Whom to Ask for Help? Leveraging the Sales Force to Develop Customer Knowledge in New Product Developments: Salesperson and Customer Characteristics to Consider

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Abstract

Products fail if they are unable to meet customer needs. Firms require customer knowledge to address customer needs, and the sales force can help. Salespeople are boundary spanners, interacting with customers every day. They understand their customers’ organization and know key personnel. Therefore, salespeople are in ideal positions to involve customers in new product developments (NPD) and thus to drive customer knowledge development. We use data from 97 innovation projects to test several hypotheses. The results show that customer knowledge development driven by the sales force increases NPD performance, and we find a direct and an indirect effect through customer diversity. Involving customers based not only on their economic potential but also their informational capabilities, opinion leadership, and relationship with the firm further increases NPD performance. In addition, while prior research has addressed intra-organizational antecedents of customer knowledge development, this work focuses on the characteristics of individuals involved in the knowledge generation process. We show that salespeople with a high degree of customer orientation, empathy, and technological competence generate higher levels of customer knowledge. Thus, they should be assigned to NPD projects and related tasks.
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Products fail if they are unable to meet customer needs. Firms require customer knowledge to address customer needs, and the sales force can help. Salespeople are boundary spanners, interacting with customers every day. They understand their customers’ organization and know key personnel. Therefore, salespeople are in ideal positions to involve customers in new product developments (NPD) and thus to drive customer knowledge development. We use data from 97 innovation projects to test several hypotheses. The results show that customer knowledge development driven by the sales force increases NPD performance, and we find a direct and an indirect effect through customer diversity. Involving customers based not only on their economic potential but also their informational capabilities, opinion leadership, and relationship with the firm further increases NPD performance. In addition, while prior research has addressed intra-organizational antecedents of customer knowledge development, this work focuses on the characteristics of individuals involved in the knowledge generation process. We show that salespeople with a high degree of customer orientation, empathy, and technological competence generate higher levels of customer knowledge. Thus, they should be assigned to NPD projects and related tasks.

Keywords: new product development, sales force, customer knowledge development, customer diversity, customer orientation, empathy, technological competence
Introduction

Recent research has shown that including salespeople in new product developments (NPD) increases NPD success (Ernst et al. 2010; Arnett and Wittmann 2014; Malshie and Biemans 2014; Kessey and Biemans 2016; Homburg et al. 2017; Kuester et al. 2017). This increase is linked to a better market alignment of released products. Market alignment has repeatedly been reported as a key driver of NPD success (De Luca and Atuahene-Gima 2007; Ernst 2002; Ottum and Moore 1997).

A crucial part of market alignment is gaining in-depth customer knowledge so that the new product fits the customer’s wants and needs and the customer is willing to pay for it. While the role of salespeople as facilitators of market knowledge within the NPD process has received broad attention (Klompmaker 1981; Kuster and Rauch 2016; Bonney and Williams 2009; Rochford and Wotruba 1993; Saegert and Hoover 1980), the role of salespeople as facilitators of customer knowledge through customer involvement has not. This is a major shortcoming for three reasons:

First, customer knowledge development within NPD projects has shown to have a strong and significant effect on NPD success (Alam 2002; Coviello and Joseph 2012; Joshi and Sharma 2014; Kessey and Biemans 2016).

Second, the departments that typically lead NPD projects - marketing and R&D (Griffin and Hauser 1996) - operate within company boundaries and do not interact closely with customers on a daily basis (Gordon et al. 1997; Homburg et al. 2008). However, sales is one of the closest links to customers a company can have (Kotler et al. 2006). As they interact with customers on a daily basis, salespeople have in-depth knowledge about customers, their organizations, and key personnel, and they know whom to ask specific questions (Gordon et al. 1997).
Third, not all customer input is alike. A broad body of literature has focused on the selection of the appropriate customers to involve in NPD and the effects of this selection on NPD success (Ernst et al. 2011; Hienerth and Lettl 2017; von Hippel 1986). However, how to operationalize this involvement has received less attention. Sales is able to include different kinds of customers. Sales personnel can leverage their existing inter-personal relationships and can use their sales skills to get in touch with the right stakeholders and sell them on project participation. Given the product idea, they will know customers with the highest economic potential - where they could sell most. They know the opinion leaders in their industry that are referred to in meetings. They know their most challenging customers, who want enhanced products and would be happy to engage in an exchange. Further, they have long-lasting reciprocal relationships and know who to ask for a favor e.g., involving the customer in a trial that might mean a lot of work or a certain investment. Consequently, we argue that the role of salespeople as drivers of customer knowledge development through customer involvement requires more attention.

Just as customers are not all alike, the same is true for salespeople. Many studies have addressed how individual salesperson characteristics affect sales performance. The salesperson’s orientation (Boles et al. 2001; Goff et al. 1997; Homburg et al. 2011; Saxe and Weitz 1982; Stock and Hoyer 2005), an ability to understand customer needs (Aggarwal et al. 2005; Homburg et al. 2009) and technological competence (Babakus et al. 1996) have been identified as important drivers. We argue that these characteristics matter not only for sales performance but also for customer knowledge development. The characteristics that allow a salesperson to understand customer needs within a sales process to offer the right product from the portfolio or stress the most meaningful product features for a customer can be applied one step earlier to shape the right product in the first place. The characteristics that allow the salesperson to engage with a customer in a sales process also allow him/her to engage a customer in an NPD project.
Prior work has called for further research that (1) examines customer involvement through sales in NPD and (2) asks for the identification of which salespeople should be involved in NPD activities (de Jong et al. 2014).

We want to answer this call. We do so by offering the following three contributions:

First, we analyze the effect customer knowledge development carried out by the sales force within NPD projects has on NPD success. We assess how far customer knowledge development in the form of active customer involvement through sales, multiple experiments carried out with customers, iterations of probing, testing, and collecting feedback has an effect on NPD success.

