

Integrating Customer Knowledge in the Early Innovation Phase

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Abstract

Customer input has become a valuable component of the innovation process. The integration of customer knowledge into the early innovation phase requires special types of customers and methods and entails specific risks according to each stage. This article describes when and how customers can be integrated and how possible negative side effects can be avoided. Relying on intensive desk research, in-depth case studies, and workshops with nine companies that are experienced in customer integration, the authors explain in detail the theoretical and practical aspects of knowledge integration and give advice on minimizing unwelcome side effects.

Keywords: Early Innovation Phase, Customer Integration, Side Effects of Integration

Suggested track: Please indicate the suggested track for your paper (choose one from the list below):

- A. Managing organizational knowledge and competence
- B. Knowledge creation and innovation, e.g., in R & D**
- C. Knowledge sharing within and across organizations and cultures e.g., in off-shoring arrangements
- D. Micro, meso and macro institutional factors affecting knowledge and learning
- E. The relationship between knowledge and power
- F. Communities of practice, knowledge networks and networking
- G. Practice-based perspectives on knowledge and learning
- H. Dynamic capabilities
- I. Intangible assets and social, intellectual and cultural capital
- J. The relationship between individual, team and organizational learning
- K. Leadership and Human Resource Management in knowledge-based organizations
- L. The nature of knowledge work and knowledge workers
- M. The role of information technology in knowledge management and collaboration
- N. The importance of knowledge management in IT design, implementation and use

Introduction

Innovations are essential for securing and expanding a company's position in the market (Larson, 2001).

The more recent integration of customers into the innovation process complements the longer-standing cooperation with suppliers and scientific partners in this field. The trigger for customer integration is the high failure rate of innovative products (Atuahene-Gima, 1995). Customer integration can reduce this rate: customers know what they want and need and thus guarantee that new products developed accordingly will satisfy the market. At the same time customers constitute a reliable buyer potential. In addition, an early customer integration minimizes the risk of a later change of construction due to customers' wishes and so prevents an increase in costs and a reduction of profits caused by a delayed market introduction (Atuahene-Gima, 1995; Bacon & Beckman, 1994; Kohli & Jaworski, 1990; Murphy & Kumar, 1996; Murphy & Kumar, 1997).

These recognized positive effects of customer integration have led to the almost general consensus that customer knowledge is an indispensable prerequisite for a successful early innovation phase where it has the biggest impact on R&D activities (Biemans, 1991). However, growing experience with customer integration has shown that the involvement of customers, advantageous as it is, entails negative side effects as well, such as dependence on customers or loss of know-how among other unwelcome aspects. The practice is interested in guidelines on optimizing the positive and minimizing the negative side effects of customer integration.

This article, mainly addressing innovation managers, concentrates on how to integrate in the most effective way customer knowledge into the early innovation phase while avoiding negative side effects as far as possible.

The first part focuses on the practical aspects of customer integration in each segment of the early innovation phase, giving advice on what kind of customer should be integrated when and with which methods. In an altogether new approach the various customer types are allocated to the diverse segments and their specific methods.

The second part centers on the negative side effects of customer integration, which may, but need not, occur in all sub-phases. To avoid repetition, these effects will be

discussed coherently and not in the context of each phase, pointing out, however, when a negative effect is most likely to occur.

Research methodology and data sample

The results presented and analyzed below were gained in a research project running from October 2003 to August 2004 and concentrating on all aspects of customer integration. A total of 141 companies were asked about their experience of customer integration with the help of a questionnaire. Nine companies with different technical backgrounds and products, having practiced customer integration in many projects, were chosen for in-depth case studies. Data was collected in 126 in-depth interviews, nine site visits, and extensive document analysis. In addition, seven workshops were organized with experts from the nine companies and from seven guest companies, each workshop centering on questions previously identified as crucial with regard to customer integration and its side effects. The results of these workshops as well as the collected data form the basis of this article.

Customer Integration in the various segments of the Early Innovation Phase

All companies who took part in the workshops have implemented a subdivision of the early innovation phase, which is also known as Fuzzy Front End. 57% prefer a breakdown into five organizational steps (opportunity identification, opportunity analysis, idea generation, idea selection, and concept definition), whereas 43% do with only three segments. Among the other investigated companies some small and medium-sized ones do not have any organizational structure of the early innovation phase. Such a structure is not imperative when relatively few employees intuitively or by routine exchange views and communicate best practices, but a certain segmentation facilitates an optimal customer integration with regard to choice of customers, timing, and methods. Companies should not hesitate to try out which kind of subdivision is best suited to their needs: the early innovation phase is ideal for experiments since changes can be made easily due to its fuzzy character (Kim & Wilemon, 2002a; Kim & Wilemon, 2002b; Shaw, 1985). Because of the emphasis on customer integration, the phase of prototype testing, though belonging to the product development part of the innovation process, has been added to the investigation of the above-mentioned five organizational steps.

The allocation of customers to the chosen steps depends not only on the specific requirements of each step but also on the general type of customers.

