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### Research Articles

## Identification of significant factors for value- in- use assessment of product service system in business to business sector

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### Abstract

#### Keywords

Product service system,  
Value-in-use,  
Customer oriented factors,  
Statistical method.

In recent times the attention afforded to Product Service System (PSS) has been a growing phenomenon. For the strategic business purposes both the manufacturer and the consumer organization are adopting PSS approach in the business to business sector. Developing approaches for understanding customer perceived value is a priority for managers and scholars alike. In particular, there exists a need for examining customer usage processes to better understand how value is derived and assessed. So in this paper, we argue for the need to identify the significant factors for assessing the value-in-use of PSS in business to business sector. A framework and statistical methods are used as a means of identifying such measures whereas interviews with the members of different organization provide support for the analysis, including the observations that individuals can assess the level of their usage processes and that they can articulate value-in-use at both organizational and individual level. Finally research direction includes identification of some significant factors and determination of their achieved level by the offered PSS, by using exploratory research technique

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### Introduction

Manufacturing firms are increasingly struggling to compete in the current economic climate. In the past decades, a transition from manufacturing to services has been notable in advanced Economies. There are calls for them to move downstream into the provision of associated services to maintain competitiveness. Such moves towards integrating products and services are commonly referred in the literature by terms such as 'product-service systems', 'integrated solutions', 'high value manufacturing or 'servitization' (Baines et al., 2007; Davies et al., 2006; Vandermerwe and Rada, 1988). For many leading manufacturers and providers of integrated products and services, this is seen as an opportunity to provide a 'one stop solution'. In recent times, the attention afforded to servitization has been a growing phenomenon. The servitization debate has witnessed calls to examine how customers perceive and assess the use value of product-service offerings. To date, the literature in the product-service domain considers the customer perspective. In particular, there exists a need for examining customer usage processes to better understand how value is derived and assessed. Moreover, there exists an important gap in explaining how and why

the assessment of 'use value' of product service system (PSS) offerings by customers is significant. In this paper, we suggest the need to explore the use value of PSS offerings. In this respect, we propose the need for in-depth exploratory research studies that shed light on customer usage processes of PSS offerings. In particular, we tried to identify the significant factors for value-in-use assessment of product-service system. This approach will be useful in developing measures that could then be applied to a larger scale study. Such an approach would begin to fill the vacuum that exists in compiling useful measures to assess the value of PSS from customer perspective. Product is a tangible commodity manufactured to be sold. It is capable of fulfilling a user's needs. And a service is an activity (work) done for others with an economic value and often done on a commercial basis (Mark J. Goedkoop, 1999). In today's business environment there are not many companies that offer only services or products, but instead offer a mix of products and services. . There is no unique definition of PSS shared by all the experts. According to Mont (1999), a Product Service System is a pre-designed system of products, services, supporting

infrastructure, and necessary networks that can fulfill consumers' needs on the market. The basic idea of PSS is not to sell the product itself, but rather with the service, which is offered by the product. A PSS is described as a marketable set of products and services capable of jointly fulfilling a user's need. The product/service ratio can vary, either in terms of function fulfillment or economic value. (Mark J. Goedkoop, 1999). According to Monroe (1990) value is defined as the perceived benefit relative to price (Monroe, 1990). Value represents a trade off of the salient give and gets components. That is, it is the overall assessment of what is received and what is given, though what is received varies across consumers (i.e. some may want volume, others high quality, others convenience) and what is given varies (i.e. some are concerned only with money expended, others with time and effort) (Sayem, A., 2010). In manufacturing industry, value is defined as the perceived trade-off between the positive and negative consequences of product use (Woodruff 1996). The value of a product is the mental estimation a consumer makes of it. Generally value may be conceptualized as the relationship between the consumers' perceived benefits and the perceived costs of receiving these benefits" (Monroe, 1990). In general value is a customer's perception of a trade-off between what is given by the customer and what is received against it. Value has two general meanings: "Value-in-exchange" and "Value-in-use". These two reflect two different ways of thinking about value and value creation. In value-in-exchange meaning of value it is created (manufactured) by the firm and distributed in the market, usually through exchange of goods and money (Vargo and Lusch, 2004; Vargo and Morgan, 2005). From this perspective the roles of "producers" and "consumers" are distinct. In this perspective, value is measured by exchange transaction. The view of Alderson (1957) and Drucker (1958) proposes an alternative view that value emerges during consumption which is the value-in-use meaning of value (Vargo and Lusch, 2008). In this meaning, the roles of producers and consumers are not distinct, meaning that value is always co-created, jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences. Woodruff (1997) developed a conceptualization of value which encompassed both embedded-value and value-in-use perspectives: "Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations" (Woodruff, 1997). As part of this view Vandermerve (1996), acknowledged that "value emerges in the customer's space, rather than in the producer's space".

