

# DOES ENGAGING CUSTOMERS SUPPORT SMEs' INNOVATION? A SURVEY OF POLISH MANUFACTURING AND SERVICE COMPANIES

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## Abstract

The paper presents a study aiming to test the hypothesis that firms engaging customers in their business activities tend to display more innovativeness. In our approach, customers' engagement was operationalized as a multiple scale following the DART framework, originally developed by Prahalad and Ramaswamy (2000). Engaged customers are knowledgeable decision makers, who create (co-create) value by using products in the most suitable and unique way. DART acronym denotes four salient dimensions of co-creation: Dialog, Access, Risk and Transparency. Innovativeness was represented by a share of revenues from new and modified products. The data for the study was gathered in July and August 2014 through CATI interviews with managers of SMEs involved in manufacturing (food and beverage production) and services (hospitality and catering). The statistical methods, including EFA, CFA and multiple regression modeling, revealed that certain DART dimensions, such as Dialog and elements of Access and Risk, did coincide with increased levels of innovativeness.

**Keywords:** co-creation, DART model, innovation, SMEs, Poland

**JEL Classification:** D84, D220, L21, L25

## 1. Introduction

In the current knowledge driven economy, with its intense competitive pressures and growing power of consumers, more knowledgeable and connected via Internet, two themes are often cited as possible sources of a lasting business success: engaging customers through co-creation and constant innovation.

Co-creation emerged relatively recently out of the core competences theory (Prahalad & Hammel, 1991) and is considered to be part of the more general theoretical framework of Service Dominant Logic (SDL), originated by Vargo and Lush (2004). SDL stands in opposition to the

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traditional goods dominant logic in that – among other things – it postulates a different role for customers, who are supposed to become value co-creators and equal partners to companies, as value is not embedded in either the factory or the distribution process but is derived from the use of products and interactions between the company and customer (Vargo & Lush, 2006). In line with this reasoning, Prahalad and Ramaswamy proposed their DART model as an aid in implementing the co-creation in companies to enhance customers' role in value creation and innovation processes (Prahalad & Ramaswamy, 2004b). DART is an acronym that refers to the main components of the model:

1. **Dialog** that represents ongoing interactions between a company and its consumers in an unrestricted, content rich fashion and on equal terms.
2. **Access** which stands for tools and procedures – mostly communication related – that facilitate co-creation and increase freedom of choice for customers.
3. **Risk assessment** are measures that allow customers to fully evaluate risk involved in accepting a value proposition.
4. **Transparency** is the extent to which a firm has managed to mitigate the information asymmetry in relations between the company and its customers.

Even though there were other attempts at conceptualizing and operationalizing co-creation (e.g. by Grönroos, 2009; Yi & Gong, 2013) DART seems to have been most extensively described in the literature, though chiefly in conceptual papers or empirical studies that relied on qualitative evidence.

In previous studies, the relationship between co-creation and innovativeness was mostly concerned with the consequences of involving customers directly in innovation processes in companies. They usually reported positive results in that the share of innovative products was higher and failure rates lower in firms that sourced novel ideas as well as other insights from their customers (an extensive review of works in this area can be found in Bogers et al., 2010). This kind of co-creation is known as “innovation co-creation” or “co-creation for others”, which is contrasted with “experience co-creation” or “co-creation for use” (Gustafsson et al., 2012). To our knowledge, the latter type of co-creation, which corresponds to everyday consumption or use of products and services, was not investigated so far in the context of innovation on a large sample of service and manufacturing companies, which makes it a valid area for research. In our

study, by using DART as the operationalization scheme we attempted to account for a wide range of co-creation practices, in particular co-creation for use.

With regard to the outcomes of innovation activities, we choose to focus on broadly considered product innovations, which comprise any modification to existing product or service structure, functional features, aesthetics or utility, as well as introduction of entirely new offerings. In particular, as a measure of innovative success we used the percentage of revenues from new and modified products in sales for the whole year (2013) preceding the moment of data collection. This and similar metrics were employed in several other studies where performance of innovation processes was measured (e.g. Zeng et al., 2010, Ebersberger et al., 2012).

Considering the growing prominence of co-creation principles in business and the constant critical role of innovation in sustained competitive success, it is interesting to know how those two concepts interact. For that purpose, following the guidelines from the literature and our own observations, **we propose that involvement in co-creation is associated with higher innovativeness**. We undertook to verify this hypothesis in the rest of the paper by first discussing employed research methods, then summarizing the findings, to close with presenting our conclusions and outlining limitations of the study.