The scientific definition of customers has been widely discussed (Brockhoff, 2003; Nambisan, 2002). We follow the established classifications of Herstatt and von Hippel (1992) and Brockhoff (2003). Herstatt and von Hippel distinguish two groups of customers, “normal” ones and lead users. Lead users have special needs, profit more than others from the aspired innovative product, and perceive trends very early. Brockhoff, concentrating on forms and ways of customer input, discerns five types of customers: 1. the “demanding” customer, i.e. the representative of the demand side of the market, who expresses his needs either directly or by his behavior and thus supplies new ideas, 2. the “launching” customer, who actively takes part in the innovation process, 3. the “innovative” customer whose own almost completed innovative solutions to his problems form the basis for a new product – this type resembles von Hippel’s lead user in some respects-, 4. the “reference” customer, who passes on his experience of using a certain product to the producer and/or to other users/customers 5. the “first buyer”, who helps reduce uncertainties about market expectations within the company.

Bearing these findings in mind, our research has brought the following practical results for customer integration in each step:

Opportunity Identification

Opportunity identification is the phase in which the company is looking for opportunities to be pursued later, opportunity meaning a business or technical need a company may wish to satisfy in order to capture a competitive advantage (Koen et al., 2002). Various tools and methods help identify existing opportunities: lateral thinking; metaphoric thinking; positive thinking; association trigger; and capturing and interpreting dreams (Tanner, 1992).

Customers can give valuable input in this phase in several ways:

Key account managers or developers usually receive detailed information from their customers about their experiences with a product. These customers will, but need not be, lead users for the most part. Their feedback is an important means of opportunity identification. SIEMENS integrates customers through a centralized Key Account Management. The customers’ input is transferred via strategy meetings and inner

strategic circles to the planners of the R&D program. GETZNER Werkstoffe maintains a close relationship to their customers through their sales agents and key account managers. The company's goals and developments are thoroughly discussed with the customers and their input is directly transferred into the company, especially to the developers.

Apart from direct individual contact with company members, lead users may be invited to take part in the special processes and methods which characterise this period as mentioned above. They should be included in workshops for roadmapping, scenario planning, and trend analysis.

At this stage of the early innovation phase, normal customers give their input passively via market research. They can also contribute knowledge in a semi-active way when watched using existing products before their behavior is analysed by experts – this is the integration concept of the Empathic Design Method (Leonard & Rayport, 1997) –

Opportunity Analysis

This segment of the early innovation phase comprehends the evaluation of the established opportunities, examining which ones are worth pursuing. The opportunities are examined and graded according to their attractiveness, development potential, and fit with the company's strategy and culture. The final assessment also largely depends on the decision makers' risk tolerance because many uncertainties still remain.

As with opportunity identification, opportunity analysis may be part of a formal process or occur iteratively. Many tools of the identification process are also used in this phase but to another end: whereas in the first stage they were employed to find out if an opportunity exists, they now have to give an answer regarding their future pursuit. An additional and highly recommended practice is the assignment of a multifunctional team, working full time on the analysis and consisting of three to five members with at least one marketing and one R&D member (Koen et al., 2002).

Customer integration, apart from the inclusion of lead users in workshops, will consist in inviting special lead users as sporadic members of the multifunctional team. A permanent membership is not advisable because the aim and purpose of this phase is not suited in all respects to external participation (e.g. fit with the company's strategy).

Idea Generation and Enrichment

In the context of the early innovation phase, an idea is “the most embryonic form of a new product, service, or environment solution” (Koen et al., 2002).

Idea generation comprehends a continuous process of tossing up, turning around, modifying, discussing, and finally shaping ideas. It is fed among other sources by opportunity identification which it feeds in its turn.

Its foremost techniques include the established creativity and brainstorming methods (brainstorming, brainwriting, method 635, mind-mapping, synectic methods) as well as the Russian TRIZ system (Theory of Inventive Problem Solving, (Altshuller, 1999)) which induces people to leave their own special field of science and to enter other scientific areas in order to find new solutions to the problem at hand.

All these aforementioned methods almost shout for the integration of lead users whose above-average knowledge and experience make them ideal sparring partners for company experts in generating ideas.

Another way of integrating customers is to install web-based idea banks not only for company employees but also for customers, preferably lead users, via respective linkages.

The newly developed IT-based tools – opinion portals, online communities, toolkits – also offer ways to siphon off knowledge from both normal customers and lead users. BMW’s marketing innovation lab follows a three-step approach in which customers’ ideas, arriving via their website and by way of customer e-mails, are used to select trendsetting and technically capable lead users. In the next step these customers are confronted with an idea, e.g. the functionalities of the man-machine interface in a future BMW series, and are asked to develop pertaining ideas of their own which will be followed up in mixed workshops. These steps are part of the idea generation element, whereas the next one belongs to a later stage of the early innovation phase.