## Literature review

Andreas, E. and Wolfgang, U., (2002), researched on customer perceived value. Researchers investigate whether customer value and satisfaction represent two theoretically and empirically distinct concepts. Also addresses whether value is a better predictor of behavioral outcomes than satisfaction in a business marketing context. Two alternative models are developed and empirically tested in a cross-sectional survey with purchasing managers in Germany. The first model suggests a direct impact of perceived value on the purchasing managers' intentions. In the second model, perceived value is mediated by satisfaction. This research suggests that value and satisfaction can be conceptualized and measured as two distinct, yet complementary constructs. Vargo S.L. and Lusch R.F. (2004), provided an overview of the European Journal of Marketing's special section on the Forum of Markets and Marketing, "Extending Service-Dominant Logic" in their paper. Their approach takes the form of a conceptual integration of core concepts in S-D logic, markets, and marketing. The overview of this paper provides insight into how the development of a positive theory of the market(s) will help to further advance normative marketing theories and practice. This paper integrates multiple perspectives on complex, dynamic systems and discusses their contributions to the development of an S-D logic-based theory of the market. Baines et. al (2007), paper aims to report the state-of-the-art of PSS research by presenting a clinical review of literature currently available on the following topic. A Product-Service System (PSS) is an integrated combination of products and services. This Western concept embraces a service-led competitive strategy, environmental sustainability, and the basis to differentiate from competitors who simply offer lower priced products. The major outcomes of each study are addressed and analyzed. On this basis, their paper defines the PSS concept, reports on its origin and features, gives examples of applications along with potential benefits and barriers to adoption, summarizes available tools and methodologies, and identifies future research challenges. Reinartz and Ulaga (2008), looked service offerings may seek to differentiate companies a potentially profitable strategy. They discovered four steps to developing a profitable services capability. Authors found that, servitized industrial companies appear to divide into two distinct groups: those that thrive under a servitization model with services margins up to eight times those in product sales, and those who are struggling to break even because they are unable to convince customers to pay for their services. They concluded that, unfortunately, companies often stumble in the effort. The paradox for many manufacturers is that while servitization is perceived as providing greater marketplace security, it can also lead to greater risk of failure. T. Baines, H. Lightfoot (2009), researched to gain a deeper understanding of the issues that arise when a servitization strategy is followed in real-life. They investigated a servitized organization case that designs, builds and delivers integrated packages. Their multi-disciplinary case-study showed how servitization necessitates companies to make modifications ranging from language they use to interact with the customers, through to their

