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ORIGINAL EMPIRICAL RESEARCH

Don't just fix it, make it better! Using frontline service employees to improve recovery performance

Gielis A. H. van der Heijden · Jeroen J. L. Schepers · Edwin J. Nijssen · Andrea Ordanini

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Abstract This study examines how frontline service employees (FSEs) can learn from recovery services and improve their performance accordingly. While research recognizes that FSEs can fulfill an innovation role by sourcing customer knowledge and developing ideas for performance improvement, it remains unclear whether such a role benefits or impairs the FSE's primary recovery service role of providing efficient and thorough solutions to customer problems. This research models both FSE roles and explores under which conditions it is beneficial for FSEs to engage in an additional innovation role. The model is tested using survey and objective data from 134 FSEs. PLS results reveal that the innovation role is detrimental because sourcing knowledge from customers takes time and effort, but also beneficial because knowledge sourcing triggers FSEs to develop ideas for improvement, which positively influence their recovery speed and recovery quality. Managers can strengthen these positive effects of knowledge sourcing by optimizing an FSE's service portfolio (i.e., the combination of products, customers, and failures an employee is responsible for), which leverages the effects of knowledge sourcing on ideas for improvement.

Keywords Frontline service employees · Recovery service · Innovation · Knowledge sourcing · Ideas for improvement · Service portfolio

Introduction

Modern-day manufacturers, such as Cisco, GE Healthcare, and Canon, realize that successfully managing the after-sales market for complex business-to-business (B2B) goods is crucial for safeguarding customer satisfaction and company profits (Cohen et al. 2006). The maintenance and repair of compound, customized systems requires firm-specific expertise and firmly ties customers to the manufacturer's business, which is increasingly typified as providing total solutions (Windahl and Lakemond 2010). Therefore, offering recovery services (i.e., services to fix products after a breakdown[1]) can be more profitable than selling the product itself.

Frontline service employees (FSEs) are central to the delivery of recovery services. Their problem-solving actions minimize hiccups in the customer's operations and help their firm to live up to predefined performance standards (Ulaga and Reinartz 2011). Failing to deliver contractual promises can lead to (financial) penalties and customer loss.

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G. A. H. van der Heijden (✉) · J. J. L. Schepers · E. J. Nijssen
Department of Industrial Engineering & Innovation Sciences, Innovation Technology Entrepreneurship & Marketing group, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands
e-mail: G.A.H.v.d.Heijden@tue.nl

J. J. L. Schepers
e-mail: J.J.L.Schepers@tue.nl

E. J. Nijssen
e-mail: E.J.Nijssen@tue.nl

A. Ordanini
Department of Marketing, Bocconi University, Milan, Italy
e-mail: Andrea.Ordanini@unibocconi.it

[1] Although the term *service recovery* is typical in literature referring to a service breakdown (e.g., De Matos et al. 2007; Maxham and Netemeyer 2002; Smith et al. 1999), few studies consider after-sales services for product repair. One notable exception is Brady et al. (2008), who consider failures of cellular phones and televisions. We use the term *recovery service* to denote the act of providing a recovery, including that for products.

As contracts tend to be won by the firm that guarantees fast service and reliable product repairs, companies traditionally expect FSEs to fulfill a *recovery service role*: activities that help to provide the customer with an efficient and thorough solution to the problem (Bettencourt and Brown 2003; Liao 2007). In line with the recovery service role's focus, recovery performance metrics monitored by many manufacturers include recovery speed (i.e., the average duration of the FSE's service visits) and recovery quality (i.e., the average quality of the product repairs conducted by the FSE).

Remarkably, little attention has been given to how frontline employees can improve their recovery performance and help the firm to deliver superior recovery service to stay competitive. Scholars from various fields, including marketing, new product development, and organizational learning, suggest that frontline employees are an important, underrated source of ideas for improvement (Melton and Hartline 2010; Umashankar et al. 2011). Plentiful face-to-face encounters provide FSEs with excellent opportunities to gather firsthand customer reactions, create ideas to revise existing routines, and realize a better recovery performance accordingly. This constitutes a new FSE *innovation role*: activities aimed at gathering customer experiences and the subsequent creation of ideas for improvement, i.e., novel responses that provide improved service delivery and solutions for failures of the products involved (West and Farr 1990).