Our research with the investigated nine companies has established additional ways and possibilities of gaining customer knowledge during the idea generation phase:

- specialist/technical fairs
- focus groups
- co-branding
- sales conferences
- conjoint analysis
- partner meetings

Feedback via key account managers or developers with direct contact to customers complements the possibilities of customer integration at this point of the innovation process.

Some companies have developed individual ways of working together with customers. BAYER Material Science integrates customers in a special Creative Center which was established with the express purpose of furthering innovations with customers. SIEMENS appoints customers to managers of core technology units within the Central Department of Corporate Technology. These integrated customers are of course all lead users.

Idea selection

Finding new ideas appears easy compared to deciding which ones ought to be pursued because this decision may be vital for a company's success or failure.

Koen (Koen et al., 2002) has pointed out that a formal decision process which allocates business resources to the new ideas, gives their originators feedback, and installs an innovation culture (this will be dealt with in detail later on), facilitates the idea selection. The usual financial measurements, such as cash flow calculations, sales and profit forecasts, and net present value considerations, are also helpful, but more for incremental than for breakthrough ideas.

In summary, the activities in this stage of the Fuzzy Front End are more or less a company's very own business. This is confirmed by BMW Group whose innovation lab discusses the customers' ideas and suggestions of the previous steps internally and selects the most valuable ones on their own. It may, however, seem feasible and in some instances advisable to let a few carefully selected customers choose among competing pre-selected ideas, because their preference is important for future market success.

Concept Definition

The final element of the early innovation phase consists of drawing up a business or technology proposition for the envisaged product. This business plan is the "gate document" which is necessary for allowing an idea to enter the product development phase (Koen et al., 2002). Diverse evaluation criteria have been established (Cooper & Kleinschmidt, 1994; Linton et al., 2002; Meade & Presley, 2002), such as innovativeness, fit with product strategy, market potential, time to market, etc.

Basically, this stage, as the prior one, is not suited to customer integration. However, our research has come up with a company where such an integration is welcome. INFOTERRA, a subsidiary of EADS, integrates customers in the development of the business plan. If and when customers are integrated, they should be lead users, reference customers, or first buyers.

Prototype Testing

As mentioned before, prototype development and accordingly prototype testing are no longer part of the early innovation phase. However, prototype testing bears some similarities with the new concept development phase in so far as customer involvement is concerned.

Before a new product goes into serial production, it is tested in the form of few specimen to find out if the new ideas work in practice. Possible negative experiences with the prototype model lead to a change at a time when this can still be done without too much waste of time and money.

The prototypes are tested by company experts, but also by customers. Lead users and prospective first buyers are used as well as normal customers, the so-called “beta testers”. SULZER HEXIS carried out an international three years’ testing period with beta testers. Their input led to further development and improvements of new fuel cells.

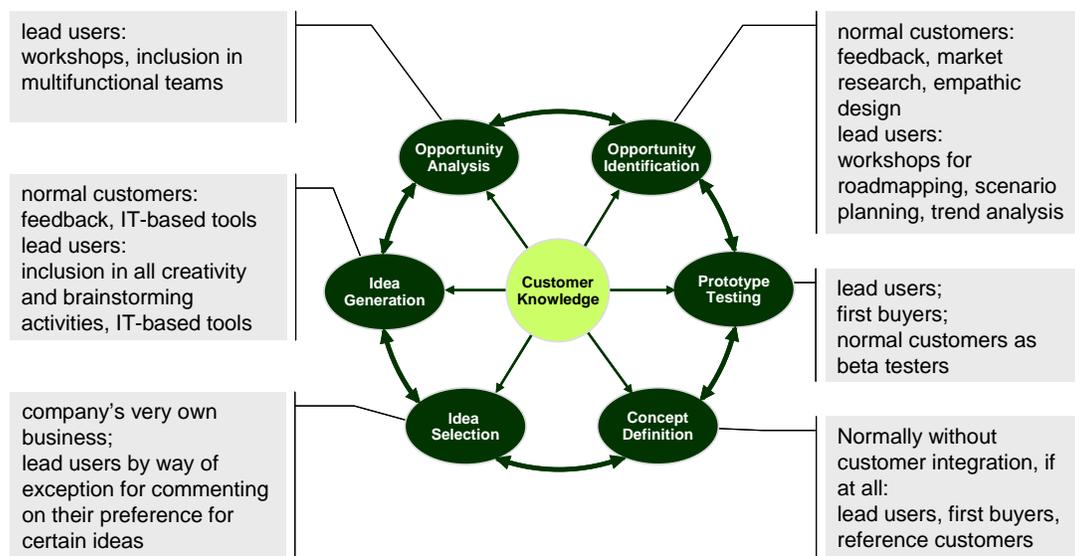


Fig. 1. Customer Integration in the Early Innovation Phase

Side Effects/Risks of Customer Integration and Measures to Manage them

As mentioned before, increasing experience with customer integration has shown that some side effects of customer integration impair its success. So far, these negative effects have only met with little attention (Veryzer Jr., 1998). The most obvious negative aspects, which all investigated companies also complained about, are dependence on customers in various forms and loss of know-how.

