents. Random sampling approach coupled with professional recommendation based tactic was followed to get willing and information-rich respondents. Data were collected during September 2013 to July 2017. Partial least square structural equation modeling (PLS-SEM) approach is used for data analysis.

Results and Discussion

Assessment of Scales

First the measurement scales were examined for reliability and convergent and discriminant validity. The composite reliability (CR) values range from 0.879 to 0.927 and are higher than the norms of 0.70 thus, representing high internal consistency (Hair et al., 2017). The average variance extracted (AVE) values were higher than 0.5 which suggest adequate convergent validity. Values of AVE in conjunction with CR values represent convergent validity of the scale items. Values of the AVE estimates (ranging from 0.678 to 0.849) are larger than squared inter-construct correlation estimates thus, representing discriminant validity. These results are depicted in Table I.

Table I Values of Confirmatory Analysis

A. Assessment of Reliabilities And Convergent Validity				
Constructs	*Factor loadings*	*t-statistics*	*AVE*	*CR*
Internal Servitization	0.962		0.681	0.927
Service Reliability	0.844	8.213		
Trustworthiness	0.889	8.570		
Attitude and Communication	0.817	7.649		
Agility	0.868	8.695		
Alignment and Adaptability	0.735	6.344		
Accessibility	0.789	7.342		
External Servitization	*0.962*		*0.678*	*0.926*
Integrity	0.812	7.966		
Responsiveness	0.921	9.621		
Customization	0.858	10.571		
Credibility	0.734	7.773		
Tangibles	0.730	7.426		
Accuracy and Agility	0.861	8.343		
Satisfaction	*0.937*		*0.784*	*0.879*
Your distributor is satisfied with your organization.	0.926	10.120		
Your distributor is getting desired service for the price it is paying from your organization.	0.843	9.441		
Loyalty	*0.945*		*0.739*	*0.894*
Your distributor is in long term purchase relationship	0.954	10.998		
Your distributor recommends your organization to others.	0.747	8.323		
Your distributor prefer higher margins but lower service	0.866	9.354		
Competitive Advantage	*0.941*		*0.722*	*0.886*
Your distributor provides excellent servitization	0.853	9.117		
Your distributor delivers products/services on time	0.821	9.017		
Your distributor accommodates changing requirements	0.874	9.134		
Organizational Performance			*0.849*	*0.918*
Your distributor helps in achieving your market share	0.911	10.784		
Your distributor helps in achieving profit.	0.932	11.243		

B. Assessment of Discriminant Validity						
Constructs in lower- triangular matrix	(A)	(B)	(C)	(D)	(E)	(F)
Internal Servitization (A)	*0.681*					
External Servitization (B)	0.668	*0.678*				
Satisfaction (C)	0.545	0.547	*0.784*			
Loyalty (D)	0.521	0.562	0.458	*0.739*		
Competitive Advantage (E)	0.613	0.596	0.471	0.586	*0.722*	
Organizational Performance (D)	0.564	0.619	0.511	0.691	0.592	*0.849*

Assessment of the Model

Assessment of the structural relationship involves first assessing measurement portion of the model. Path estimates of various hypothesised relationships range from 0.219 to 0.678 and associated t-values were higher than prescribed |1.96| at ($p<0.005$). Thus, the relations between latent and manifest variables are significant. Signs of the parameter estimates are consistent and are in line with hypotheses 1 to 7. The hypothesised relationships were assessed using PLS algorithm to generate the standardized path coefficients. Effect size of each path is assessed using f^2 values and these values range from 0.129 to 0.695. Values above 0.15 show moderate effect and above 0.3 indicate high effect (Hair et al., 2017). Further higher the path coefficients, higher will be the effect size or f^2 values. Path estimates and f^2 values are depicted in Table II.