organization design. Mario, R., Markus, K., Wolf-Christian, S., (2009), analyzed the threat companies have faced from industrialized nations with of competition from low-cost countries. They suggest Industrial Product Service Systems (IPS<sup>2</sup>) as a possible answer. Their article proposes two main aims. They established a framework for designing an initial IPS<sup>2</sup> which meets current customer and market requirements. Building on this, they broaden their focus to include requirements induced by subsequent changes. They propose a combination of the Net Present Value Approach and the Real Options Approach as a means of determining the quantified value of an IPS<sup>2</sup> for an individual customer over its life cycle. Sayem, A., (2010), conducted a study to explore the outcomes of the existing literature. Then the researcher explored the literature behind PSS, to form the basis of a list of components and elements influencing the value area of PSS. After exploring a significant number of literatures, by hypothesizing three main linkages the author proposed a theoretical framework for value-in-use assessment of PSS in Business-to-Business sector aimed at filling the literature gap, and arranged the influencing components and value-in-use outcome/elements in a systematic way. The list of these components were explored and/or validated by interview with an industry expert/consultant. The findings of the research were the validation of the three hypotheses behind the proposed framework, and the validated components and a proposed value-in-use assessment framework. Emma K. Macdonald, Hugh Wilson, Veronica Martinez, Amir Toossi (2011), developed approaches for understanding customer perceived value is a priority for managers and scholars alike. A conceptual framework for assessment of value-in-use is proposed and explored within the context of a maintenance service provider. In contrast to value models in previous empirical research, the framework includes assessment not just of provider attributes but also of the customer's usage processes, as well as customer evaluations of the value-in-use they obtain. Assessment of usage process quality as well as service quality evolves as the customer's goals evolve. Practitioners may wish to elicit usage process quality and value-in-use as well as service quality. Research directions include scale development for both usage process quality and value-in-use. Bernhard Dachs, Sabine Biege, MarcinBorowiecki, Gunter Lay, Angela Jäger, Doris Schartinger, (2012), provided new evidence for the servitization of European manufacturing – the trend that manufacturing firms increasingly offer services along with their physical products. They employ input-output data as well as data from a company survey to give a comprehensive picture of servitization across countries and industries. Highly innovative sectors reveal the highest share of firms that offer services and the highest turnover generated with services. Moreover, firms which have launched products new to the market during the last two years are more likely to realize higher shares of turnover from services compared to companies which launched no products new to the market.

### **A framework for customer oriented factors**

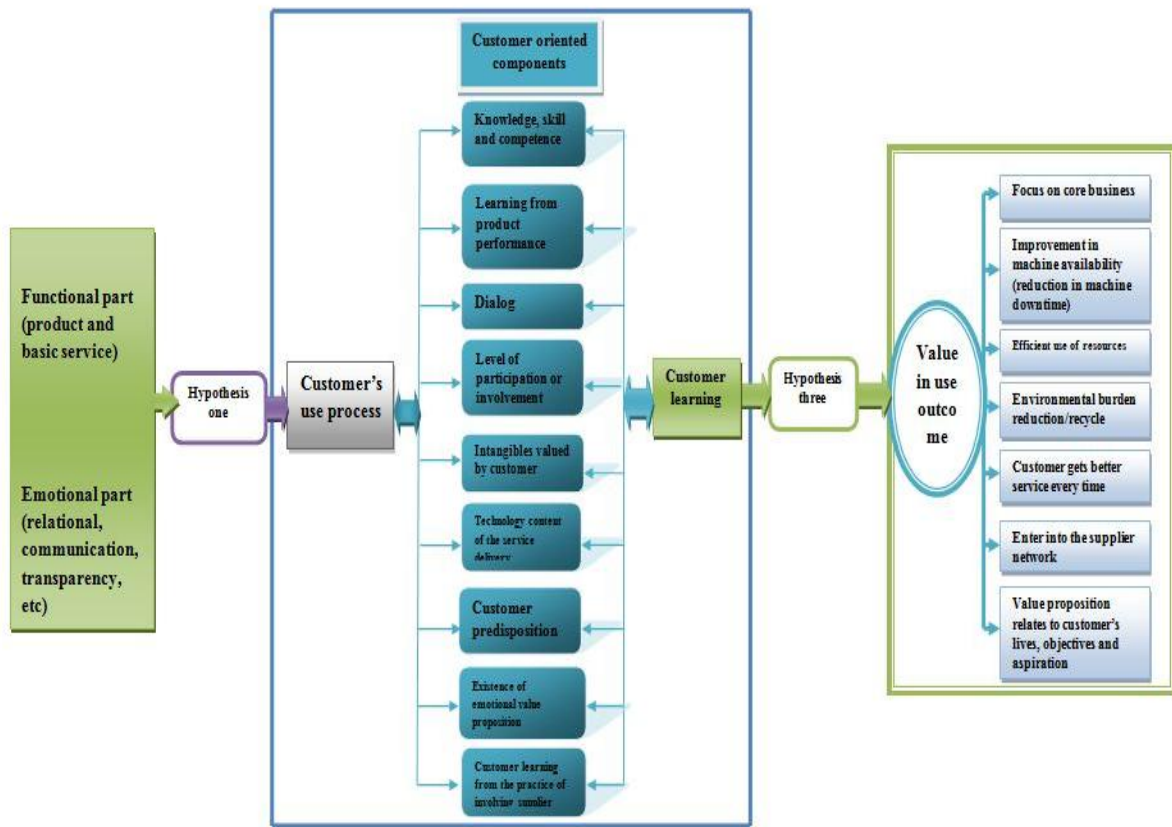
To carry out this step systematic brainstorming literature study and expert opinion was taken. From the study of the literature we have found some crucial information about concerned factors as well as from the parallel expert opinion we also gained some significant information which are used to perform this step in a successful manner.