However, engaging in an innovation role can also have a downside for FSEs. Actively accessing and digesting customer knowledge takes time and mental resources which FSEs cannot spend on efficiently solving the customer's problem. Hence, it remains unknown whether frontline-led improvement initiatives are always valuable for the firm. The aim of this research is to explore to what extent FSEs may fulfill an innovation role in addition to their traditional recovery service role, and under which conditions this innovation role is most likely to result in recovery performance improvements.

Our research offers three important contributions. First, while prior research focuses on how FSEs may restore justice perceptions and customer satisfaction after a failure (Gremler and Gwinner 2008; Ma and Dubé 2011; Maxham and Netemeyer 2002), it has largely overlooked the fact that FSEs can learn from recovery situations. Literature recognizes that obtaining customer feedback in the frontlines allows firms to keep up with ever-changing market demands and can be done by employees behaving proactively (e.g., Challagalla et al. 2009). However, empirical evidence remains scant. This study therefore introduces FSE knowledge sourcing as a key concept in an FSE's innovation role. We define knowledge sourcing as the FSE's proactive behavior of tapping into customers' experiences with the firms' products and services through personal, face-to-face interactions (Gray and Meister 2004; Leiponen 2005). This may lead to retrieving unique information that is unaffected by dominant organizational paradigms, which allows employees to more quickly learn from service jobs and develop ideas for improving recovery speed and quality. We therefore extend the recovery literature with an innovation perspective.

Second, building on role theory (Solomon et al. 1985), we investigate whether and how an innovation role can be combined with the FSE's recovery service role. The latter role requires core recovery behavior: solving customer problems in a courteous, responsive, and prompt manner (Bettencourt and Brown 2003; Liao 2007). While taking up the innovation role may help FSEs to realize greater recovery speed and quality, it is also time consuming because knowledge sourcing may reduce the efficiency of one's core recovery behavior. Existing studies have focused on either recovery behavior *or* obtaining information from customers, but this research addresses the potential trade-off that exists between these two activities.

Third, the current study identifies the conditions under which FSEs should engage in an innovation role. Because an FSE's innovation role may both impair and benefit recovery performance, managers need to know under which work conditions the beneficial effects prevail. We argue that the value of the innovation role is contingent on characteristics of the FSE's service portfolio, defined as the combination of products, customers, and failures that an employee is responsible for. Creativity literature considers contextual variety, such as task diversity, task complexity, and variety in social contacts crucial for idea development because it motivates employees to think "outside the box" (George 2007; Shalley et al. 2004). Therefore, we consider product diversity, familiarity with customers, and failure complexity as our service portfolio characteristics of interest. While prior marketing research has recognized the importance of portfolios for firm-level innovation (e.g., Wuyts, Dutta & Stremersch 2004; Yli-Renko & Janakiraman 2008), no study has examined how managers can optimize frontline performance by adapting individual service portfolios.

Theoretical background

FSEs as a source of ideas

Firms increasingly recognize the importance of external knowledge sourcing for value creation and competitive advantages (Im and Rai 2008; Umashankar et al. 2011). Southwest Airlines, for example, owes its success partly to the strategic principle of empowering the right FSEs to ask for customer feedback and use this feedback for product and service improvement (Gadiesh and Gilbert 2001). While some studies examine employee involvement in New Product and Service Development (NPD/NSD), there is also

the recognition that FSEs serve a crucial purpose in improving recovery performance (Robinson and Schroeder 2009; Vandenbosch et al. 2006). FSEs are important knowledge brokers between customers and the firm, because the nature of their job gives them an ideal position from which to access, filter, and translate sticky knowledge possessed by dispersed customers (e.g., Rothaermel and Hess 2007). For FSEs who repair product failures, this position becomes particularly salient, because failures represent deviations from the expected course of action, and addressing deviations offers a fertile ground for ideas for improvement. For instance, new solutions to existing product problems may be creatively generated, or novel service procedures that benefit the overall speed of the recovery process may be acted out.