The following text describes the main side effects of customer integration and recommends measures to minimize the inherent risks.

Dependence on Customers

A customer who takes part in the various stages of the Fuzzy Front End consciously or subconsciously puts his stamp on the outcome. In whichever way, for whatever purpose, and at whatever time he is integrated, his personal and professional interests and qualifications are a decisive factor of the final innovative product. Exactly this enrichment with external views and ideas is the main reason for customer integration, but whereas it mostly leads to broadening the scope of innovative research, it may also have the contrary effect of limiting or impairing the outcome in several ways which will be described later on. Irrespective of the nature of the diverse negative side effects, they more or less all boil down to the key question of customer integration: the choice of the “right” customer. In other words: The main risk of customer integration is the customer himself.

Risk of selecting the wrong customer

The classification of customers as “normal” customers or lead users is, as mentioned before, by now a recognized concept (Herstatt & von Hippel, 1992; Lüthje & Herstatt, 2004). The criteria for their choice depend on this classification.

Normal customers are mainly integrated in conventional market research. They are mostly picked out at random or, if special demands have to be met with regard to e.g. age, gender, or habits, are chosen according to the established market research methods. The newly developed IT-based tools open up new possibilities of reaching normal customers. Interactive games, placed in the internet, siphon off customers' needs. This “information pump” (Dahan & Hauser, 2001) requires skills and creativity from the person who installs the respective internet platform. Special toolkits (Thomke & von Hippel, 2002) are designed to enable normal customers, who, it is true, must

have more than average skills and knowledge concerning web-based tools, to contribute innovative suggestions. The choice of these customers is influenced by the way the toolkit is programmed in order to reach hitherto unknown interested customers. INFOTERRA has integrated customers via a toolkit used as configurator for different variants concerning geoinformation: customers are guided through a certain system which allows the use of different norms.. The anonymity of this method reduces normal customers' shyness or reticence to articulate their needs, wishes, and suggestions.

However, while reaching many normal customers in an uncomplicated random way once the rather complicated software is installed, the toolkit method has been criticized for generating imperfect suggestions for solutions (Franke & von Hippel, 2002), for being expensive (Jeppesen & Molin, 2003) and for being unreliable (Franke & Piller, 2004). Thomke and von Hippel (2002) therefore suggest that the toolkit method, although being able to integrate normal customers, should be used with pre-selected lead users only.

According to our research with the nine companies, choosing and integrating customers with IT-based tools has been valuable for marketing and customer relationship purposes, whereas a success in other areas is not verifiable yet.

Lead users are the preferred customers for integration into the early innovation process (Lilien et al., 2002). Their identification has been widely discussed (Herstatt & von Hippel, 1992; von Hippel, 1986). In addition to the by now established concept of screening a great number of users and of networking, i.e. asking few well-known customers about other users known to them, our research has produced various criteria which indicate "right" lead users:

With regard to the product the company has in mind, the prospective integrated customer should be either a trendsetter or a market leader. The customer's reputation in the market is also very important, as are his PR and sales potential for presenting and in some cases even selling off the result of the collaboration to the public. Other criteria that were considered important by the investigated companies are the customer's competence, complementary skills, and interests. The recognition of these criteria presupposes a former (positive) experience of collaboration with the respective customer, a criterion which was deemed especially significant. Not all criteria are equally important for choosing the right lead user; each company has to heed those which are suited to the specific integration project.

Trade fairs, sales conferences, and focus groups offer possibilities to get to know customers. In addition, seminars are a proven way to identify lead users. GETZNER WERKSTOFFE GmbH frequently organizes scientific seminars about Solymer elastomers with energy-absorbing properties. They invited, for example, all major rail companies from the German-speaking countries as well as engineering companies and universities to a seminar where all participants presented new technologies and major trends . This helped them find appropriate co-developers besides giving them an insight into their competitors' and customers' activities.

The risk of integrating a “wrong” customer is inherent in all stages of the early innovation process, no matter how or to what purpose a customer is implemented. It can be reduced by a careful selection of customers according to the above-mentioned rules.

Dependence on customers' views and interests

A customer's point of view and his specific interests influence the direction of the search for innovative ideas (Gruner & Homburg, 2000; Wynstra & Pierick, 2000).

The external point of view, welcome as it is, may bias the turn of the search in an unwelcome way which is illustrated by the following example: ZUMTOBEL STAFF, a global market leader in electronic light technology, integrates renowned architects and light designers as lead users into its early innovation phase. Their unusual and highbrow solutions, while meeting the highest aesthetic standards, did not sell in a market with predominantly down-to-earth customers.

To reduce this negative side effect, which mostly occurs in the first three stages of the early innovation stage, a mix of integrated customers, representing different tastes and needs in the market, is the measure of choice.