Second, the study contributes to the literature stream that finds that not all customer input is alike. Customers differ in their economic, informational, opinion leadership potential, and the relationship they have with the firm. We analyze the effect of customer knowledge development on customer diversity. We assess whether - and if true, how far - active customer knowledge development leads to a wider range of customers involved, and we assess a possible mediated effect of customer knowledge development on NPD success through customer diversity, as well as its direct effect.

Third, this study extends the understanding of customer knowledge development antecedents beyond the organizational context (Joshi and Sharma 2014). In line with existing literature on sales performance, we assess individual salesperson characteristics and their effect on customer knowledge development.

**Conceptual Background**

*Customer knowledge development.* Joshi and Sharma (2004) define customer knowledge development as a set of activities and an evolutionary process with three key characteristics: (1) It is ongoing throughout the NPD process, (2) it is primarily related to customer interaction within all these phases, and (3) it requires an “action-based, trial-and-error mode of organizational learning” (Joshi and Sharma 2004, p. 48).
The customer-knowledge-development process consequently requires the active involvement of both customers and employees. Probing and learning activities and iterations thereof (Lynn et al. 1996) are necessary to fully understand customer preferences related to a new product. Employees involved in the NPD process must engage with customers regarding product ideas, concepts, and prototypes and collect their feedback for refinement and further iterations (Hargadon et al. 2000).

As customer knowledge development means actively involving the customer and seeking their feedback on specific issues, it goes beyond listening to the voice of the customer, as conceptualized in prior research (Griffin and Hauser 1993). Moreover, it must be differentiated from co-designing or co-creating product development concepts, where the customer takes an active role in directly shaping the final product (Hienerth et al. 2014; Fueller et al. 2014; Hoyer et al. 2010; O’Hern and Rindfleisch 2010). Firms engaging in customer knowledge development, as defined above, actively seek customer knowledge in customer interactions, but they modify the product idea, concept, or prototype for further interactions and testing internally. Customer knowledge development, as used here, captures the way customer knowledge is developed within a project, not the level of customer knowledge itself.
Sales in customer knowledge development. As a boundary-spanning unit with close ties to customers in day-to-day interactions, sales is best suited to involve customers for customer knowledge development. Prior research has shown how important sales is in gathering market information (Gordon et al. 1997; Liu and Comer 2007), in carrying out market intelligence activities (Kuster and Rauch 2016; Menguc and Boichuk 2012), and in further leveraging customer relationships to convince customers to participate in prototype testing and giving feedback (Ernst et al. 2010).

Sales is aware of internal objectives and ideas with regards to the new product and knows whom to approach in this regard. Salespeople can use their existing contacts within customer organizations to show and discuss ideas, prototypes, and other NPD-related questions. The personal characteristics that allow them to engage in sales interactions let them know which product to pitch from the portfolio, and which features are the most important for the customer also helps them to select customers in NPD projects and to engage with them.

Customer diversity as a mediator. The kind of customer that is included in NPD projects has a significant impact on NPD success (Hienerth and Lettl 2017; Ernst et al. 2011; von Hippel 1986). While customer knowledge development is a set of activities to make the right choices within the NPD process, it does not address who this knowledge is developed with. As customer knowledge development is an iterative process of probing and learning throughout the NPD process (Joshi and Sharma 2004), questions are asked where respondents might be missing. We argue that the more questions asked, the more specific and more diverse set of customers need to be involved to answer them. We argue that customer knowledge development has a direct effect on NPD success as already outlined and, furthermore, an additional, mediated effect through customer diversity. Only validating internal hypotheses with regards to product decisions with customers in the field has a chance for correction before launch and be beneficial for success. If this process widens the base of involved customers, in terms of diversity, these decisions are made from a broader foundation that later results in actual buying customers.
Antecedents of customer knowledge development. Prior research has addressed intra-organizational antecedents of customer knowledge development, including organizational and project characteristics (Joshi and Sharma 2014).

Customer knowledge is developed in interactions with customers, and certain antecedents shape the customer–employee relationship in these interactions. Prior research has stressed that it is important to identify appropriate customers (Hienerth and Lettl 2017; Ernst et al. 2010; Gruner and Homburg 2000; von Hippel 1986) and employees to include.

As outlined above, salespeople are in a unique position to get involved with customers during the course of an NPD project. Several studies have identified individual skills of salespeople that determine their success in their primary role (Baldauf et al. 2001). In this study, we link salespeople’s orientations and the skills required for a sale to the success of customer knowledge development. Prior research has addressed the relationship between salespeople’s orientation and their job performance (Boles et al. 2001; Jaramillo et al. 2007). In this context, special attention has been paid to customer and selling orientations (Saxe and Weitz 1982). While a customer-oriented salesperson cares for customers’ needs and aims to satisfy them to the best of his/her ability, a selling-oriented salesperson cares most about the sale, even if it is not in the best interest of his customer. Customer knowledge development requires time and interaction with customers to fully understand the customers’ preferences; thus, it is not aligned with a selling orientation. Consequently, customer orientation among employees interacting with customers should improve customer-knowledge-development results. Other research that relates skills, such as empathy (Homburg et al. 2009) or technological competence (Babakus et al. 1996), to sales performance is considered transferable for the same reasons. Only employees - in this case, salespeople - who are able to understand customer needs empathically and technically will be able to contribute to customer knowledge development as they are able to grasp what a customer might mean or want, even if he/she has difficulties in expressing that,
and then can work with other NPD team members on the next iteration of the idea or product to present to the customer again.

**Research Framework**

Figure 1 depicts our research framework. It outlines our conceptualization that salesperson characteristics (customer orientation, empathy, and technological competence) affect customer knowledge development which, both alone and mediated through customer diversity, affects overall NPD performance.