FSE roles

According to role theory (Solomon et al. 1985), sourcing knowledge from customers and generating ideas accordingly constitute a role: a set of coherent behaviors and its associated outcomes (Goolsby 1992). This study examines the innovation role in relationship to FSEs' traditional recovery service role, which comprises core recovery behavior aimed at achieving an efficient and high-quality solution to customers' problems (cf. Bettencourt and Brown 2003; Liao 2007). Prior literature offers two conflicting views about the effectiveness of employees with multiple roles. One stream emphasizes that multiple roles compete for resources and thus tend to be accompanied by adverse performance consequences (Singh 2000). Time and effort spent interacting with customers to gather new knowledge cannot be spent recovering a product failure, which is detrimental for recovery speed. Another stream instead argues that different roles can be combined successfully if they share a common ground, through role accumulation (Sieber 1974; see also Keaveney and Nelson 1993). This theory argues that each employee can effectively transfer resources between roles to meet each role's performance objectives (Bettencourt and Brown 2003; Goolsby 1992). During recovery services, FSEs can combine courteous problem solving with knowledge sourcing, because both take place at the face-to-face encounter between the FSE and the customer. The additional time spent on knowledge sourcing may be recouped by implementing ideas for improvement, which benefits the FSE's ultimate recovery performance.

The importance of the FSE's service portfolio

As role theory posits both detrimental and beneficial effects of employees engaging in multiple roles, it is important to know how the beneficial effects can be optimized. Literature in the field of organizational behavior and psychology considers work variety as a crucial element in predicting employee creativity (George 2007; Shalley et al. 2004). Managers may orchestrate the variety in an FSE's work context by adjusting the diversity of product types an employee should service, by matching FSEs to (un)familiar customers, and by allocating employees to more or less complex service jobs. In this way, managers have an important tool to stimulate FSE idea development through knowledge sourcing and thus to optimize the value of FSEs' innovation role. We discuss our conceptual framework next.

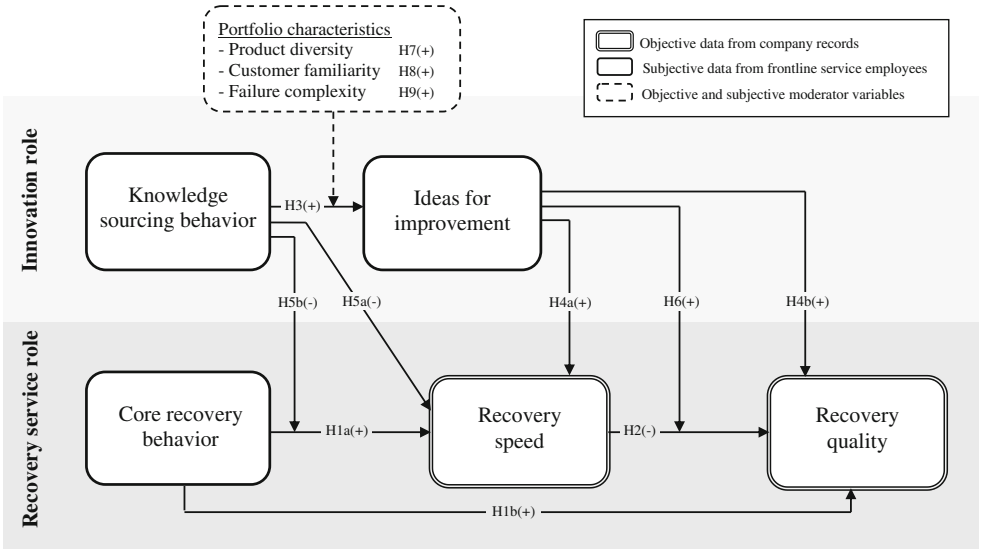
Framework and hypotheses

The conceptual framework in Fig. 1 depicts the FSE's recovery service and innovation roles, on the basis of their associated behaviors: core recovery and knowledge sourcing behavior, respectively. Recovery speed and recovery quality represent the outcomes of interest. In line with role theory, we predict that knowledge sourcing behavior negatively influences recovery speed and negatively moderates the core recovery behavior–recovery speed relationship (i.e., detrimental effects) but enhances recovery speed and quality through ideas for improvement (i.e., beneficial effects). These ideas also moderate the recovery speed–recovery quality relationship. Finally, we explore the moderating effects of different configurations of the service portfolio on the relationship between knowledge sourcing and ideas for improvement of the FSE. An overview of the construct definitions can be found in Table 1.