## 2. Research method

Data for the study were collected in July and August 2014 with CATI method and encompassed 408 fully usable cases (i.e. without missing values and obvious reply errors) for a response rate of 30%. The interviewed managers represented Polish small and medium companies involved in manufacturing of food and beverage (n = 201), and hospitality, tourism and catering services (n = 207). To ensure representativeness the sample was drawn from a database comprising almost every manufacturing and service company in Poland, maintained by a research agency that was hired to conduct the interviews.

To test our hypothesis of a positive link between involvement of firms in co-creation with consumers and innovativeness we used exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and multiple linear regression.

The central part of our research instrument was a multi-item Likert scale for establishing the extent of the DART model implementation (Table 1). In developing the statements for that scale we were informed by several earlier works, in particular Mazur & Zaborek (2014), Albinsson et al. (2011), Ruso Spena et al. (2012), Prahalad & Ramaswamy (2000, 2004a, 2004b,

2004c). The DART framework, even though it is admittedly a popular way to conceptualize co-creation, does not have a fully validated set of scale items for use in quantitative research. In addition, there is controversy as to the underlying structure of the latent variables (Mazur & Zaborek, 2014). In particular it is not clear in the face of extant empirical evidence if the scope of the DART concept is best represented by only four constructs – as originally proposed by Prahalad and Ramaswamy (2004) – or it is a more complex composition with more hidden variables, accounting for various aspects of co-creation. One of the apparent reasons for this uncertainty is owing to the fact that DART was first developed through a series of case studies and most of later research, where it served as a guiding framework, was also of qualitative nature. Considering that scale validation methods are distinctly different in the qualitative versus quantitative approach (qualitative researchers cannot look at covariance matrices, but have to rely instead on various pattern matching schemes, as suggested by Yin, 2011), it seems warranted to start the analysis with EFA. In our study we used the maximum likelihood EFA procedure in SPSS 22 to see if the theoretical, four latent variable structure also holds for our data. As it turned out, we identified seven hidden variables that correspond to Dialog, Transparency, two different aspects of Access, two aspects of Risk and a single new factor that depicts the use of internet in consumer communication. Consequently, in the second step, we used that latent variable structure to build and validate the measurement model via CFA, with the AMOS 22 software (see Table 1 for the results). Once the measurement model yielded acceptable fit metrics we saved the factor scores as new variables and used them as predictors in the multiple regression modeling, which concluded the statistical data processing for this study.

A word of explanation is needed as to why we decided against building a full structural equation model (SEM) to verify our hypothesis. The main reason was that in our particular case the displays for the equivalent SEM would be too complex to present concisely in such a short paper, while not providing any substantial advantage over a regular regression analysis. Specifically, we would have to present two models, separately for manufacturing and service companies. Each of them would have to accommodate a set of rather confusing covariance links between the seven first order factors since it was impossible to fit an adequate model with a single second level construct standing for a hypothetical unified co-creation involvement variable, which would simplify the displays markedly. Also, the regular multiple regression makes it easier to represent interactions between predictors, which we suspected could be present in our data.

### 3. Research findings

As a starting point we will report our CFA results. Here, the major issue was to establish if the manufacturing and services firms exhibited any distinct differences in their respective DART measurement models. If they turned out to be the same, then a single, pooled measurement model could be used; otherwise two models would be needed. To address this issue a measurement invariance test was performed. In that test two models were statistically compared: the one with each group having independently estimated parameters (the so called unconstrained model assuming that the firms are different) and the second having the same regression weights for both groups (i.e. the specification with constrained measurement weights that asserts that both kinds of companies were described by the same DART model). The resulting chi-square value of 22.066 ( $p = 0.106$ ) indicated that the firms could not be pooled together and treated as a single group and instead the models should be estimated separately. The unconstrained model had significantly better data fit as compared with the constrained one, but that does not mean that each and every parameter was different across both models. The significance of specific pairwise differences was assumed whenever critical ratios fell beyond the range of -1.96 and 1.96. In those cases where significance was established regression weights were marked in bold.