*Figure 1: Model – antecedents and outcomes of customer knowledge development and customer segment diversity on overall NPD performance*
**Hypotheses Development**

*Customer knowledge development on overall NPD performance.* In NPD research, a broad body of literature has linked new product success to the ability to understand customers’ needs, wants, and specifications related to new products (Cooper 1979; Cooper 1984; Cooper and Kleinschmidt 1987; Ernst 2002; Parry and Song 1994; Mishra et al. 1996). Involving the customer in idea generation, concept development, and prototype testing increases the chance for a “big hit” (Gruner and Homburg 2000). Updating customer information during the NPD process and early identification of customer dissatisfaction have further been reported to contribute to increased success (Rothwell et al. 1974). Consequently, customer knowledge development itself has been linked to increased NPD success in prior research (Joshi and Sharma 2004). Therefore, the earlier that versions of the product - at the idea, concept, or prototype stages - are tested in iterations with the customer, the more the resulting feedback can be used to refine and improve the product to align with customer preferences. Customer knowledge development allows a firm to improve its understanding of customer needs and to correct misconceptions early. Thus, the firm ships a product that closely matches customer preferences and, consequently, is more successful.

Therefore, the following hypothesis is proposed:

H1: The more customer knowledge is developed within NPD projects, the more successful it will be once launched in the market.

*Customer segment diversity as a mediator.* Customer knowledge development, as a form of knowledge generation and iterative learning, leads to answers as well as new questions. The right customer must be identified and sought out for help regarding initial, as well as newly thought, questions. Prior research has stressed that not all customer input in NPD projects is alike (Hienerth and Lettl 2017; Ernst et al. 2011; Gruner and Homburg 2000; von Hippel 1986). Therefore, customers must be (re-)selected based on the question at hand. Initial feedback must
be verified with a broader customer base. More answers lead to more questions and the involvement of more, and different, customers.

To avoid over-engineering for niche-customer segments and to capture the variety of customer demands accurately, diverse customer segments must be involved. Sales can select customers based on their economic value in order to predict the revenue potential of a new product (Gruner and Homburg 2000; Reinartz et al. 2004). Sales is also able to identify lead users who encounter needs before the rest of the market and have high informational potential that would enable the firm to understand and implement product features today that will be relevant for a broader audience tomorrow (Lillien et al. 2002; von Hippel 1986). Through many sales encounters, sales is able to point out opinion leaders within a market. By ensuring they support the new product later will benefit diffusion (Sawhney and Prandelli 2001). Further, sales can leverage long-lasting relationships to tap into information that other customers might not share as trust needs to build up over time (Jayachandran et al. 2005). Therefore, the more customer knowledge is developed, the more diverse customer input is sought and the diversity of customers increases. Active customer knowledge development based on a diverse set of customers broadens the foundation of NPD decisions and increases their likelihood to later be in accordance with the market and therefore have higher NPD success.

Therefore, the following hypothesis is proposed:

H2: Customer segment diversity mediates the effect of customer knowledge development on overall NPD performance.

Antecedents

Customer orientation. Customer orientation describes a mindset and attitude that a salesperson adopts when interacting with customers. In the sales context, being customer oriented means using information rather than pressure to convince a customer. It describes a salesperson who tries to find the right product for the right customer (Saxe and Weitz 1982). In
the customer-knowledge-development process, a customer-oriented salesperson will be eager to build up knowledge before the final product is launched so that it will meet customers’ needs. Referring to the NPD context, Im and Workman Jr. (2004, p. 117) summarized customer orientation as the “collection of intelligence about customers to satisfy their needs and desires as they respond to novel and meaningful stimuli,” which matches the customer knowledge development process. Empirical research has further linked strong customer orientation to a better understanding of customer needs (Homburg et al. 2009; Rothwell et al. 1974). In addition, Wang and Miao (2015) link customer orientation to sales creativity, which refers to salespeople’s ability to frequently come up with new ideas to satisfy customers’ needs and their ability to develop fresh perspectives on old problems. The drivers of creativity in this regard can also be considered a driving force behind customer knowledge development as it requires constant new ideas and fresh perspectives for iterations of tests and experiments. Therefore, the more customer oriented salespeople are, the more they drive customer knowledge development to understand their customers’ needs and to shape a product with involved customers that will finally solve their customers’ problems. Moreover, the more customer oriented salespeople are, the more they will conduct tests and experiments with customers to fulfill these goals.

Therefore, the following hypothesis is proposed:

H3: The more customer oriented the involved salespeople are, the higher the level of customer knowledge development within an NPD project.

*Empathy.* Individuals interacting with one another are trapped within a cycle where their empathy shapes their perception of what is said or done and how they react to it (Barrett-Lennard 1981). Depending on individuals’ empathy levels, their reception and inner resonation of verbal or non-verbal messages lead to different responses that spur new interaction cycles.
Since customer knowledge development involves ongoing interaction with customers throughout the NPD process, empathy plays an important role in shaping these interactions. Prior research has identified empathy as a fundamental driver of listening skills and as a prerequisite for trust within buyer–seller relationships (Aggarwal et al. 2005). Further, empathy has been linked to the accurate recognition of customer needs (Homburg et al. 2009). High levels of empathy have been identified as common traits of successful corporate innovators (Brenton and Levin 2012), while a lack of empathy has been linked to decreased product “innovativeness” (Bosch-Sijtsema and Bosch 2015). Both aspects can be related to coming up with fresh ideas based on a deeper customer understanding to test with customers within customer knowledge development. Therefore, the higher a salesperson’s empathy level, the more he/she is able to leverage customer relationships for customer knowledge development. The more a salesperson is able to sense exactly what customers want, the more he/she is able to convince the customers to participate in prototype testing and/or experiments related to an NPD project for their own good by stressing the benefits the customer will receive from the launched product. The more a salesperson is able to empathize with customers’ perspectives, the more he/she can overcome customers’ objections to, for example, prototype testing, and the more he/she is able to understand customers’ feedback regarding conducted tests.

Therefore, the following hypothesis is proposed:

H4: The more empathy the involved salespeople possess, the higher the level of customer knowledge development within an NPD project.