The figure 1 illustrates a framework depicting a relational approach of different customer oriented components with its value-in-use outcomes. The relational approach is developed following the concept of a pre-stated value-in-use assessment framework. By studying the literature different customer oriented components and outcomes were found out, which were added in the framework for clarification. From the figure we can observe that there is an important relational approach in different components. It is observed that the significance of the framework is inherent in use process and learning which follows a two way relationship. The functional and emotional part which derives from the bundle of PSS is concerned with the use process of the customers. And these use process is associated with some components which are engaged to the learning of customers. Both the learning and use process have some value-in-use outcomes. Here the factors don't have same chance to make an impact on the outcomes because of their different approach. Thus the framework clarifies the relational approach of different customer oriented components with value-in-use outcomes.

### **Research methodology**

Identification of significant factors for value-in-use assessment is the main issue of the research study. The methodology adopted for this research work is case study. It is a method to narrow down a very broad field of research into one easily researchable topic (Williams, C., 2007). The case study has been conducted in a selected world class machine and service provider organization. The analysis was carried out to identify significant factors for value-in-use assessment in PSS. At last some issues are highlighted through the results of performance. The overall steps of the study are presented in figure 2.

For the purpose of the study a non-probability sampling design in the form of a convenience sampling method was adopted and considered to be appropriate to gather the data. The basis for using this sampling method was due to the respondents being easily accessible, their availability, as well as it being less time consuming and inexpensive to gather the information related to this study. The advantage of non-probability samples is that they are less complicated and more economical than probability samples. Convenience sampling involves collecting information of members of the population that are near and readily available for research purposes. However, there is a limitation in terms of utilizing convenience sampling, that it is not necessarily representative of the population and therefore the results are not dependable to other entities (Leedy, P.D., 1993). A quantitative methodology was used to identify the significant factors of value-in-use assessment. The instruments used to gather the data include questionnaires.



**Figure 1.** A framework depicting different customer oriented components with its outcomes- a relational approach (adapted from Sayem, A., 2010).



**Figure.2.** Overview of the research work

Major data collection tools to be used in this task are specifically designed self-developed questionnaires. Both the quantitative and qualitative questionnaires were prepared for the collection of data. The questionnaires were used to obtain situation specific information relevant to the sample. Participants were asked to furnish information with regard to their availability of information.

### Data collection & data processing

During the study data were collected by:

- **Interviews:** Interview sessions were carried out with the manager (planning/commercial/operations) and experts on the basis of necessity. Here authors intended to gather specific information on the subject matters as well as for collecting various qualitative data related to the service system.
- **Questionnaires:** Major data collection tools to be used in this task are specifically designed questionnaires. Both the quantitative and qualitative questionnaires were prepared for the collection of data.

Data of concerned factors are then processed in a systematic way on the basis of the framework and using SPSS (version-17). The data analyses involved both descriptive and inferential statistics.

### Findings & analysis

The results are obtained based on the empirical analysis. The descriptive and inferential statistics are presented thereafter. The inferential statistics were used to identify the significant factors for value-in-use assessment. By descriptive statistics the impact/contribution of perceived service to significant factors are expressed. The significance levels of .05 and .01 were selected a priori for test of significance for correlations.

### Reliability statistics

KMO and Bartlett's test of sphericity are measured to test the adequacy of the collected data from respondents used in factor analysis (Shown in table 1). In this study, the result of Bartlett's test of sphericity are approx. Chi-square = 94.474, df = 36 and significance level,  $p = 0.000$  and KMO value is 0.692 which is suggested to be acceptable for factor analysis. The acceptance level for KMO and Bartlett's test is 0.50 (Hair et al, 1998).

A statistic Cronbach's alpha ( $C$ ) is used for investigating the internal consistency of the respondents answer for overall and each factor (shown in table 2 & 3).

The alpha coefficient for the nine items is .900, suggesting that the items have relatively high internal consistency.