Table II. PLS Path Analysis Results

Hypothesised Relationships	*Path Loading*	*t-statistics**	*Significance***	*f^2 Values*	*Inference*
Internal servitization enables external servitization	0.678	14.068	0.000	0.695	Supported
External servitization enables distributor satisfaction	0.557	12.093	0.000	0.342	Supported
External servitization enables distributor loyalty	0.454	8.747	0.000	0.216	Supported
Distributor satisfaction enables distributor loyalty	0.219	3.361	0.000	0.048	Supported
Distributor loyalty enables manufacturer competitive advantage	0.596	6.009	0.000	0.417	Supported
Distributor loyalty enables manufacturer performance	0.524	5.220	0.000	0.276	Supported
Manufacturer competitive advantage enables its performance	0.295	4.378	0.000	0.129	Supported

** Significant at 0.05, **significant at 0.001*

The R^2 values are moderate to high (ranging from 0.30 to 0.53) indicating that these variables are successful measures and represent the amount of variance in the endogenous constructs explained by all of the exogenous constructs (Hair et al., 2017). External servitization, satisfaction, loyalty, competitive advance and organization performance have R^2 values 0.45, 0.30, 0.35, 0.34, 0.53 respectively. This reflects predictive relevance of structural model. Remaining variations might be explained by other variables which are not included in the study. Stone-Geisser's Q^2 values derived from blindfolding procedure are used as a criterion of predictive relevance (Hair et al., 2017). As a norm number of observations divided by the omission distance should not be an integer and lie between 5 and 12 (Hair et al., 2017). All the Q^2 values are greater than zero, thus, structural model has predictive relevance. Table III depicts these values.

Table III. R^2 and Q^2 values

Endogenous Construct	*R^2 values*	*Adjusted R^2 values*	*Q^2 values*
External servitization	0.446	0.445	0.132
Distributor satisfaction	0.299	0.297	0.129
Distributor loyalty	0.349	0.344	0.156
Manufacturer competitive advantage	0.343	.0341	0.165
Manufacturer performance	0.531	0.528	0.294

Standardized root-mean-square-residual (SRMR), normed-fit-index (NFI) and rms_theta are used to assess goodness of fir of the model. The chi-square value for saturated the model comes out to be 1557.186 and for estimated model comes out to be1680.476 and represent a reasonable fit of the model. Table IV depicts these indices.

Table IV. Model Fit Indices

Model Fit Assessment		*Derived Values of the Model*	*Inference*
Fit indices	*Norms*		
NFI	Should lie between 0 and 1 and value should be close to 1	0.853	a reasonable fit of model
SRMR	Should be less than 0.10	0.04	
rms_theta	Should be less than 0.12	0.08	

Direct, Indirect and Total Effects

Total effect that variable IS imposes is 1.749. In a similar way variables ES, distributor satisfaction, distributor loyalty and manufacturer competitive advantage, impose a total effect of 1.631, 0.353, 1.110 and 0.285 respectively. The values of direct, indirect and total effects are depicted in Table V.

Table V. Direct, Indirect and Total Effects

Measures	*A*	*B*	*C*	*D*	*E*	*F*	*Total*
Internal servitization	0	DE:0.668	IE:0.323	IE:0.349	IE:0190	IE: 0.219	1.749
External servitization		0	DE:0.547	DE:0.445	IE:0296	IE: 0.343	1.631
Distributor satisfaction	-		0	DE:0.209	IE:0.130	IE: 0.031	0.353
Distributor loyalty	-	-	-	0	DE:0.586	DE:0524	1.110
Manufacturer competitive advantage					0	DE:0.285	0.285
Manufacturer performance	-	-	-		-	0	0

DE: Direct effect, IE: Indirect effect

Mediation Analysis

In this study distributor satisfaction and manufacturer competitive advantage acts as a mediator and explains partial effect on distributor loyalty (37%) and manufacturer performance (68%) respectively. The results are depicted in Table V.