**Table 1. CFA measurement model of DART framework for manufacturing and services firms**

Indicator content	Regression weights from parent construct to indicator	
	for manufacturers	for service providers
<b>Dialog</b> (Manufacturers: AVE = 0.62, Cronbach's Alpha = 0.81, MSV = 0.18; Services: AVE = 0.56, Cronbach's Alpha = 0.76, MSV = 0.48)		
D_1: We systematically engage in dialog with consumers of our products / services.	0.92	0.89
D_2: We use special means to encourage consumers to have dialog with us.	0.98	0.89
D_3: One objective of our dialog with customers is generating ideas for new and modified products / services.	<b>0.59</b>	<b>0.45</b>
D_4: Dialog with consumers enables us to learn about their experiences with our products / services.	0.58	0.66
<b>Access 1</b> (Manufacturers: AVE = 0.54, Cronbach's Alpha = 0.68, MSV = 0.14; Services: AVE = 0.60, Cronbach's Alpha = 0.62, MSV = 0.09)		
A_1: Consumers can freely choose the time of product delivery / service provision.	<b>0.74</b>	<b>0.98</b>

A_2: Consumers can decide about certain elements of our products/services that influence their looks and/or utility.	<b>0.68</b>	<b>0.48</b>
<b>Access 2</b> (Manufacturers: AVE = 0.51, Cronbach's Alpha = 0.65, MSV = 0.22 ; Services: AVE = 0.28, Cronbach's Alpha = 0.61, MSV = 0.56)		
A_3: Consumers can always choose their preferred payment method.	<b>0.41</b>	<b>0.28</b>
A_4: Consumers can always choose their preferred method of communicating with us.	<b>0.76</b>	<b>0.58</b>
A_5: Consumers can readily learn specifics of our offer.	<b>0.88</b>	<b>0.66</b>
<b>Risk 1</b> (Manufacturers: AVE = 0.72, Cronbach's Alpha = 0.71, MSV = 0.31; Services: AVE = 0.56, Cronbach's Alpha = 0.64, MSV = 0.53)		
R_1: Consumers can entirely consciously make their purchasing decisions because we inform them fully about the benefits of our products/services.	0.69	0.72
R_2: Consumers can entirely consciously make their purchasing decisions because we inform them fully about the risks from using our products/services	<b>0.98</b>	<b>0.77</b>
<b>Risk 2</b> (Manufacturers: AVE = 0.52 Cronbach's Alpha = 0.82, MSV = 0.31; Services: AVE = 0.61, Cronbach's Alpha = 0.79, MSV = 0.35)		
R_3: We discourage from buying those consumers for whom we believe our products/services are not appropriate.	0.74	0.80
R_4: We encourage consumers to learn the detailed information about using our products/services.	0.77	0.84
R_5: We sometimes modify user manuals and/or other information based on negative feedback from consumers about their product/service experiences	0.64	0.69
<b>Transparency</b> (Manufacturers: AVE = 0.44, Cronbach's Alpha = 0.63, MSV = 0.25; Services: AVE = 0.28, Cronbach's Alpha = 0.48, MSV = 0.56)		
T_1: All information that we disseminate is reliable.	<b>0.78</b>	<b>0.68</b>
T_3: We follow an open information policy since we have nothing to hide.	<b>0.88</b>	<b>0.71</b>
T_5: We don't try to hide when we are blamed for something; we address such charges openly.	<b>0.48</b>	<b>0.32</b>
T_6: If we happen to make mistakes we admit to them publicly.	<b>0.43</b>	<b>0.23</b>
<b>Internet Use in Customer Communication</b> (Manufacturers: AVE = 0.68 Cronbach's Alpha = 0.82, MSV = 0.25; Services: AVE = 0.51, Cronbach's Alpha = 0.75, MSV = 0.46)		
A_6: Information about our offer are readily available for consumers on our web site.	0.89	0.84
T_2: Information published on our web site is up to date.	0.81	0.76
T_4: We immediately reply to questions from our current and potential customers.	<b>0.77</b>	<b>0.49</b>
<b>Overall fit metrics for the entire measurement model:</b> Chi-squared/df=1.344; GFI=0.908; AGFI=0.869; CFI=0.928; RMSEA=0.028; PCLOSE=0.876.		

Source: own work.

