Customer Knowledge Co-creation Process in New Product Development

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Abstract— Customer knowledge has been increasingly accepted as a key strategic resource in any company's success. It has been recognized in marketing as a significant resource that can be managed to support R&D, to improve innovation, to facilitate the sensing of emerging market opportunities and to support the management of long-term customer relationships.

Technology can facilitate gathering and analyzing customer data as well as transferring customer information in an organization, but they are weak in converting the information to knowledge, because knowledge is strongly related to a person or a group of people. Knowledge management (KM) enables Customer Relationship Management (CRM) to expand from its current "mechanistic, technology-driven, data-oriented approach" towards more holistic, complex, and insightful ways of developing and using customer knowledge. Customer Knowledge Management (CKM) is described as an ongoing process of generating, disseminating and using customer knowledge within an organization and between an organization and its customer.

This paper promotes the framework to describe the customer knowledge flow in the every stages of NPD process to co-create the customer knowledge, by the interaction of the knowledge agent from the company with the customer. This will fill the lack of understanding of CKM implementation in NPD.

Index Terms — CKM, Knowledge Co-creation, NPD.

I. INTRODUCTION

Costumers today have more choices of products and services than ever before, but they seem dissatisfied. Firms invest in greater product variety but are not able to differentiate themselves. Growth and value creation have become the dominant topics for managers [1]. Many research show direct evidence the positive effects of knowledge management implementation on innovative works [2][3].

One of the indicators of a company's competitiveness is the ability to develop new products [4][5]. NPD project itself needs an efficient strategy to achieve good performance, such as to shorten time to market, provide good feedback and rapid response to customer needs [6]. Leonard [7] adds that the ability to absorb knowledge of the market is an important

component in NPD process.

Many studies are conducted to develop a model of knowledge management and implementation of knowledge management system to improve the performance of NPD. [8] Jiang and Li [8] examined the relationship between knowledge management and the performance of innovation. Lin et al. [9] proved that in the knowledge-based companies, NPD can be designed and managed in different ways. Belbaly, et.al, [6] developed a model of knowledge creation in the utilization of costumer knowledge to improve the performance of NPD. Kolbacher [10] developed a model of knowledge co-creation in NPD to foster the NPD performance. Schulze and Hoegl [11] developed a model of knowledge creation in the relationship SECI framework on the concept and development stage in NPD projects. Jiang and Li [8] examined the relationship between knowledge management with the performance of innovative activity in the case of alliances. From the studies, it is found that the implementation of knowledge management in NPD can improve the performance of new product. The evidence recommends the success of NPD depends on the ability to understand the technical and market knowledge combined with existing product and the adaptation of this knowledge is to support NPD [12][13][14].

The CKM that will be discussed in this paper is the customer knowledge that is managed to design and develop new product. The success CKM implementation increases the creation of the new knowledge. The knowledge co-creation in CKM that is going to be discussed is the knowledge that is created from the collaboration of the company with the customers.

II. THEORITICAL BACKGROUND

This paper is inspired by Kohlbacher's [15] that promote the framework of knowledge-based marketing and knowledge co-creation in the business ecosystem. He identified four cores marketing process (SCM, market research, CRM, and PDM) in which knowledge co-creation plays an essential role as seen in Fig 1.
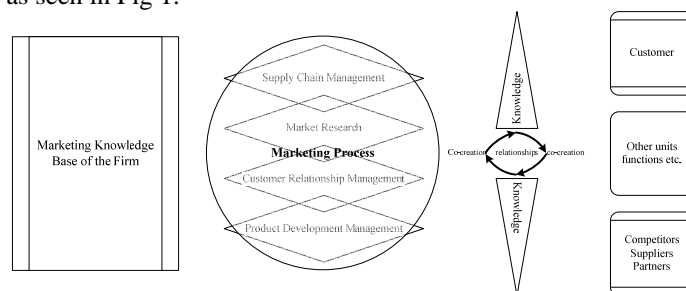

Fig 1.   Knowledge-based marketing processes (integrated model) [15]

Table 1. CKM versus KM and CRM [18]