The specific interests of integrated customers may cause other problems. Customers, who have to invest considerable time when integrated into the innovation process, often agree to the integration only because they expect a personal benefit (von Hippel, 1986). If they, correctly or not, perceive a clash of interests between the company and themselves, they will most likely act for their own benefit. Such an experience was made by SEFAR (market leader in filtration systems). On presenting their breakthrough idea of enzyme immobilization on fabrics to an integration candidate producing enzymes and respective instruments, they were told the idea was uninteresting. The

negative reply was due to the fact that the new idea would have made the customer's instruments obsolete. This widespread mind-set often prevents innovative ideas which, if carried out, would interfere with a customer's own line of production.

Even if the customer is an end user who does not expect any monetary profit by the aspired innovative product, his interests seldom comprise developments which may turn up in the process but are of no immediate or obvious avail to him.

This side effect of "losing" possible innovations due to customers' interfering interests appears above all in the phases of opportunity identification and idea generation, but to a lesser degree also in the respective selection phases. It can be reduced - apart from choosing the right customers - by avoiding the integration of only a small number of customers. A mix of customers from different backgrounds and with different needs counterbalances any conscious or subconscious efforts of a particular customer to give the search for ideas a certain direction. HENKEL collects information about the customers to be integrated from different sources (consumer diaries, home visits, the "Day in my life" Empathic Design tool, and internet platforms) and thus can set up well-balanced customer groups.

When company and customer interests do not clash, but are more or less identical, the customer's interests may still cause a problem. His willingness to be integrated is often based on his need of a special product adapted to his particular demands. The advantage of this fact is that customers constitute a reliable buyer potential for products which were designed according to their needs (Prahalad & Ramaswamy, 2000). This advantage can quickly turn into a disadvantage when it becomes apparent that these customers, representing only a small group, are the only ones interested in the newly created product. A mere niche market will hardly meet with the company's expectations regarding sales and profit.

To counteract the side effect of serving a niche market only, an effect basically relevant in all phases, it is recommended to implement customer integration in two or three separate stages of the innovation phase, using different customers in each: at the very beginning, in an advanced stage, and for prototype testing. In this way different prospective buyer groups can be considered, preventing the creation of a niche product.

In addition, our research has established that a well-organized Fuzzy Front End as described before prevents to a high degree the risk of a niche market. SIEMENS, for

example, used the Berlin city tram for co-developing and testing the e-ticket. City tram employees were involved in different stages of the process which led to the product they had wished for. But due to circumspect innovation processing the concept of the e-ticket is applicable in many other areas as well and is anything but a niche product.

Dependence on customers' experience

Customers helping with the innovation process often rely on their experiences, which is why they were chosen in the first place (von Hippel, 1988). They have first-hand knowledge of an existing product and know where it does not fulfil their needs and expectations. This implies the risk that they direct their innovative efforts in one direction only: to improve the familiar product rather than to create a radically new solution. Especially with normal customers this so-called "functional fixedness" (Leonard, 2002; von Hippel, 1986) tends to prevent radical innovations and encourage incremental ones.

To exclude or at least minimize this side effect (which is most likely to occur in the first three phases) the most effective way is to integrate lead users rather than normal customers, for lead users have both the potential and the motivation for radical innovations (Herstatt & von Hippel, 1992). In addition, the investigated companies recommend to rely on "indirect" customers/users (e.g. soccer coaches for sportswear manufacturers) in combination with other integrated customers. ZUMTOBEL STAFF, as mentioned before, integrates architects and designers who do not use the light technology themselves but recommend the various products to their clients. These, unlike the architects and designers, may be victims of functional fixedness, but this is overcome by the "indirect" users' expertise. (There are two sides to a coin: while having undesired side effects in one way –too elaborate products-, integrating specialists may have advantages in another way). SULZER HEXIS, a producer of fuel cells, also has good experiences with integrating indirect users: they include electrical fitters into their innovation process. These electricians gather knowledge about the end consumers' needs and wishes in the course of the every day work at their homes. Being experts themselves, the electrical fitters can pass on their customers' experiences without the latter ones' functional fixedness.

Whenever it is deemed appropriate to integrate normal customers, the risk of mere incremental innovations can be reduced by way of big numbers. Especially with toolkits the potentially incremental inclinations of the unknown users can be compensated by

prioritising the various suggestions and blending them with lead users' or own experts' ideas.

Finally, incremental innovations can be avoided by an intelligent timing of customer integration. An early involvement of customers offers opportunities of counterbalancing limited views at later stages and with different knowledge sources.

Dependence on customers' demands or personality

Sometimes customers demand exclusive rights to the outcome of the combined innovative effort. Apart from the arising problem of intellectual property, which will be discussed later on, such a request, if granted, may impair the success of the innovation from the very beginning. Only if the customer in question is the company's biggest or currently only buyer of the existing products can giving in to such a demand make sense: in this case, the company gets a definite and reliable future buyer and does not have to look for others. In all other cases, however, such a restriction would hinder the company from selling the innovation to other customers, thus preventing possibilities of profit.

The request of exclusive rights may be turned up in all phases of customer integration but is more likely in the earlier ones. The obvious way to avoid its negative consequence is to repudiate any demands for exclusivity, looking for other customers instead. Integrating customers who can provide the necessary knowledge without having the market position to ask for exclusive rights is the measure of choice. SULZER HEXIS integrates customers from small independent service companies rather than from the big power companies who would only cooperate as exclusive partners.