Technological competence. To generate knowledge in iterations with the customer directly, a salesperson must have a certain level of technological competence to engage at a meaningful level. Babakus et al. (1996) see salespeople’s technological competence as a performance criterion: tech-savvy salespeople are aware of the designs, specifications,
functions, and possible applications of current and coming products. This knowledge allows them to understand relative product advantages, complexity aspects, risks, and compatibility issues that exist or are perceived by the involved customers and why certain customers may refrain from or participate in prototype testing. This allows them to address and overcome possible issues on a more rational and technical level when interacting with them (McDermott and Schweitzer 1980). On the one hand, being able to engage with a customer at a technical level has been shown to lead to improved products and new market opportunities (Geiger and Finch 2009); on the other hand, customers who sense their sales counterpart lacks a certain level of technological sophistication might bypass him/her for certain discussions, quickly leaving the salesperson without insights or contacts from previous encounters that then cannot be leveraged for active customer knowledge development in NPD projects (Malshe and Biemans 2014; Piercy 2009). Therefore, the more the involved salesperson is aware of the technological details of current and coming products, the more he/she is able to leverage existing customer contacts for customer knowledge development. The more he/she is aware of the technical specifications of coming products and knows his customers’ applications, the more he/she can approach the right customer for feedback and prototype testing, and the more he/she is able to channel back the feedback correctly for further refinements and the next iterations.

Therefore, the following hypothesis is proposed:

H5: The more technological competence the involved salespeople possess, the higher the level of customer knowledge development within an NPD project.

Methodology

Sample

In order to avoid industry-specific bias, we selected companies from five different industries for our sample. The industries we selected were based on their sales volume as
reported by the German Federal Bureau of Statistics (DESTATIS 2012). The top five industries – after excluding oil refinery and mining – were the automotive, mechanical engineering, electronics, chemical, and metal industries. We decided to exclude oil refinery and mining as we wanted to focus on industries were standardized products are developed and brought to market, while in these two industries the sales volume is primarily driven by the sale of raw materials.

We used AMADEUS (2013), a commercial company register, to select the top 250 companies by revenue for each industry. From this sample, we removed pure sales companies as well as those that did not have sales, marketing, and R&D in Germany. Those companies were identified by desk research, utilizing the internet and explorative phone calls. A total of 1056 companies remained.

We contacted these companies and sought their participation. We offered them a research summary and an individual benchmark in return. As a unit of analysis, we chose the NPD project and asked for respondents from sales involved within an NPD project within the last three years. We limited the recall time frame to three years to minimize potential problems with retrospective data collection (Miller et al. 1997).

In total, out of the 1056 companies contacted, 97 companies participated, a response rate of 9.2%, which is in line with prior research (Ernst et al. 2010).

On average, the respondents had 13.5 years of industry, 10.3 years of company, and 8.4 years of NPD experience. They worked for companies with, on average, revenue of €1.9 billion and 17,600 employees. They were responsible for an average of 385 customers. In the sample, at least one team member from sales was involved in the project. In 85.1% of the cases, a team member from sales with the job title of sales manager participated, in 78.9% of the cases, a team member from the inside sales team was present, and in 85.4% of the cases, a sales representative from the field participated. In 51.5% of the cases, customers were assigned to sales representatives by territory, in 12.4% by customer type, in 7.2% by product category, in
2.1% by other criteria, and in 26.8% by mixed criteria. The five different industries were represented in this sample in a satisfactory share: automotive (15.5%), mechanical engineering (32.0%), chemical (20.6%), electronics (17.5%), and metal (14.4%).

Measures

Overall NPD project performance. We asked for the overall NPD performance. In line with prior NPD research, an often-used subjective measure of overall NPD performance (Ernst et al. 2010, Song and Parry 1997) was used. Items addressed revenue, product profitability, and the achievement of predefined goals.

Customer knowledge development. We captured customer knowledge development within the NPD project as a reflective measure of the extent of customers’ involvement in solving the questions and hypotheses of the project team regarding product aspects in an iterative way. Respondents rated from “1 = strongly disagree” to “7 = strongly agree” in how far the following statements characterized the NPD project: “We went through a lot of iterations based on customer feedback prior to launching the product in the market,” “We developed and tested a lot of new ideas over the course of this new product development process,” “The new product development process in this project involved numerous failed experiments,” and “We learned about customer preferences as we worked with them through the new product iterations” (Joshi and Sharma 2004).

Customer segment diversity. We measured customer segment diversity as a formative second-order construct. We identified four possible customer segments to involve: customers with high economic value, customers with high informational potential, customers recognized as opinion leaders in their industry, and customers who had a good relationship with the firm (Ernst et al. 2011).
Economic value. This was modeled as a formative construct. Respondents rated the extent to which customers were selected for involvement in this project based on their past, current, and possible future business with the firm (Ernst et al. 2011).

Informational potential. This formative construct was used to assess the extent to which involved customers were selected as an information source. Items addressed their potential for recognizing problems early, as well as their expert technical and profound user knowledge (Ernst et al. 2011).

Opinion leader. Measured as a formative construct, opinion leader captured the extent to which customers were selected for a project because they were either actively sharing information about new products or because their opinion about new products was sought by market participants (Ernst et al. 2011).

Relationship quality. This formative construct measured the extent to which customers were selected to be part of the project according to relationship specifics. Items covered aspects such as relationship length, trust, contact frequency, general satisfaction with the relationship, and motivation to work together (Ernst et al. 2011).

Customer orientation. We measured customer orientation as a reflective measure. It captures the extent to which customers are at the center of sales efforts (rather than just reaching a deal to simply generate revenue). Items address the extent to which customer problems are key. This measure was used to determine whether the salesperson offers products that best solve the customers’ needs, whether accurate information is used to win the customer over, or whether the salesperson rather relies on pressure to win an opportunity (Saxe and Weitz 1982).

Empathy. Operationalized as a reflective measure, empathy assesses the extent to which salespeople are able to understand customers and put themselves in a customer’s shoes. Examples of items are: “We always sense exactly what customers want” and “It is easy for us to take the customer’s perspective” (Barrett-Lennard 1981; Homburg et al. 2009).
Technological competence. As a formative measure, technological competence captures salespeople’s understanding of the design, specifications, and applications of current company products and those under development (Babakus et al. 1996).