The table 3 expresses the values of Cronbach's alpha ( $C$ ) for each of the factor. From the values stated in the table 3 it is observed that the variables or factors possess relatively high internal consistency. The validity and reliability of questionnaires (in terms of internal consistency) is tested by the Cronbach's alpha ( $C$ ) of each variable (Teerajetgul et al., 2009). Although there is no acceptable limit of  $C$ , as it can be extended by large number of variables (Zhang, 2005). When the sample size is greater, then the reliability of the questionnaire is automatically counts as valid.

### Ranking of factors by RII (Relative Importance index)

Ranking of factors represents the importance of particular factors in the system. A total of 9 factors are ranked on the basis of RII (Details shown in table 4). The ranking is done on the basis of the response of the experts. The co-relationship among factors is not known from the RIIs value of the data.

### Inferential statistics for customer oriented factors

Inferential statistics is used to infer from the sample data what the population might think. The following section addresses the results obtained from the inferential statistics to ascertain the relationship between the different customers oriented factors for value-in-use. This section will play significant role to determine how the factors are correlated as well as the impact of one factor on the correlated one. Table 5 presented in this step for correlation analysis of different customer oriented factors. Table 5 illustrates the different value of co-efficient of correlation between different factors. The value of co-efficient of correlation expresses the level of relationship between factors. It is observed that there are some positive and negative relationships between factors but all the correlation are not regarded as statistically significant because of the value of significance level or statistical law. From the table it is found that four factors are correlated with the concerned one by maintaining statistical law and remaining factors doesn't follow this, and for this the correlation are not regarded statistically significant. The correlated factors (which are maintaining statistical significance) affect each other in the use process of this system. For example, it is observed that there is a positive linear relationship between the factor of knowledge, skill and competence of customer and dialog between parties ( $r = .329$ ,  $p < .05$ ), here the results are regarded as statistically significant and this signifies that these two factors affect each other in the use process positively. On the other hand some other factor possesses negative values of coefficient of correlation ( $r$ ) which is close to zero, which indicates a weak linear relationship with negative slope, statistically with no significance. So, it can be said that customers are capable of articulating their perceptions of the value-in-use process through interaction, usage, and engagement in their networks with provider organization. Consumer's perceived excellence or superiority is influenced by

**Table. 1** KMO and Bartlett’s test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity (Approx. Chi-Square)		94.474
	df	36
	Sig.	.000

**Table .2** Overall Cronbach’s alpha

Cronbach’s alpha	N of items
.900	9

**Table. 3** Cronbach’s alpha for each factor

Factors	Cronbach’s alpha (C )
Knowledge, skill and competence	.889
Learning from the product performance	.885
Dialog between parties	.893
Level of customer participation/involvement	.883
Intangibles valued by customers	.906
Technology content of the service delivery	.870
Customer predisposition (personality, attitude, values)	.899
Emotional value proposition (Brand Reputation)	.898
Customer learning (learning from the practice of involving supplier)	.871

different factors provided by the supplier organization. So it is important to identify the significant factor for value-in-use assessment.

From the test of correlation it is observed that some factors are correlated with statistical significance and affects the concerned factor positively. On the other hand the remaining factor posses no statistical significance which refers the independence in the consumption of provided service. The factors which are significantly correlated are influential in nature with the concerned factor and it is found that for the increase in the use level of one factor affects the

correlated one positively which express the significance of those factors in the value-in-use process. Thus we find that the significant factors are;

- knowledge, skill and competence of the customer,
- Dialog between parties,
- Increase in the level of customer participation or involvement and
- Learning from the practice involving a supplier.

**Table. 4** Ranking of the factors

Factors	RII	Ranking
Knowledge, skill and competence	0.82963	1
Learning from the product performance	0.740741	2
Customer learning (learning from the practice of involving supplier)	0.733333	3
Technology content of the service delivery	0.725926	4
Level of customer participation/involvement	0.703704	5
Emotional value proposition (Brand Reputation)	0.703704	5
Dialog between parties	0.696296	6
Intangibles valued by customers	0.688889	7
Customer predisposition (personality, attitude, values)	0.637037	8

**Descriptive statistics for customer oriented factors**

Descriptive statistics is used simply to describe what's going on in our data as well as to describe the impact/contribution of perceived service to the use process. Tables 6 to 14 are presented in this step for expressing the condition of different factors. The table 6 illustrates the mean and standard deviation of the collected data on Knowledge, Skill and Competence of customer from different customers. Here relatively more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service.