Another way of limiting the negative side effect of exclusivity is to set up parallel workshops with different customers, granting the exclusivity-demanding customer rights only to the results of the workshop he is a member of. BASF integrates different automotive OEMs (Original Equipment Manufacturers) into their search field process, setting up special workshops for each.

Negative side effects may also occur due to a customer's behavior/personality. A group of overly cautious people will not come up with a radical innovation; visionaries among themselves may overlook important details in the innovation process, and so on.

To minimize possible limitations of the innovative result because of customers' personal traits, it is recommended to fall back on the findings of ergonomics which has

established the importance of recognizing and making use of different roles employees may play: controller, “doer”, agitator, visionary, or doubter (Margerison & McCann, 1984). These scientific findings also apply to integrated customers. In case they are known to the company from former projects, their roles should be taken into account when setting up workshops in order to guarantee a mix of different role-players both on the side of the internal participants and of the customers.

Apart from these considerations, every company considering to integrate customers should gather as much information as possible about them in order to assess their compatibility with the internal team.

Negative side effects due to customers’ personal attributes are relevant in all phases with integration in workshops.

Loss of know-how

A customer who takes part in the innovation process unavoidably acquires company know-how while contributing his own knowledge or ideas (Li & Calantone, 1998; Lukas & Ferrell, 2000). If he uses company know-how for his own purposes, this may not be much of a problem in most cases, but if he trades it to a competitor, the consequences may be disastrous. SIG allCap, for instance, integrated a customer in the early innovation phase who, after jointly generating and developing a concept for innovative packing solutions, took the combined know-how elsewhere. He developed the final product with a competitor of the company’s with whom he developed the final product, thus increasing the competitor’s innovative power to SIG allCap’s detriment.

The core of this problem is the question of who owns the results of the combined innovative efforts: the company, the customer, or both (Brouwer & Kleinknecht, 1999; Hagedoorn & Cloudt, 2003; Masurel, 2002). The answer is even more complicated when a customer claims to have contributed know-how which had already existed in the company (so-called contamination with customer know-how). Both IBM and KABA had quarrels with customers about intellectual property rights in alleged contamination cases.

Negative side effects of customer integration regarding company know-how have to be taken into account in all phases of the integration process. They can be avoided by specific agreements on intellectual property rights. Such written contracts should include non-disclosure (secrecy) agreements, detailed lists of who contributes which

know-how, and agreements on the ownership of the innovative result. It requires both legal skill and managerial feeling to strike the right balance between the protection of company know-how and the necessary space for creative work in the course of the innovation process. Such a balance can be achieved more easily if different agreements are set up according to the different segments of the Fuzzy Front End. All agreements should be signed before integrating customers. This is an absolute must for non-disclosure agreements no matter in which phase.

The best agreements are of little or no use, however, if a customer does not keep them. With regard to the protection of intellectual property, the choice of the right customer means the choice of an honest and trustworthy one. "Make sure you know whom you are dealing with" should be the maxim in this respect, meaning that customers with long-standing contacts or who were "tested" before in minor projects are the best integration candidates.

The choice of the right moment of integration also helps prevent a loss of know-how. Customers ought to be integrated as early as necessary but as late as possible. In this way the customer contributes his ideas when they still have a considerable leverage while learning as little as possible himself about company know-how.

Problems with customer integration on the company's side

The above-mentioned risks/side effects are all related in one way or another to the customers themselves. There are, however, some company-related influencing factors which may impair the success of customer integration.

Quite often parts of customer information disappear in the course of the integration process. A distortion or even the complete loss of customer input may occur when information gained by one department (e.g. marketing) has to be transferred to another one (e.g. R&D). The best way to solve this problem is to install suitable operative structures with cross-functional, preferably multifunctional teams (Pitta, 1996). GETZNER has done so and works successfully with interdisciplinary teams.

This side effect and its remedy are to be considered in the first three stages, to a lesser degree in the idea selection phase.

Another important step to avoid misunderstandings between company employees among each other or between employees and customers is to implement an innovation culture. The company should cultivate measures which ensure transparency, trust, and

easy communication. KABA has implemented an efficient database and intranet management; MERCK relies on a systematic portfolio evaluation throughout the whole company.

Sometimes R&D teams are openly or secretly against customer integration because they prefer to work on their own. This attitude is called the “not-invented-here syndrome”. It can be overcome by rewarding innovative activities with customers. Special incentive systems considerably increase the willingness to cooperate with externs. SCHINDLER ELEVATORS, for example, bestows an “Innovation Award”, which consists of money, on employees who were chosen by an external jury for successful innovation activities with customers. KABA rewards employees on an annual “Innovation Day” when those who have actively pursued innovation with customers are given public praise – expressly no money.

A last way to avoid conflicts on integrating customers is to thoroughly examine in advance each innovation project as to its general and particular suitability for customer integration, because some projects simply do better without customers and some internal teams are better left on their own.