	KM	CRM	CKM
Knowledge Sought in	Employee, team, company, network	Customer Database	Customer experience and creativity
Axioms	"if only we know what we knew"	"retention is cheaper than acquisition"	"if we only knew what our customer know"
Objectives	Sharing knowledge about customer among employees	Mining knowledge about the customer	Gaining, sharing and expanding knowledge of (inside) the customer. Individual or group experiences in application, competitor behavior, possible future solution, etc
Role of Customer	Passive, recipient of product	Captive, tied to product by loyalty schemes	Active, knowledge partner
Recipient of Incentives	Employee	Customer	Customer
Corporate Role	Lobbying knowledge boarding employees	Captive customers	Emancipate customers
Business Objectives	Efficiency and speed gains, avoidance of re-inventing the wheel	Customer base nurturing, maintaining our customer	Collaboration with customers, joint value creation
Conceptual Base	Customer retention	Customer satisfaction	Customer success, innovation, organizational learning
Business Metrics	Performance against budget; Customer retention rate	Performance in terms of customer satisfaction and loyalty	Performance against competitors in innovation and growth; Contribution to customer success

A. Marketing Knowledge and Knowledge-Based Marketing

Kohlbacher [15] has developed a conceptual framework of knowledge-based marketing and the essential processes of marketing knowledge co-creation among the main actors in the business ecosystem – or network – of which global firms are a part – customers, suppliers, competitors, and business partners (Fig 1). While traditional marketing approaches have focused too much on explicit knowledge and neglected the important role of tacit knowledge, specifically in international (cross-cultural) settings, Kohlbacher's approach aimed to adjust this imbalance in the extant literature and proposed a new knowledge-based marketing paradigm where knowledge and knowledge co-creation is the key to sustainable competitive advantage in the global network economy. As much of marketing knowledge is tacit and hard to codify, face-to-face communication and the integration of local staff into marketing processes and decision-making is an important factor in global marketing knowledge sharing, one that that leads to successful marketing and sales [15].

Hanvanich et al. [16] argue that while marketing scholars have been interested in the topic of marketing knowledge, "they have focused mainly on how firms acquire, disseminate, and store knowledge", with related research areas being market orientation and organizational learning. Kohlbacher [15] defines marketing knowledge as "all knowledge, both declarative as well as procedural, concerning marketing thinking and behavior in a corporation". Taking a new approach to re-conceptualizing marketing knowledge and innovation, Hanvanich et al. [16] claim that "marketing knowledge resides in three key marketing processes: Product Development Management (PDM), Customer Relationship Management (CRM), and Supply Chain Management (SCM)". This notion is based on Srivastava et al.'s [17] framework that redefines marketing as a phenomenon embedded in the three core marketing processes of PDM, SCM and CRM.

B. Customer Knowledge Management

Gibbert et al. [18] research shows that by managing the knowledge of their customers, corporations are more likely to sense emerging market opportunities before their competitors, to constructively challenge the established wisdom of "doing things around here", and to more rapidly create economic value for the corporation, its shareholders, and last, but not least, its customers. CKM is the strategic process by which cutting edge companies emancipate their customers from passive recipients of products and services, to empowerment as knowledge partners. CKM is about gaining, sharing, and expanding the knowledge residing in customers, to both customer and corporate benefit.

At first glance, CKM may seem just another name for Customer Relationship Management (CRM), or Knowledge Management (KM). But customer knowledge managers require a different mindset along a number of key variables (see Table 1). Smart companies realize that corporate customers are more knowledgeable than one might think, and consequently seek knowledge through direct interaction with customers, in addition to find the knowledge about customers from their sales representatives. Conventional knowledge managers typically focus only on trying to convert employees from egoistic knowledge hoarders into altruistic knowledge sharers [19].

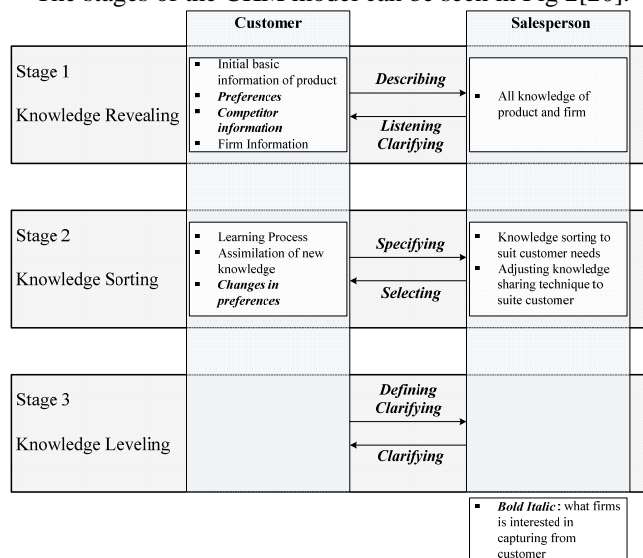The stages of the CKM model can be seen in Fig 2[20].

Fig 2. Stages of The Model [20].

Step 1: Knowledge revealing

When the customer and salesperson come together, they both bring their knowledge and experience to the interaction.