The table 7 illustrates the mean and standard deviation of the collected data on learning from product performances from different customers. Here mean express the level of provided service whereas comparatively less standard deviation signifies the uniformity or less dispersion of the provision of services by the service provider to the customer.

The table 8 illustrates the mean and standard deviation of the collected data on dialog between parties from different customers. Here more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service which is in the moderate range.

The table 9 illustrates the mean and standard deviation of the collected data on Increase in the level of customer participation or involvement from different customers. Here more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service which is below the moderate range.

**Table. 5** Pearson correlation matrix for different customer oriented factors

Factors	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
(a) Knowledge, skill and competence	1								
(b) Learning from the product performance	-.212	1							
(c) Dialog between parties	.329*	-.006	1						
(d) Level of customer participation/involvement	.331*	.020	.341*	1					
(e) Intangibles valued by customers	.113	-.165	.031	.240	1				
(f) Technology content of the service delivery	.185	.063	.189	.252	.080	1			
(g) Customer predisposition (personality, attitude, values)	.278	-.122	.103	.144	.250	.236	1		
(h) Emotional value proposition (Brand Reputation)	.272	-.074	.085	.125	-.003	.134	.041	1	
(i) Customer learning (learning from the practice of involving supplier)	.216	-.056	.343*	.269	.045	.062	.248	-.027	1

\* Correlation is significant at the 0.05 level (2 tailed)  
 The table 10 illustrates the mean and standard deviation of the collected data on intangibles valued by the customer (e.g. response time) from different customers. Here more standard deviation signifies the non uniformity of the provision of

services by the service provider to the customer whereas mean express the level of provided service. The table 11 illustrates the mean and standard deviation of the collected data on technology content of the service delivery from different customers



**Table. 6** Descriptive statistics of knowledge, skill and competence of customer

Particulars	Knowledge, Skill and Competence of customer
N	46
Missing	0
Mean	4.3478
Std. Deviation	1.60855

**Table. 7** Descriptive statistics of learning from product performances:

Particulars	Learning from product performances
N	46
Missing	0
Mean	2.2826
Std. Deviation	0.62050

**Table. 8** Descriptive statistics of dialog between parties

Particulars	Dialog between parties
N	46
Missing	0
Mean	2.7826
Std. Deviation	0.98687

**Table. 9** Descriptive statistics of increase in the level of customer participation or involvement

Particulars	Increase in the level of customer participation or involvement
N	46
Missing	0
Mean	1.5870
Std. Deviation	0.65238

**Table .10** Descriptive statistics of intangibles valued by the customer

Particulars	Intangibles valued by the customer(e.g. response time)
N	46
Missing	0
Mean	1.8696
Std. Deviation	0.49927

**Table. 11** Descriptive statistics of technology content of the service delivery

Particulars	Technology content of the service delivery
N	46
Missing	0
Mean	2.3696
Std. Deviation	0.67852

**Table .12** Descriptive statistics of consumer predisposition (e.g. personality, attitude & values)

Particulars	Consumer predisposition (e.g. personality, attitude & values)
N	46
Missing	0
Mean	2.0870
Std. Deviation	0.62632

**Table .13** Descriptive statistics of existence of emotional value proposition (e.g. brand reputation)

Particulars	Existence of emotional value proposition(e.g. brand reputation)
N	46
Missing	0
Mean	2.3261
Std. Deviation	0.59831

**Table .14** Descriptive statistics of Customer learning from the practice of involving supplier

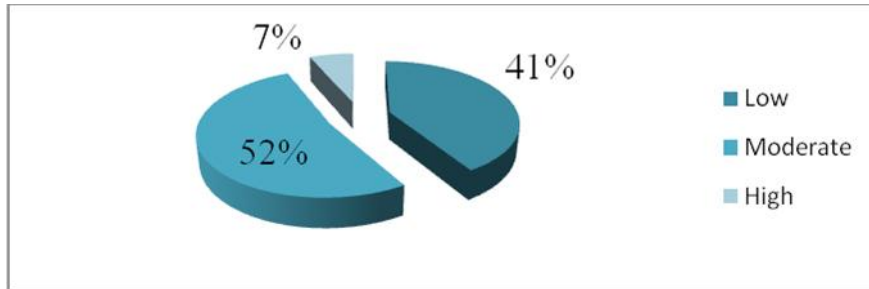
Particulars	Customer learning from the practice of involving supplier
N	46
Missing	0
Mean	1.7609
Std. Deviation	0.56509