The side effect of misunderstandings and antagonism within the company may turn up in all stages and be dealt with as described above.

The figure below illustrates possible negative side effects of customer integration and their relevance to the different segments of the early innovation phase.

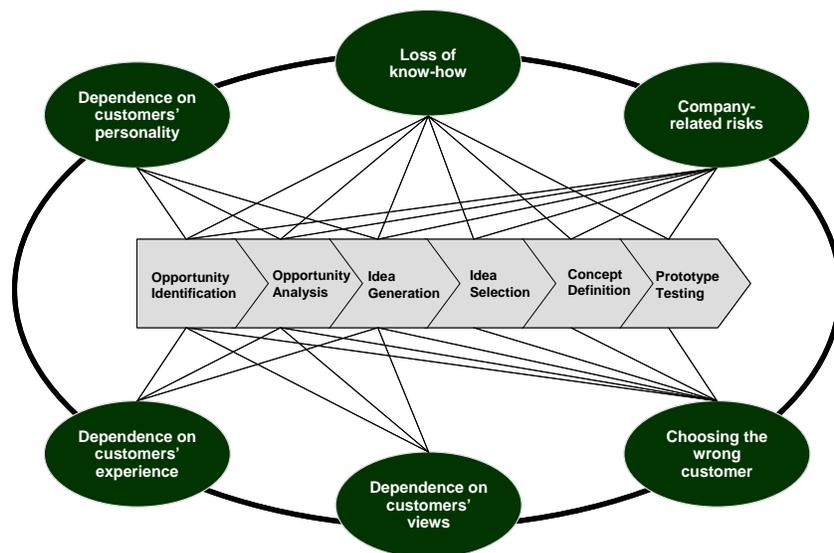


Fig. 2. Negative Side Effects of Customer Integration in the Early Innovation Phase

Summary and Recommendations

The process of integrating customer knowledge into the early innovation phase can be optimized by subdividing this phase into diverse segments and by assigning different types of customers to each segment as required by its specific function. In doing so, special attention has to be given to process structure, methods, and the placing of customers within the respective segment.

Even with a well-organized innovation structure, some negative side effects of customer integration are likely to occur. Among the ones predominant in practical customer integration are the dependence on customers and the threat to company know-how. Misunderstandings and antagonism within the company constitute a less common, but nevertheless not inconsiderable side effect.

To avoid or at least mitigate these negative aspects of customer integration, special measures are at the managers' disposal:

The customer-related measures comprise the careful selection of customers to be integrated, the right mix of customers within each innovation project, the choice of the optimal time and place for integration, and the use of the appropriate integration methods. With regard to know-how, the provision of effective intellectual property agreements as well as the selection of trustworthy customers are essential. Company-related problems are reduced by an innovation culture, by an incentive system, and by the scrutiny of each innovation project as to its suitability for integration.

Heeding these recommendations, most companies will find that their innovative power as consequence of customer integration increases. However, various other, if less conspicuous, side effects of customer integration may still impair the desired success. Further research on these other side effects has to be done.

References

- Altshuller, G. (1999). *Innovation Algorithm - TRIZ, systematic innovation and technical creativity*. Technical Innovation Ctr.
- Atuahene-Gima, K. (1995). An Exploratory Analysis of the Impact of Market Orientation on New Product Performance: A Contingency Approach. *Journal of Product Innovation Management*, 12(4), 275-293.
- Bacon, G. and Beckman, S. (1994). Managing product definition in high-technology industries: A pilot study. *California Management Review*, 36(3), 32.
- Biemans, W. G. (1991). User and third-party involvement in developing medical equipment innovations. *Technovation*, 11(3), 163-182.
- Brockhoff, K. (2003). Customers' perspectives of involvement in new product development. *International Journal of Technology Management*, 26(5/6), 464-481.
- Brouwer, E. and Kleinknecht, A. (1999). Innovative output, and a firm's propensity to patent. An exploration of CIS micro data. *Research Policy*, 28(6), 615.
- Cooper, R. G. and Kleinschmidt, E. J. (1994). Screening new products for potential winners. *Institute of Electrical and Electronics Engineers IEEE, Engineering Management Review*, 22(4), 24-30.
- Dahan, E. and Hauser, J. R. (2001) In *Handbook of Marketing*(Eds, Weitz, B. A. and Wensley, R.) Sage, London, pp. 179-222.
- Franke, N. and Piller, F. (2004). Toolkits for user innovation and design: exploring user interaction and value creation in the watch market. *Journal of Product Innovation Management*, 21(6), 401-415.
- Franke, N. and von Hippel, E. (2002) Satisfying Heterogenous User Needs via Innovation Toolkits: The Case of Apache Security Software. MIT Sloan School of Management, 1-32.
- Gruner, K. E. and Homburg, C. (2000). Does Customer Interaction Enhance New Product Success? *Journal of Business Research*, 49(1), 1-14.
- Hagedoorn, J. and Cloudt, M. (2003). Measuring innovative performance: is there an advantage in using multiple indicators? *Research Policy*, 32(8), 1365-1379.