Table V. Mediation Analysis

Exogenous variable	*Endogenous variable*	*Mediating variable*	*Direct effect*	*Indirect effect*	*Total effect*	*VAF*	*Mediation*
External servitization	Distributor loyalty	Distributor satisfaction	0.445	0.114	0.559	0.037	Partial mediation
Distributor loyalty	Manufacturer performance	Manufacturer competitive advantage	0.524	0.167	0.691	0.068	Partial mediation

Discussion

The analysis of the M-D dyad reveals significant revelations. Factors of the ES are identified as - Integrity, responsiveness, customization, credibility, tangibles, accuracy and agility. Factors of the IS are identified as- reliability, trustworthiness, attitude and communication, agility, alignment and adaptability, accessibility. These constructs may be used as a benchmarking tool. The analysis of data provides empirical evidence suggesting that the proposed model of the study might be a viable representation of the

true relationship between observed and latent variables. Grönroos (1990) argues that in the distribution of products the service is a major factor in competition. This may be more relevant in the market segments where manufacturers compete with products that are intrinsically similar.

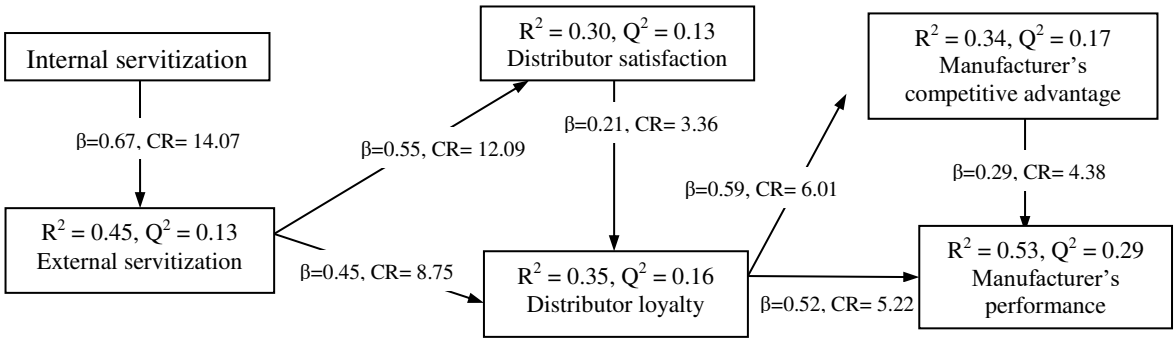

Figure 2: Path Estimates of the Model

This paper finds positive effect of service reliability, accessibility, trustworthiness, attitude and communication on distributor satisfaction as well as existence of economic (such as getting required service for the margin distributor is charging) and non-economic factors (such as aligning business interest by the manufacturer with its distributor) influencing distributor satisfaction. Figure 2 depicts the strength and direction of various path estimates of proposed relationships. In bi-directional flow of service (path coefficient is 0.67), each actor is co-producer of service, product, knowledge, and other value propositions for each other (Lusch and Vargo, 2004). These values can be viewed as an effort towards alignment of processes. Manufacturers are realizing that they cannot compete only on the sales and the margins produced by their products, therefore, manufacturers are introducing various value-added, revenue-producing services. Services as offered by the distributor to the manufacturer has a direct impact on distributor satisfaction (path coefficient is 0.55) and loyalty (path coefficient is 0.45). Distributor's willingness to continue to work with the manufacturer reflects that distributor is satisfied with the derived benefits and distributor's word of mouth in the form of recommendation to others may constitute distributor loyalty. This is critical for manufacturers where they are engaging many distributors for selling of its products. Manufacturers' effort to strategically align with their distributors and provide integrated solutions provide them opportunities for delivery of value added services (Johnstone et al., 2009).

Conclusion

This paper contributes to the literature by conceptualizing servitization in supply chain processes defined at the M-D dyad and provides empirical support that services instilled by the manufacturer is direct positive antecedent for distributors' satisfaction and loyalty and contribute towards manufacturer performance. Earlier studies have explored servitizaion in a single organization settings and this paper extends the concept of servitizaion along a dyad. Managers are advised to lay emphasis on building relationships with the existing distributor network through superior services as these are pivotal determinants of distributor's satisfaction and satisfaction. This paper is based on data collected from one country. Future studies may be conducted across many countries. Researchers may also conduct the study from the perspective of distributors.

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