Controls. We included multiple control variables with regard to customer knowledge development. To accurately relate the customer knowledge development to salesperson characteristics and not to relationship aspects, we asked for how many years the salesperson had known the involved customer companies and how many contact points he/she had there. If a salesperson knew an involved customer company for many years and was well connected within this company, part of the knowledge development level should be attributed to the relationship (Knudsen 2007). Further, we controlled for the opposite effect, where customer knowledge development might be hindered by distance, although certain personal characteristics are present. We controlled for the average distance between the salesperson and the customer in kilometers (McDonough et al. 2001).

Multiple control variables were further included in the analysis with regards to overall NPD performance. At the project level, we assessed salespeople’s industry experience and NPD experience and management’s attention to the project. Experience was measured in years. The rationality behind controlling for industry experience was that the more experience a salesperson has, the more impact he/she can have by sharing deeper and more meaningful insights regarding the market that did not originate from the customer and drive success through his/her knowledge (De Luca and Atuahene-Gima 2007; Ottum and Moore 1997). The more NPD experience a salesperson has, the more accustomed he/she is to cross-functional teamwork, which we assumed would lead to smoother collaboration and increased success (Song et al. 1997). Measuring how many people with “sales manager” as their job title were involved relates to the importance and management attention the project received. The more senior-management attention a project receives, the more resources it is likely to receive, and
the more important it is for the company; thus, its chances of success increase (Felekoglu and Moultrie 2014).

Analytical Procedures

We used partial least squares structural equation modeling (PLS-SEM) to calculate our model and test our hypotheses. We decided on PLS-SEM for several reasons: 1) Our focus is on prediction and on identifying “key” driver constructs. This relates to the effect of customer knowledge development on overall NPD performance, the effect of customer knowledge development on customer segment diversity, and the effect of the envisioned antecedents on customer knowledge development. 2) Our structural model is complex, including many constructs and indicators. 3) Within our complex model, we combine reflectively and formatively measured models. 4) PLS-SEM is able to work with smaller sample sizes, in our case n = 97, compared to e.g., covariance-based structural equation models (CB-SEM). To calculate our model, we used SmartPLS, version 3.2.7, as the most prominent application for PLS-SEM calculations (Ringle et al. 2015).

We assessed the reflective and formative constructs within our model according to various guidelines (Chin 1998; Fornell and Larcker 1981; Hair et al. 2017). We verified that for the reflective constructs, the recommended thresholds were met: internal consistency (Cronbach’s alpha > .80, composite reliability (CR) >.80), convergent validity (average variance extracted (AVE) > .50), indicator reliability (item loadings > .60), and discriminant validity (Fornell-Larcker criterion). With regards to the Fornell-Larcker criterion, all square roots of the reflective construct AVEs were greater than the correlations between reflective constructs (see Table 1). Further, with regards to discriminant validity, we applied the Heterotrait-Monotrait ratio (HTMT) and found all ratios below .90 (Gold et al. 2001; Henseler et al. 2015).

Table 1: Descriptive statistics and correlations
Notes: Numbers on the diagonal show the square root of the AVE; n.a. = not applicable; n = 97; S.D. = standard deviation.

**Correlation is significant at the .01 level (2-tailed).

*Correlation is significant at the .05 level (2-tailed).

1Customer Segment Diversity modeled as a hierarchical component model.

High correlations between higher-order components (HOC) and lower-order components (LOC) by design (Hair et al. 2017, p. 283).

For formative constructs, we assessed the convergent validity and the collinearity among the constructs indicators. The convergent validity was assessed through redundancy analysis using the formatively measured construct as an exogenous latent variable predicting the same construct, content-wise, operationalized as a reflective item. Here, all path coefficients exceeded .70 and were highly significant. We assessed collinearity among the formative items through calculated variance inflation factors, which were below the threshold of 5 (Hair et al. 2011) in all but two cases (opinion leader construct) but never above 10. Therefore, we conclude that no critical levels of collinearity exist between the indicators of our formative constructs.

Mediation effects were assessed according to the procedure outlined for SmartPLS models by Hair et al. (2017, pp. 233).

We used $R^2$ and the Stone-Geisser criterion ($Q^2$) to assess the PLS-SEM model. $R^2$ values ranged from .25 (overall NPD performance) to .30 (Customer knowledge development), which we interpret as satisfactory predictive accuracy. The level of predictive relevance we
assessed using the Stone-Geisser criterion ($Q^2$), which was positive and, hence, can be concluded to be fulfilled sufficiently.

Further tests. Testing for non-response bias, we ordered all responses by the date the questionnaire was returned, split the sample in half, and carried out an independent sample t-test testing for a significant difference between these two groups on all central reflective constructs (customer orientation, empathy, customer knowledge development, overall NPD performance). There was no significant difference below the 5% level. Hence, no critical non-response bias is assumed.

Testing for single-respondent bias, we could rely on a second respondent in 31 cases (32.0%). Here, either an approached project manager referred us to the sales employee or vice versa. In the 31 cases, the project manager filled out a second, different questionnaire for the same project the sales employee reported on. We used the inter-rater-reliability (IRR) as defined by James et al. (1984) for answers to identical questions and found general agreement between the two respondents. Of the 31 cases where a second respondent was available, in 28 the IRR ranged from .7 to 1.

Testing for knowledgeability of the respondent, we were able to rely on an item placed ex-ante within the questionnaire, as applied in prior research by Joshi (2010), which asked the respondent to assess his/her own knowledgeability regarding the questions asked. The scale ranged from “1 = not at all knowledgeable” to “5 = highly knowledgeable.” With a mean value of 4.0, we consider the respondents to be knowledgeable with regards to the questions answered.