In this face-to-face meeting the sales person seeks the customer needs to be satisfied. The needs can be for a product or service. On some occasions the customer knows well what they intend to buy but in other circumstances, the customer may not be oriented and expected to find information at the store. Although the customer does not expect to be educated about a particular product, they could learn something at the store. On some occasions they may be lucky and find a helpful salesperson that is willing to offer some advices. In CKM the role of the salesperson changes considerably and, instead of just providing basic information about a location or availability of a product, he becomes an attentive listener who is trying to understand the customer's needs. In addition to informing, the salesperson can gather knowledge from the customer about [20]:

- Preferences with respect to the product or service, such as color, size, shape, textures, style for products and requirements for services;
- Competing products and in particular the attributes that are appealing about them; and even
- Industry trends such as incoming products or services.

Step 2: knowledge sorting

While the customer expresses what they know and their preferences, the salesperson begins to create a mental map of user needs. Based on customer needs, the salesperson will begin to identify the pieces of knowledge that can help the costumer in their particular situation. To help a customer make a decision, the salesperson sorts knowledge relevant to that particular individual regarding product characteristics, functional attributes, information about common problems, substitute products, maintenance information, quality records, competitive products, and options. The knowledge identified by the salesperson should be articulated and presented to the customer not necessarily as pressure for a sale but as a genuine effort to assist in the decision-making process. The customer in turn feels more comfortable making a decision that satisfies their needs and returns to the store to satisfy future needs. The determining factors, in this sorting mechanism, are the customer's knowledge of the product and firm, the amount of information the customer needs, the type of information appropriate to meet the customer's needs, and the time available for the interaction. Once the factors have been initially determined, the salesperson presents the pieces of knowledge he has identified to the customer. This facilitates the process of creating long-term partnership with the customer [20].

Step 3: knowledge leveling

At this point of the interaction, the customer has obtained general information about the products and services. Similarly the salesperson has an idea of customer preferences and needs. Because complete understanding might not have been achieved initially and because preferences change over the course of the interaction, this third step in the process involves reaching an understanding of the needs and perspectives of both parties. It is important for the sales-person to have a clear idea of customer needs after exchange of knowledge has taken place and for the customer to realize the type of information that he requires to make a decision.

Although this step is necessary to satisfy the user, the company benefits the most from the initial encounter. This is because once the customer is aware of the options available at the store he will have to adjust his preferences to what is actually available. It may be useful then for a company to make a distinction in the company's knowledge base between actual and modified preferences [20].

Customers, are like employees, are often not able to make knowledge, i.e. their experiences with the company's products, their skills, and reflections explicit, and thereby easily transferable and shareable. The alternative solution to these problems is customer knowledge managers put themselves in the shoes of corporate customers, inspiring customers' intrinsic, rather than extrinsic motivation to share their knowledge for the benefit of the company [18]. The reason why we make this distinction is because we are assuming an interactive process of knowledge exchange between the firm and the customer where sometimes the customer provides information while other times the firm does [20].

CKM collects large amounts of data about customers and their transactions to help companies understand the behavior of their customers through advocates of CRM argue that that it improves customer retention and satisfaction by providing customer-tailored services [21].

C. Dimension of CKM

Some companies assess the CKM as a difficult and only a few that can run it well [18][23]. One of them is the absence of area adequate framework for understanding the CKM [24]. And it is also because the CKM defined and implemented in a very diverse and depends on how defined CKM, CKM exceeds the number of functional areas in the company's existing [22] [25].

Focus group found that the organization recognizes four types of CKM, and each type using knowledge in different ways. These four dimensions form a conceptual framework that will demonstrate understanding and CKM position within the company (Fig 3).
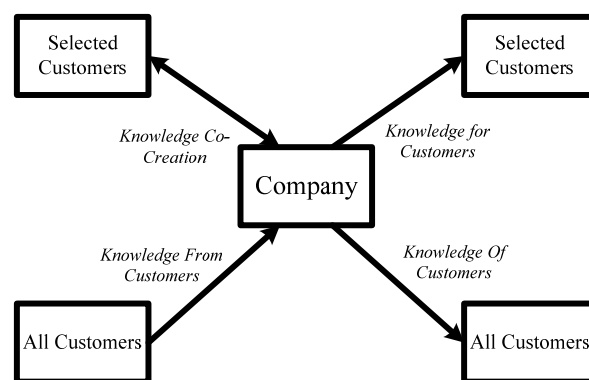

Fig 3. A Conceptual Framework for CKM [26]

- Knowledge of customers

Knowledge about customers is the primary sense of CRM systems and data mining. But not only include basic data about the costumer (i.e. name, contact information), but also include records of transactions with the organization's customers, products and services selected and the specific personal preferences (e.g. language, communication

methods). With this kind of knowledge, the goal of CKM is to form a view of an integrated and comprehensive business and costumers preferences through all business function, and audience interaction point [24].