According to threshold levels given in Garson (2012), general fit indices given at the bottom of the table show that the measurement model fits the data well, which in this case means that the covariance matrix computed from the model closely resembles the empirical covariance matrix. However, it cannot be missed that indicators obtained for individual constructs clearly point at some deficiencies in the model. Most notably, it is clear that DART is better suited for manufacturing companies than for service providers. Among manufacturers, each construct has a satisfactory level of average variance extracted from its indicators (AVE of more than 50%) and there are no issues with discriminant validity (AVE was greater than MSV which stands for maximum shared variance). On the other hand, with service companies some constructs are rather difficult to interpret due to low AVE coefficients and AVE being lower than MSV. Specifically, the factors Risk 2 and Transparency explain little variance in its indicators and are too similar to other factors. This finding is consistent with our previous research on DART (Mazur & Zaborek, 2014), where – using different sample – we concluded that the DART framework works better for manufacturing companies, possibly because it was originally developed from a qualitative investigation of several manufacturing firms. Even though services firms are generally worse represented by the model, for other factors then the problematic Risk 2 and Transparency, reliability and validity is at least adequate, and Dialog and Risk 1 have measurement models equivalent to manufacturers’ (as indicated by insignificant differences between regression weights). This could imply that those two aspects of co-creation are universal and valid regardless of the nature of business operations.

As a general note, the regression weights in Table 1 should not be interpreted as telling which indicators are more prevalent among which type of firms, or that manufacturing firms are involved more in co-creation. Rather, they show where the DART model is more accurate and reliable and where it is somewhat lacking.

What also needs to be commented on are the interpretations of the “split” factors labeled Risk 1 and 2, and Access 1 and 2. Risk 1 seems to encapsulate the more passive aspects of addressing the danger and inconvenience involved in purchasing wrong products or inadequate services, as it calls for providing right information to consumers. In contrast, Risk 2 is more dynamic, since it requires specific activities targeted at particular needs and circumstances of individual customers. Access 1 concerns practices that can provide substantial benefits to customers, such as home delivery or custom made products. On the other hand, Access 2

components are about more intangible characteristics, which mostly rely on availability and transfer of information. Hence, it appears that dividing Risk and Access had well founded substantive reasons and was not performed only due to statistical criteria.

To enable further analysis, the regression weights of Table 1 were used to create factor scores for each case in the sample, which resulted in 7 new variables representing aspects of co-creation based on DART. These new variables were entered into a regression equation as predictors. In addition, to control for two important characteristics of firms, the regression model was supplemented by the economic sector variable (0 for manufacturing and 1 for services) and size of the company measured by the number of employees. The last model specification task was to check for interactions between economic sector and other variables and input significant ones into the equation. The resultant model is depicted in Table 2.

**Table 2. Parameter estimates of the multiple regression model**

*Dependent Variable: Percentage of New and Modified Products in Total Revenues; R-squared for the model = 0.181*

Parameter	B	Std. Error	t	p-values	95% Confidence Interval		Partial Eta Squared
					Lower Bound	Upper Bound	
<b>Intercept</b>	24.894	1.915	13.002	<b>.000</b>	21.130	28.658	.299
<b>Dialog</b>	4.290	1.662	2.581	<b>.010</b>	1.022	7.558	.016
<b>Access 1</b>	3.802	1.719	2.211	<b>.028</b>	.422	7.182	.012
Access 2	-4.169	3.370	-1.237	.217	-10.795	2.457	.004
Risk 1	1.418	2.302	.616	.538	-3.107	5.943	.001
<b>Risk 2</b>	5.197	1.814	2.864	<b>.004</b>	1.630	8.763	.020
Transparency	-1.527	2.733	-.559	.577	-6.899	3.845	.001
Internet Use	3.487	3.371	1.034	.302	-3.141	10.115	.003
<b>Economic Sector</b>	14.962	2.868	5.217	<b>.000</b>	9.324	20.600	.064
No. of Employees	1.405	1.267	1.109	.268	-1.086	3.896	.003
<b>Internet Use * Economic Sector</b>	-7.035	3.280	-2.145	<b>.033</b>	-13.484	-.587	.011

Source: own work.

As indicated by the R-squared value, the whole set of predictors accounted for 18.1% of the variance in the dependent variable. Further investigation of model quality did not show any problems with multicollinearity, non-normal distribution of residuals or heteroscedasticity (due to space constraints we chose not to enclose specifics of these tests in the paper).