Results

The hypotheses were tested using the sample of 97 NPD projects. Table 2 summarizes the results.
First, we examined the effect of customer knowledge development on overall NPD performance (H1). There was empirical evidence for a linear and positive relationship (H1 path: .283, p < .01).

Second, we assessed the mediation of customer knowledge development through customer segment diversity on overall NPD performance (H2). We found a positive and linear relationship between both customer knowledge development and customer segment diversity (path: .451, p < .001) and between customer segment diversity and overall NPD performance (path: .280; p < .05). Given the positive and significant effect of customer knowledge development on both customer segment diversity and overall NPD performance, as well as the positive and significant effect of customer segment diversity on overall NPD performance, a complementary, partial mediation is concluded (Hair et al. 2017, p. 233).

Third, with regards to employee characteristics and their effect on customer knowledge development, we found a linear and positive effect for all characteristics. Customer orientation had the strongest effect (H3 path: .256; p < .05), followed by empathy (H4 path: .232; p < .05) and technological competence (H5 path: .218; p < .05).

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1 Calculated path value according to Hair et al. (2018), pp. 52-53 by multiplying the path values from Customer Knowledge Development to the lower order constructs and their path value to Customer Segment Diversity plus adding the path value from Customer Knowledge Development to Customer Segment Diversity. Calculated the significance level and standard deviation thereof through a separate model excluding the lower order constructs and standard bootstrapping procedure.
Table 2: Results of PLS analyses: Impact of customer knowledge development on NPD

<table>
<thead>
<tr>
<th>Construct</th>
<th>Estimate</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall NPD performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer knowledge development</td>
<td>.283**</td>
<td>.101</td>
</tr>
<tr>
<td>Customer segment diversity</td>
<td>.280*</td>
<td>.123</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry experience</td>
<td>.053 n.s.</td>
<td>.108</td>
</tr>
<tr>
<td>NPD experience</td>
<td>.095 n.s.</td>
<td>.108</td>
</tr>
<tr>
<td>Management attention</td>
<td>.022 n.s.</td>
<td>.079</td>
</tr>
<tr>
<td>Customer segment diversity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer knowledge development²</td>
<td>.451***</td>
<td>.092</td>
</tr>
<tr>
<td>Customer knowledge development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer orientation</td>
<td>.256*</td>
<td>.106</td>
</tr>
<tr>
<td>Empathy</td>
<td>.232*</td>
<td>.105</td>
</tr>
<tr>
<td>Technological competence</td>
<td>.218*</td>
<td>.111</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average number of persons per customer</td>
<td>.008 n.s.</td>
<td>.069</td>
</tr>
<tr>
<td>Average number of contact years per customer</td>
<td>.070 n.s.</td>
<td>.103</td>
</tr>
<tr>
<td>Average physical distance per customer</td>
<td>.027 n.s.</td>
<td>.114</td>
</tr>
<tr>
<td>Customer Segment Diversity (HOC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>.199***</td>
<td>.031</td>
</tr>
<tr>
<td>Informational</td>
<td>.323***</td>
<td>.035</td>
</tr>
<tr>
<td>Opinion leader</td>
<td>.291***</td>
<td>.035</td>
</tr>
<tr>
<td>Relationship quality</td>
<td>.385***</td>
<td>.032</td>
</tr>
<tr>
<td>SmartPLS model metrics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R² - Customer knowledge development</td>
<td>.297</td>
<td></td>
</tr>
<tr>
<td>Q² - Customer knowledge development</td>
<td>.182</td>
<td></td>
</tr>
<tr>
<td>R² - Overall NPD performance</td>
<td>.255</td>
<td></td>
</tr>
<tr>
<td>Q² - Overall NPD performance</td>
<td>.175</td>
<td></td>
</tr>
</tbody>
</table>

Significance: two-tailed: †p < .1 (1.645); *p < .05 (1.960); **p < .01 (2.576); ***p < .001 (3.290); n.s. = not significant (p ≥ .1), n = 97; SmartPLS used, version 3.2.7.

² Calculated path value according to Hair et al. (2018), pp. 52-53 by multiplying the path values from Customer Knowledge Development to the lower order constructs and their path value to Customer Segment Diversity plus adding the path value from Customer Knowledge Development to Customer Segment Diversity. Calculated the significance level and standard deviation thereof through a separate model excluding the lower order constructs and standard bootstrapping procedure.
Discussion

Customer knowledge development through the sales force in NPD projects increases overall NPD performance. Both direct and mediated effects through customer segment diversity have been proven. We answer the call of de Jong et al. (2014) in how far the sales force can be leveraged for customer involvement in NPD projects. Further, we extend the concept of customer knowledge development to customer segment diversity. We show that customer knowledge development drives customer segment diversity and that the latter partially mediates the full effect of customer knowledge development on overall NPD performance. It is not only important to involve customers in NPD projects but, in line with prior research (Hienerth and Lettl 2017; Ernst et al. 2011), it also matters who is involved. Further, we have shown individual characteristics to answer the question of which individual orientations and skills drive customer knowledge development and, consequently, whom to involve from the sales force in the NPD process for this task.

Theoretical implications. This research makes three theoretical contributions.

First, prior research regarding the role of sales in NPD is extended. Ernst et al. (2010) - on sales, marketing, R&D cooperation across new product development stages - call for research on “specific processes by which these types of information are input in the NPD process”. De Jong et al. (2014, p. 645) - in their special issue on sales in NPD - call for “… future research on the facilitating role of a company’s sales force because little is known about how the sales force can effectively involve the customer in the company’s innovation process”. In the current study, we show that customer knowledge development driven through the sales force has a positive and linear effect on overall NPD performance. Salespeople are in ideal positions to involve customers that can be leveraged in NPD for continuous probing, testing, and experiments and to iterate to better products before launch. Further, de Jong et al. address “the selection of those salespeople that are suitable to be involved in the company’s innovation process as an important area of future research” (2014, p. 645). Regarding the selection of
salespeople to involve, the current study reveals that salespeople with a strong customer orientation, empathy, and technological competence are best suited to drive customer knowledge development and, consequently, customer segment diversity and overall NPD performance.