- Knowledge for customers

These include all provided by the organization to its customers [22]. This sort of knowledge is more focused on information and specifics on products and services developed by the marketing or R & D, with the help of e-business, customers benefit from the knowledge that more companies. Examples are done by Google, e-Bay and Amazon.

- Knowledge of customers

Customer is a strategic opportunity for learning because the knowledge that the company owned by the customer against the knowledge of the customer [18]. This is the domain of customer service or marketing. Understanding what is known customers, namely their experience with the company, customer needs and how companies treat customers, and controls the emotion and function of this relationship is important but often overlooked by organizations knowledge. This feedback helps the company to continue to develop products and services, determine market segments more effectively, builds good business strategy and creating new products and innovative services [25].

- Knowledge co-creation

This type of costumer knowledge obtained from two-way relationship. Here knowledge management becomes a way to facilitate interaction between customers and companies to form new knowledge, the products and services. An example is what is done by Microsoft to Beta versions of software to gain knowledge of the costumer as part of Microsoft's new product will be launched to the market. Involving customers to better work together in the knowledge co-creation is one of the biggest challenges faced by managers of knowledge [23]. The customer knowledge management cycle is as shown in Fig 4.

III. IMPLICATION FOR THEORY AND RESEARCH

From the literature review, the definition of stages in CKM and the knowledge creation is already clarified. Now it is required to develop the knowledge co-creation process in NPD stages, and it begins by defining the customer knowledge co-creation process in NPD so it will encourage the identification of the success factor.

A. Benefits and Outcomes of Customer Knowledge

The outcome of the customer knowledge process benefits to both the customer and the firm. From a better understanding of the customer, the company will have more understand the true needs and expectations of the customer. This is because transactional data only reflects the satisfying (satisfying behavior is a relaxed assumption based on the assumption of rational behavior commonly used in economics. It means that agents will not necessarily reach the most optimal choice because of high transactions costs.

Instead they satisfied, or choose an option that is good enough under the constraints that they face listening to the customer will reveal knowledge that customers bring to the transaction. These pieces become increasingly valuable when they are collected because they can help identify trends and patterns about multiple aspects of the product and the customer [20].
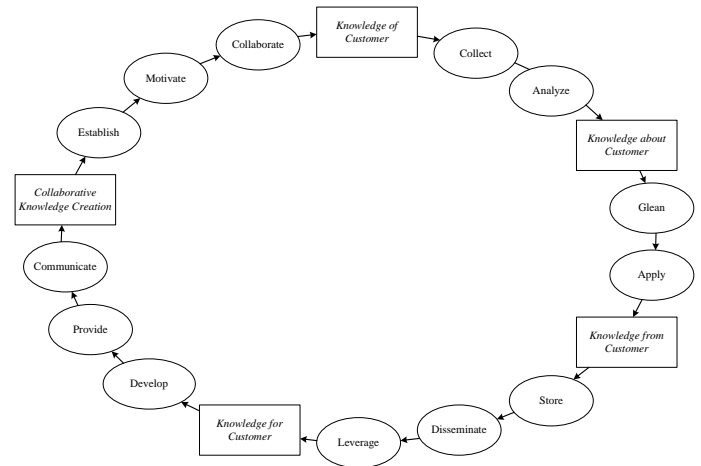

Fig 4.   Knowledge co-creation Cycle in Customer Collaboration [27]

While the firm learning from its customers, customers also benefit from the hunches, insights, and intuition of other customers, which are conveyed to them by the salesperson. Meeting the customer's needs by taking the time to listen to them and later providing knowledge will foster the relationship between the customer and the firm. The company will acquire knowledge that will assist in product innovation and improvements. Better relationships with the customer leads to increasing sales and acquiring new customer [20].