There were six significant parameters in the model: the intercept, Dialog, Access 1, Risk 2, Economic Sector and the interaction between Internet Use and Economic Sector. Effect sizes of individual predictors can be determined from eta squared coefficients, which reflect the proportion of unique variance in the dependent variable explained by each predictor (Field, 2013). The variable with the apparently strongest effect on Percentage of New and Modified Products was Economic Sector, which was a dichotomous attribute coded 0 for manufacturing and 1 for services. Here, with all the other predictors held constant, service providers had, on average, 14.96% more revenues from new and modified products than manufacturers. The second most important predictor was Risk 2, closely followed by Dialog 1, and Access 1. For these aspects of co-creation the b values were positive, meaning that increased levels of involvement, *ceteris paribus*, corresponded with higher levels of innovativeness. Relatively weakest was the effect of the interaction, whereby the increased Use of Internet in consumer relations was more characteristic of less innovative service companies (coded as 1 on the Economic Sector variable), while in manufacturing firms Internet Use was not linked with any systematic differences in innovativeness. The intercept had an actual practical interpretation since all the metric predictors were standardized before being entered into the model and the only categorical variable – Economic Sector – could legitimately take a 0 value. As such, the intercept was the percentage of new and modified products in revenues for a hypothetical manufacturing company with all the metric predictors set at their means (which equal 0 for standardized variables). This number (24.89%) was very close to the average for all manufacturers (23.99%) and quite distinct from the mean for service companies (38.95%).

To conclude the overview of the model, **there was a significant positive effect between involvement in co-creation, as operationalized by the DART model, and innovativeness. However not all aspects of co-creation were associated with higher levels of innovation, which gives only partial support to our research hypothesis.**

#### **4. Conclusions and limitations**

Our study findings are in general agreement with Gustafsson et al. (2012), who surveyed 334 managers to investigate communicative aspects of co-creation in terms of frequency, direction, modality and content (it should be noted, though, that in contrast to our project the scales employed by those authors were more concerned with innovation co-creation than experience co-creation). They found that frequency, direction and content of communication with customers was

corresponding to higher innovation success rates when innovations were incremental. For radical innovations, only frequency of communication mattered. Even though we did not distinguish in our survey instrument between radical and incremental innovations, it seems certain that the vast majority of innovations in the investigated industries were of the latter kind.

Considering that dialog is “a form of reflective conversation that enables actors to alter managers’ mental models through conscious, critical exploration” (Jacobs & Heracleous, 2005) it is not surprising that its association with innovation was positive. After all, innovation – especially that of a strategic kind – calls for shifts in existing mental models. Intense dialog with customers was found before to be conducive to more intense and effective innovation practices (e.g. see a case study by Ayuso et al., 2006).

The other significant predictor in the model (Access 1) involved highly interactive practices that engaged consumers in the process of determining the features of their desired offerings. Such interactions, in addition to providing increased utility to customers, are information rich for firms, which naturally leads to a higher chance of acquiring useful insights for product innovation.

The Risk 2 variable represents an active involvement on the part of the company to ensure that its products are bought only by customers who can fully benefit from their features, sometimes at the cost of discouraging those customers for whom the products would not be appropriate. Such an attitude and behavior promotes trust (which facilitates dialog) and gives additional opportunity to glean insights from customers, which can inspire creative ideas for modifications and completely novel offerings.

Interestingly, for service firms the internet use had a mildly negative association with revenues from innovative products. One possible explanation is that many service companies in hospitality, tourism and catering rely on the internet as a sales channel, and so it may not be uncommon for them to mostly exchange only such information that is necessary for closing transactions. It can be argued that such exchanges, tending to be routine and mechanical, do not support the true dialog and thus have no positive effect on innovativeness. In addition, the studied firms were involved in services that at some point required a face-to-face contact. These direct interactions provided ample opportunities for dialog with consumers, that arguably could make for a richer communication than internet exchanges.

From the academic perspective, the study contributed by provided further empirical evidence for the validity of the DART model, suggesting that its actual measurement structure could involve 7 instead of 4 hidden variables. Moreover, this conceptualization of co-creation appears to be more suitable for description of manufactures than service providers, but in terms of its Dialog and Risk 2 components both industries seem to show similar association patterns.

Among the limitations of the current study the most obvious is the used conceptualization of the co-creation concept. Admittedly, the DART model is not perfect and it is not unconceivable that a different approach could bring unlike results. However, seeing that Dialog or its close equivalents are central elements of any co-creation concept, we are convinced that with alternative methods of operationalizing the possible differences will likely concern the magnitude of the effect sizes and not their direction, which should remain positive. Finally, the fact that the study was carried out in a single country and on a limited selection of industries (food, beverage, hotels and travel services) do not guarantee that the same patterns are to be found in other countries and industries.

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