Here more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service which is above the moderate range. The table 12 illustrates the mean and standard deviation of the collected data on Consumer predisposition (e.g. personality, attitude & values) from different customers. Here more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service which is above moderate range. The table 13 illustrates the mean and standard deviation of the collected data on existence of emotional value proposition (e.g. brand reputation) from different customers. Here mean express the level of provided service which is above moderate range whereas comparatively less standard deviation signifies the less dispersion or uniformity of the provision of services by the service provider to the customer.

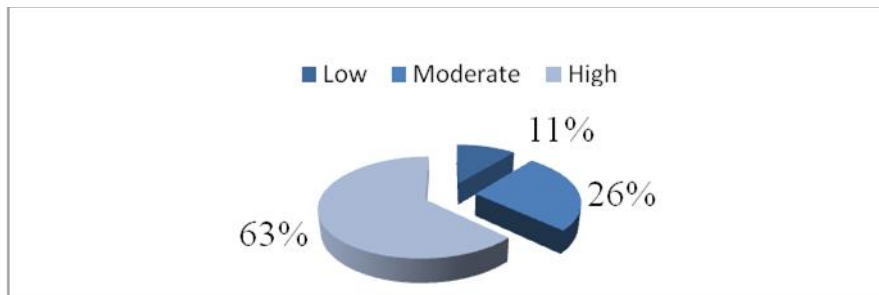
The table 14 illustrates the mean and standard deviation of the collected data on customer learning from the practice of involving supplier from different customers. Here more standard deviation signifies the non uniformity of the provision of services by the service provider to the customer whereas mean express the level of provided service.

#### **Contribution of the service**

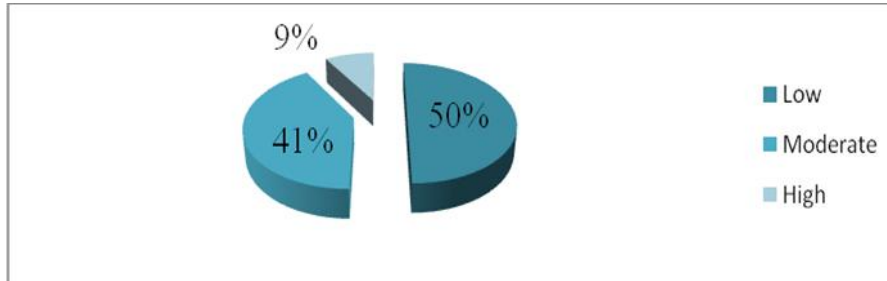
These contribution levels are expressed on the basis of the response of the respondents by using pie chart. The figure 3 illustrates that the portion of 7% high, 52% moderate and 41% are in low. This percentage level expresses the contribution level of the provided services for a factor of Knowledge, Skill and Competence of customer. We can observe that the majorities (52%) of the respondents are moderate level in the consumption of provided services and 41% in low and only 7% consumer are in the high level for this factor.



**Figure. 3** Impact/contribution of perceived service to the use process (knowledge, skill and competence of customer).



**Figure. 4.** Impact/contribution of perceived service to the use process (dialog between parties).



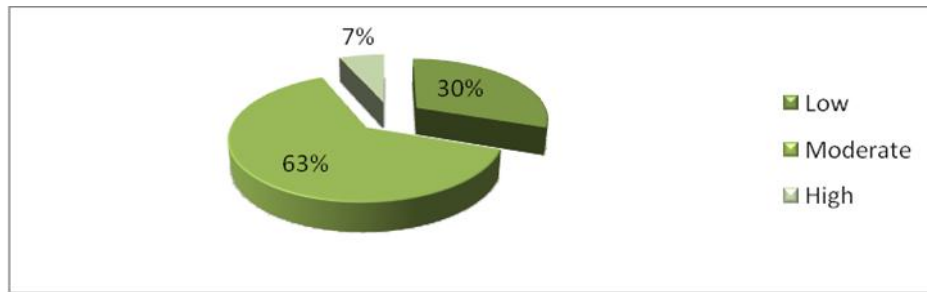
**Figure. 5** Impact/contribution of perceived service to the use process (increase in the level of customer participation or involvement).