IV. CUSTOMER KNOWLEDGE MANAGEMENT PROCESS IN NEW PRODUCT DEVELOPMENT

The conceptual model of customer knowledge co-creation in CKM for NPD implementation can be seen in Fig 5 and the description of each element can be seen in Table 2.
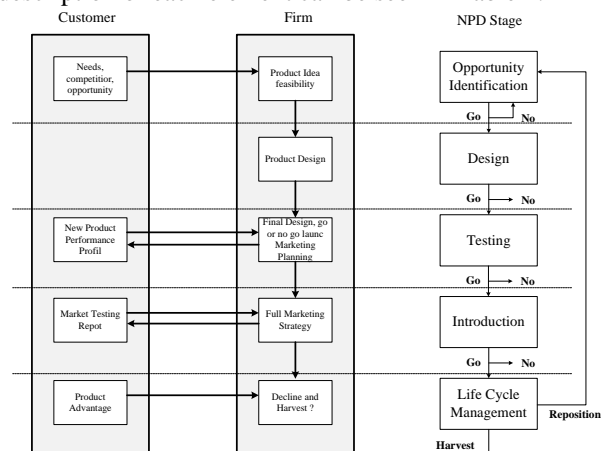

Fig 5.   The Information Flow in between the Customer and NPD Agent of the Company

This model and description is developed using the NPD model by Urban and Hauser [28] and Barker and Hart [29].

Table 2. The Detailed Information Process of Customer Knowledge Management Implementation in New Product Development

NPD Stages [28]	Description [28][29][30]	Information needed for stage; nature of information [30] [31]	Information Sources [29]	Likely output of stage in light of information [28][29][30]
Opportunity Identification	Explicit statement of new product strategy	- Strategic planning - Company objectives - Business opportunity analysis - Preliminary market and technical analysis, company objectives	Generated as part of continuous MIS and corporate planning	Identification of market opportunities to be exploited by new products.
	Idea gathering and generation	- Customer requirements and technical developments in previously identified markets - New product idea evaluation	- Inside company: salespeople, technical functions. - Outside company: customers, competitors, inventors, etc	Body of initially acceptable ideas
	Idea screening: finding the most potential idea	- Assessment of whether there is a market for this type of product, and whether the company can make it. Assessment of financial implications: market potential and costs. Knowledge of company goals and assessment of fit	Main internal functions: - R&D - Sales - Marketing - Finance - Production	Ideas which are acceptable for further development
Design	Concept development: transforming from idea to product recognized concept, with identified market attribute and position from engineering, advertising and marketing activity.	- Explicit assessment of customer needs to appraise market potential. Explicit assessment of technical and design requirements - Product specification	Initial research with customer(s). Input from marketing and technical functions.	Identification of key attributes that need to be incorporated in the product, major technical costs, design, target markets and potential
	Business analysis: full analysis of the proposal from business potential perspective	- Fullest information thus far: - Detailed market analysis - Explicit technical feasibility and costs - Production implications - Corporate objectives	Main internal functions customers.	Major go-no go decision: company needs to be sure the venture is worthwhile as expenditure dramatically increases after this stage. Initial marketing plan. Development plan and budget specification
	Product development: - Product crystallization to the completed product the product that satisfy the customer needs - Market research to define the objective and establish the product trade-off.	- Customer research with product. Production information to check 'makeability' of product or service design - Product concept development	Customers Production	Explicit marketing plans
Testing	Test Marketing: small scale tests with the customers	- Prototype testing - Profile of new product performance in light of competition, promotion and marketing mix variables - Test market results and report	*Market research*: production, sales, marketing, technical people	Final go-no go for launch
Introducing	Commercialization	- Product crystallization from product specification - Defining launching strategy and technique	As for test market	Incremental changes to test launch Full-scale launch
Product Cycle Management			*Customer service and relationship*	The decision if the product will be revitalized, be re-positioned to other market, or be harvested

From Table 2 it can be seen for every stages of the NPD process all of the description of the activity, the information, source of information and the likely output of the every stage are defined. The objective that is completed in one stage will influence the success of next stage. This is very useful to set up the objective and the success factor of CKM implementation in NPD. This research will proceed to develop the performance measurement of the CKM in NPD implementation. The right measurement tools will ensure the advance of NPD performance that utilized by the CKM.

V. CONCLUSION

Areas related to knowledge management such as marketing and CRM have concentrated primarily to improve the performance of NPD and innovation. As it is known that maintaining existing customer is much easier and cheaper than grabbing new customer, then the KM integration to the management of customer relationship and marketing will avoid the risk the new product fails in the market. From the detailed description in table 2, it can be seen that the physical interaction with the customer only absence at the design stage. But somehow as the relationship with the customer occurs in long term, the influence of the customer perception and knowledge in articulating the idea into a design should not be rejected. It means that the presence of the customer is in other form.

Although knowledge gained from personal interaction with customer can benefit companies, culture and incentives may have to be changed for the implementation success. Then constructing the success factors of the CKM implementation in NPD process by considering the KM enablers such as technology, structure, people and culture will be useful. It can be proceeds by developing the performance measurement tools for maintaining the benefits obtained from this implementation.

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