Second, this research contributes to the literature of customer involvement in NPD projects (Bosch-Sijtsema and Bosch 2015; Candi et al. 2016; Cui and Wu 2016) and customer knowledge development (Joshi and Sharma 2004). We extend existing antecedents of customer knowledge development beyond the organizational context to characteristics of individuals who involve the customer in customer knowledge development. Further, we extend the concept of customer knowledge development to the customers involved, showing a positive and linear effect of customer knowledge development on customer segment diversity and the mediating effect of the latter on overall NPD performance.

Third, this study contributes to the sales research literature. Salespeople’s orientations and skills that have been linked to customer-need recognition and sales performance are transferrable to the NPD context. While in sales research salespeople’s orientations and skills are related to selling an existing product, this study applies them one step earlier to, for example, understanding the customer needs accurately to shape a product in development so that it can later be sold (Babakus et al. 1996; Homburg et al. 2009).

Managerial implications. Three managerial implications can be derived from this work.

First, customer knowledge development increases NPD success. Internal customer and market knowledge residing with sales, marketing, and R&D should be combined with customer involvement throughout the process. Internal assumptions and beliefs must be verified in customer interactions. Market research done upfront can only lead to initial beliefs that need to be validated through iterations of probing and learning throughout the NPD process. While marketing and R&D have limited customer contact and relationships, this research has shown how valuable a firm’s sales force can be for customer knowledge development. As boundary spanners, salespeople are able to leverage their external and internal relationships to generate
and transfer knowledge from existing customers and approach new customers. NPD typically is led by the marketing or R&D departments (Homburg et al. 2015), which collaborate extensively in new product projects. Managers from these departments need to open up their teams and processes for sales involvement. They need to understand the big asset sales is internally to involve customers in the NPD project and gain valuable insights. Cross-functional teams from sales, marketing, and R&D are an effective solution in this regard. Further, these managers and the whole organization should understand that sales representatives supporting NPD projects work outside their primary role. In order for sales to contribute to NPD, and to be motivated, revenue targets of their primary role might need to be decreased, as well as a possible loss in commission due to less revenue being compensated.

Second, this research has shown that the diversity of involved customers matters. As customer diversity is naturally driven by probing and learning activities inherent to customer knowledge development, managers should nevertheless stress its importance. They must avoid tailoring new products to a small fraction of customers who have the closest relationships with the firm or are the easiest to connect with; the product must be able to gain traction with others. NPD project managers should actively monitor that the new product idea, prototype, or concept has been validated with customers that have high economic potential or at least are representative of a specific customer segment. Further, depending on the industry, the acceptance and support of the new product by opinion leaders should be ensured if the market is relying on their judgment. If product development gets stuck on real-life application questions, sales advice should be sought regarding whom to ask for help and subsequently arranging the contact. Sales will, furthermore, know whom to ask for favors in trialing, having built up and maintained long-term reciprocal relationships with certain customers.

Third, this research gives indications as to which salespeople to include in customer knowledge development. While the literature is inconclusive regarding how salespeople’s orientation affects their sales performance, customer knowledge development clearly benefits
from being customer orientated. The best-selling salesman is not automatically the best choice to include in an NPD project. It matters if he/she really wants to solve the customer’s needs rather than simply looking for the next commission on a sale. Further, next to customer orientation, empathy is important. Managers should choose a person from sales that can see and understand customers’ perspectives. It will allow the salesperson - like in a product sale - to argue, with customer benefits in mind, why the customer should contribute to the NPD project through feedback or trialing a prototype for later benefit. The salesperson’s technological knowledge will allow the salesperson to connect at different levels with project team members internally and stakeholders on the customer side. While customer orientation is highly related to a certain mindset, and empathy can be argued to be an inherent skill, technological competence among all three characteristics is the one that can be trained. Therefore, given the findings, if the ideal salesperson is not at hand but one with customer orientation and empathy is available, it makes sense to invest in his/her technological understanding for the benefit of the NPD project.

Limitations and Future Research. We acknowledge several limitations of this research. While prior research has addressed intra-organizational antecedents of customer knowledge development (Joshi and Sharma 2004), this research focuses on the link between customers and the NPD team, and it addresses the characteristics of salespeople driving the knowledge development. For a thorough assessment of the antecedents driving knowledge development, it would be interesting for future research to compare employee characteristics at the individual level and intra-organizational aspects at the project or company level. Salespeople were chosen in this study as key employees as they typically have the closest contact with customers (Kotler et al. 2006). With regards to employee characteristics, this study has addressed customer orientation, empathy, and technological competence as they have been linked to customer need recognition and sales performance in prior research (Babakus et al. 1996; Homburg et al. 2009).
Further salesperson characteristics might be worth testing in future research (Babakus et al. 1996).

Additionally, while our sample included companies from several industries, all respondents were from Germany. Future research should verify the extent to which our findings can be extended to other (industrialized) countries.

In addition, we captured customer knowledge development in a rather broad way. This is justified as we defined it as an ongoing process throughout the NPD process. However, future research might focus on specific phases and address levers for customer knowledge, specifically in idea generation, concept refinement, or prototype testing phases. In general, and specifically in this context, the different impacts of involved customer segments might yield interesting insights.
Appendix: Constructs, Items, Scales, and Reliabilities

Customer orientation

(Adapted from Saxe and Weitz 1982)

The statements below describe various ways a salesperson might act with a customer or prospect (for convenience, the word “customer” is used to refer to both customers and prospects). For each statement, please indicate how often you act as described in the statement: (1 = “never” to 7 = “always”; AVE = .83, CR = .95, Cronbach’s α = .93).

1. We try to influence a customer by information rather than pressure.
2. We offer the product that is best suited to the customer’s problem.
3. We answer a customer’s questions about products as correctly as we can.
4. We try to bring a customer who has a problem together with a product that helps him solve that problem.