The figure 4 illustrates the portion of 63% high, 26% moderate and 11% are in low. This percentage level expresses the contribution level of the provided services for a factor of dialog between parties. We can observe that the majorities (63%) of the respondents are high level in the consumption of provided services and 26% in moderate and 11% consumer are in the low level for this factor. The figure 5 illustrates the portion of 9% high, 41% moderate and 50% are in low. This percentage level expresses the contribution level of the provided services for a factor of increase in the level of customer participation or involvement. We can observe that the majorities (50%) of the respondents are low level in the consumption of provided services and 41% in moderate and only 9% consumer are in the high level for this factor.

The figure 6 illustrates the portion of 7% high, 63% moderate and 30% are in low. This percentage level expresses the contribution level of the provided services for a factor of customer learning from the practice of involving supplier. We can observe that the majorities (63%) of the respondents are moderate level in the consumption of provided services and 30% in low and only 7% consumer are in the high level for this factor.

### Discussion of the results

The sample consisted of 46 employees of the industrial sewing machinery user (business organization) of a world class machine and service provider. The aim of this research is to identify some significant factors for value-in-use assessment of PSS.



**Figure .6** Impact/contribution of perceived service to the use process (customer learning from the practice of involving supplier).

To fulfill the aim immense literature study as well as collection of practical information related to the factors was performed. In this study by using a framework and statistical methods four significant factors are identified. The significant factors are Knowledge, skill and competence of the customer, Dialog between parties, Increase in the level of customer participation or involvement and Learning from the practice involving a supplier. From the test of correlation it is observed that these factors are in positive relationship. The correlations are then estimated by the regression analysis. The significant factors keep a combined impact on the use process. The reliability statistics is performed to find out the adequacy of the collected data and internal consistency of the respondents answer relevant to the different factors of the system and it is found that all the factors possess relatively high internal consistency. And then 9 factors are ranked on the basis of RII. The ranking is done on the basis of the response of the experts. The co-relationship among factors is not known from the RIIs value of the data. As validity is a unitary concept, it is found that all the factors are very important or valid for the adopted system of this study.

The table 5 depicts the relational mode of different factors. From this type of analysis we can find out the correlation of different factors as well as how different factors are interacting in the use process, which assist to find out significant factors.

From the descriptive statistics we found that impact/contribution of perceived service to the use process of the factors. For majority of the cases contributions are in the low and moderate portion and little in the high portion. This can be improved by reducing the dispersion of the provided services by service provider. Because of the dispersion there creates non-uniformity in the provision of services, and if this non-uniformity can be reduced then the use level of the provided service will improve. For the uniformity of the provision of the service the provider should take input from the customer site regularly. As the significant factors shows a combined impact on the customer use process, the provider should focus on those during designing of service/s.

Though some factors are significant in this research and have a combined impact on the use process but other factors also have an impact on the use process in an individual manner

## Conclusions

Now a day's innovative manufacturing firms could adopt a Product Service System (PSS) approach to gain competitive advantage. The target of our research was to identify significant factors for value-in-use assessment of Product Service System (PSS) in business to business sector. PSS defenses that frequently a pure product market approach is not the best way of satisfying the necessities and expectations of the customers. Usually a mix of products and services (combined together in a package solution) is a more effective approach. As new concept, PSS seeks value and so PSS provide routes for companies to move up the value chain and exploit higher value business activities. For these, we make a relational approach with different customer oriented components in this paper on the basis of an established framework. To gain relevant information from the relational approach further analysis is performed.

The analysis was performed on the basis of the collected data to find out significant factors by considering the statistical methods. The levels of contribution of the selected significant factors are expressed using descriptive statistics. The empirical findings from the study indicate that the provider organization is in lack of maintaining uniformity at the time of provision of service for different significant factors. This form of information will be propitious for the supplier or manufacturers organization for value generation process as well as to know the position of the organization to the consumer on the basis of the value-in-use.

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