- Herstatt, C. and von Hippel, E. (1992). From experience: Developing new product concepts via the lead user method: A case study in a "low-tech" field. *Journal of Product Innovation Management*, 9(3), 213-221.
- Jeppesen, L. B. and Molin, M. J. (2003). *Consumers as Co-developers: Learning and Innovation Outside the Firm*: Carfax Publishing Company.
- Kim, J. and Wilemon, D. (2002a). Focusing the fuzzy front–end in new product development. *R & D Management*, Vol. 32(Issue 4), 11p.
- Kim, J. and Wilemon, D. (2002b). Strategic issues in managing innovation's fuzzy front-end. *European Journal of Innovation Management*, 5(Number 1), 27-39.
- Koen, P., Ajamian, G. M., Boyce, S., Clamen, A., Fisher, E., Fountoulakis, S., Johnson, A., Puri, P. and Seibert, R. (2002) In *PDMA Toolbook for New Product Development*(Eds, Belliveau, P., Griffin, A. and Somermeyer, S.) John Wiley and Sons, New York.
- Kohli, A. K. and Jaworski, B. J. (1990). Market Orientation: The Construct, Research Propositions, and Managerial Implications. *Journal of Marketing*, 54(2), 1-18.
- Larson, C. F. (2001). Management for the new millenium - the challenge of change. *Research Technology Management*, 44(6), 10.
- Leonard, D. (2002). The Limitations of Listening. *Harvard Business Review*, 80(1), 93.
- Leonard, D. and Rayport, J. F. (1997). Spark Innovation Through Empathic Design. *Harvard Business Review*, 75(6), 102ff.
- Li, T. and Calantone, R. J. (1998). The Impact of Market Knowledge Competence on New Product Advantage: Conceptualization and Empirical Examination. *Journal of Marketing*, 62(4), 13.
- Lilien, G. L., Morrison, P. D., Searls, K., Sonnack, M. and Von Hippel, E. (2002). Performance Assessment of the Lead User Idea-Generation Process for New Product Development. *Management Science*, 48(8), 1042.
- Linton, J. D., Walsh, S. T. and Morabito, J. (2002). Analysis, ranking and selection of R&D projects in a portfolio. *R & D Management*, 32(2), 139.

- Lukas, B. A. and Ferrell, O. C. (2000). The Effect of Market Orientation on Product Innovation. *Journal of the Academy of Marketing Science*, 28(2), 239.
- Lüthje, C. and Herstatt, C. (2004). The Lead User method: an outline of empirical findings and issues for future research. *R & D Management*, 34(5), 553-568.
- Margerison, C. and McCann, D. (1984). Team Mapping: A New Approach to Managerial Leadership. *Journal of European Industrial Training*, 8(1), 12.
- Masurel, E. (2002). Patenting behaviour by SMEs. *International Journal of Entrepreneurship and Innovation Management*, 2(6), 574-583.
- Meade, L. M. and Presley, A. (2002). R&D Project Selection Using the Analytic Network Process. *IEEE Transactions on Engineering Management*, 49(1), 59.
- Murphy, S. A. and Kumar, V. (1996). The role of predevelopment activities and firm attributes in new product success. *Technovation*, 16(8), 431ff.
- Murphy, S. A. and Kumar, V. (1997). The front end of new product development: A Canadian survey. *R & D Management*, 27(1), 5ff.
- Nambisan, S. (2002). Designing Virtual Customer Environments for New Product Development: Toward a Theory. *Academy of Management Review*, 27(3), 392.
- Pitta, D. A. F., Frank Katsanis, Lea Prevel (1996). Redefining new product development teams: learning to actualize consumer contributions. *Journal of Product & Brand Management*, 5(6).
- Prahalad, C. K. and Ramaswamy, V. (2000). Co-opting Customer Competence. *Harvard Business Review*, 78(1), 79.
- Shaw, B. (1985). The Role of the Interaction between the User and the Manufacturer in Medical Equipment Innovation. *R & D Management*, 15(4), 283-292.
- Tanner, D. (1992). Applying creative thinking techniques to everyday problems. *Journal of Consumer Marketing*, 9(4), 23.
- Thomke, S. and von Hippel, E. (2002). Customers as Innovators: A New Way to Create Value. *Harvard Business Review*, 80(4), 8ff.

Veryzer Jr., R. W. (1998). Key Factors Affecting Customer Evaluation of Discontinuous New Products.

Journal of Product Innovation Management, 15(2), 136-150.

von Hippel, E. (1986). Lead Users: A Source of Novel Product Concepts. *Management Science*, 32(7), 791

- 805.

von Hippel, E. (1988). *The sources of innovation*, New York: Oxford University Press.

Wynstra, F. and Pierick, E. t. (2000). Managing supplier involvement in new product development: a

portfolio approach. *European Journal of Purchasing & Supply Management*, 6(1), 49-57.