Empathy

(Adapted from Homburg et al. 2009)

Please rate generally for the sales force project team members to what extent you agree with the following statements: (1 = “strongly disagree” to 7 = “strongly agree”; AVE = .76, CR = .91, Cronbach’s α = .85).

1. We always sense exactly what customers want.
2. We realize what customers mean even when they have difficulty saying it.
3. It is easy for us to take the customer’s perspective.
Technological competence of project team members from the sales force

(Adapted from Babakus et al. 1996)

Please rate the following statements to the extent that they characterize the technological competence the project team members from the sales force had, on average, in this project: (1 = “strongly disagree” to 7 = “strongly agree”).

1. Knowing the design and specifications of company products/services. (4.534)
2. Knowing the applications and functions of company products/services. (3.729)
3. Keeping abreast of the company’s production and technological developments. (2.574)

Reflective indicator

“Knowing technical details about one’s own products/services, related applications and one’s own production and technological abilities.”

External validity: path coefficient: .888, t-value: 32.179, p ≤ .000.

Collinearity assessment: VIF in brackets, all below the threshold of 5.
Customer segment diversity

(Ernst et al. 2011)

In this project, to what extent did you integrate the following types of customers into the project? Customers, that… (1 = “not at all” to 7 “extensively”):

**Economic**

(Ernst et al. 2011)
1. …are economically attractive with respect to past business. (2.407)
2. …are economically attractive with respect to present business. (3.451)
3. …are economically attractive with respect to future business. (1.829)

Reflective indicator

“Customers, that we selected based on their economic potential.”

External validity: path coefficient: .758, t-value: 12.500, p ≤ .000.

Collinearity assessment: VIF in brackets, all below the threshold of 5.

**Informational**

(Ernst et al. 2011)
1. …recognize problems early. (2.121)
2. …would benefit significantly from the new product/service. (2.305)
3. …have a high degree of technical expert knowledge. (3.797)
4. …have a high degree of application knowledge as a product user. (3.520)

Reflective indicator

“Customers, that we selected based on their information potential.”

External validity: path coefficient: .762, t-value: 15.993, p ≤ .000.
Collinearity assessment: VIF in brackets, all below the threshold of 5.

**Opinion leader**

(Ernst et al. 2011)

1. …talk very often about new products in their social environment. (4.241)
2. …can give a lot of information in discussions about new products to members of their social environment. (7.164)
3. …are very likely to be asked questions about new products by members of their social environment. (8.379)
4. …are often used as a source of getting advice by members of their social environment. (4.693)

Reflective indicator

“Customers, that we selected based on their opinion leadership/recommendation potential.”

External validity: path coefficient: .815, t-value: 13.734, p ≤ 0.000.

Collinearity assessment: VIF in brackets, two out of four above the threshold of 5.

**Relationship quality**

(Ernst et al. 2011)

1. …have a long-term relationship with the firm. (2.631)
2. …have frequent contacts with the firm. (3.221)
3. …we generally trust. (3.708)
4. …are satisfied with the relationship with our firm. (3.350)
5. …are motivated to work with us. (2.679)
Reflective indicator

“Customers, that we selected based on our relationship with them.”

External validity: path coefficient: .783, t-value: 19.582, p ≤ .000.

Collinearity assessment: VIF in brackets, all below the threshold of 5.

Customer segment diversity

(Adapted from Ernst et al. 2011)

(AVE = .62, CR = .87, Cronbach’s α = .79)

Higher-order formative model of:

1. Economic (2.814)
2. Informational (3.785)
3. Opinion leader (1.378)
4. Relationship quality (2.281)

Reflective construct

In this project, to what extent did you integrate the following types of customers into the project? (1 = “not at all” to 7 “extensively”)

(AVE = .62, CR = .87, Cronbach’s α = .79)

1. Customers were selected based on their economic potential.
2. Customers were selected based on their information potential.
3. Customers were selected based on their opinion leadership/recommendation potential.
4. Customers were selected based on our relationship with them.


Collinearity assessment: VIF in brackets, all below the threshold of 5.
Customer knowledge development

(Adapted from Joshi and Sharma 2004)

Please rate the following statements to the extent that they characterize the new product development process in this project: (1 = “strongly disagree” to 7 = “strongly agree”; AVE = .73, CR = .92, Cronbach’s α = .88).

1. We went through a lot of iterations based on customer feedback prior to launching the product in the market.
2. We developed and tested a lot of new ideas over the course of this new product development process.
3. The new product development process in this project involved numerous failed experiments.
4. We learned about customer preferences as we worked with them through the new product iterations.

Overall NPD performance

(Adapted from Ernst et al. 2010)

Please indicate your assessment of the success of the new product developed in this project.

(AVE = .79, CR = .94, Cronbach’s α = .91).

1. How successful was this new product from an overall profitability standpoint? (1 = “a complete financial failure” to 7 = “a great financial success”)
2. Relative to your firm’s other new products, how successful was this new product in terms of revenues? (1 = “far less than our other new products” to 7 = “far exceeding our other new products”)
3. Relative to your firm’s other new products, how successful was this new product in terms of profits? (1 = “far less than our other new products” to 7 = “far exceeding our other new products”)
4. Relative to your firm’s objectives, how successful was this new product in terms of profits? (1 = “far less than our objectives” to 7 = “far exceeding our objectives”)
**Controls**

**Overall NPD performance**

(Adapted from Thamhain 1990)

1. How much experience, in years, do you have within your industry?
2. How much experience, in years, do you have within new product development projects?
3. How many project team members from the sales force had the following job roles, in addition to their normal work, in this project? (Number of people) (Number taken for job role sales manager).

**Customer knowledge development**

(Adapted from Doney and Cannon 1997; Palmatier 2008; Ganesan et al. 2005)

1. How many years (on average) had you been in contact with involved customer companies prior to the project?
2. How many different contact persons do you have (on average) within the involved customer companies?
3. How far away, on average, are the customers that you included in this project (in kilometers)?
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