The FSE's recovery service role

The primary responsibility of an FSE is to take corrective actions or initiate product repair in response to a customer complaint, while demonstrating politeness, respect, and friendliness (Bettencourt and Brown 2003; Liao 2007). In core recovery behavior, problem solving is thus combined with courtesy to provide the customer with an efficient and thorough solution to the problem. Two theoretical perspectives explain the relationship between problem solving behavior and recovery speed/quality. The first stems from literature on focus of attention, which argues that engaging in problem solving behavior keeps the employee focused on achieving his/her operational targets without distractions (Siegall and McDonald 1996). Keeping one's attention to the actual problem benefits the efficiency of task execution and increases the chance of providing error-free and high-quality solutions. The second perspective comes from script theory, which argues that problem solving behavior is generally more role prescribed, therefore frequently repeated, resulting in strongly standardized and well-rehearsed problem solving scripts (Solomon et al. 1985). Sticking to such

Fig. 1 Conceptual model



scripts helps FSEs to find a thorough solution to the problem in a prompt manner (Bettencourt and Brown 2003; Liao 2007).

Courtesy relates to recovery speed and quality because a courteous approach encourages customers to provide the basic information that the FSE needs to deal with the product failure (Gremler and Gwinner 2008; Meuter et al. 2000). Friendliness and honesty increase levels of intimacy and help to determine the product problem the FSE was called for (Beatty et al. 1996). Courtesy reduces the time required

Table 1 Key constructs and definitions

Construct	Definition
Core recovery behavior	The frontline service employee's behavior of solving customer problems in a courteous, responsive, and prompt manner. Problem solving operates together with courtesy to provide the customer with an efficient and thorough solution to the problem.
Knowledge sourcing behavior	The frontline service employee's proactive behavior of tapping into customer experiences with the firms' products and services through personal, face-to-face interactions. It includes both providing and acquiring information; the first notifies customers on (to be conducted) recovery actions, the second proactively asks customers about their product and service experiences.
Ideas for improvement	The frontline service employee's novel responses that provide improved service delivery and solutions for failures of the products involved. Ideas may include new routines for better solving a product problem or new structures for service visits.
Recovery speed	The average duration of the frontline service employee's service visits. Duration is reflected in the number of service visits per day and the time between arrival at and departure from the customer's location, provided that the employee has repaired the broken product.
Recovery quality	The average quality of the product repairs conducted by the frontline service employee. The quality is assessed as the time between the current service job and the product's next breakdown.
Product diversity	An element of the frontline service employee's service portfolio (i.e., the combination of products, customers, and failures that an employee is responsible for) that indicates the extent to which the employee is charged with servicing products which are very different from each other in terms of technology.
Customer familiarity	An element of the frontline service employee's service portfolio that indicates the extent to which an employee knows the contact person of the B2B customers he/she services.
Failure complexity	An element of the frontline service employee's service portfolio that indicates the extent to which the product failures an employee encounters in his/her service visits are complicated to solve.

to search for root causes and enhances the chance of correctly diagnosing the problem. In a recovery context, solving a problem in a polite way thus provides a fast, sustainable solution and higher recovery quality. In sum:

H1: FSE core recovery behavior positively influences the FSE's (a) recovery speed and (b) recovery quality.

As firms increasingly recognize the need to reduce costs while increasing revenues (Marinova et al. 2008; Rust et al. 2002), a serious tension arises between productivity and quality outcomes, particularly at the frontline (Ye et al. 2012). Delivering consistently high-quality service requires time to make sure all issues are resolved and the customer can fully rely on the product in the future. In addition, a customer may ask the FSE to conduct some additional services during his visit, which would violate the preset norm. In contrast, pressure from service management to speed up recoveries may cause FSEs to cut corners, skip steps, or even overlook parts of a problem. These acts compromise the quality of repairs (Singh 2000). Accordingly, we hypothesize:

H2: The FSE's recovery speed negatively influences recovery quality.

Beneficial effects of the FSE's innovation role

Employees may use service encounters as an opportunity to collect customer information and thus increase their knowledge. FSE knowledge sourcing behavior may lead to the identification of valuable information, because FSEs proactively ask customers about their experiences with the product and/or service (Van Vaerenbergh et al. 2012; Ye et al. 2012). In turn, they can inform the customer about service actions on the product or explain how to use it better, thereby stimulating customers to disclose their knowledge of the products and service involved (Dong et al. 2008; Gremler and Gwinner 2008). This information may also contain insights that would not have been shared if the interaction were limited to a rudimentary conversation to determine the product problem the FSE was called for. In contrast to core recovery behavior, where customer interaction centers around friendly greetings and simple questions, knowledge sourcing behavior involves a dialogue in which customers share knowledge that otherwise would have remained unarticulated.

This acquired information may stimulate learning through a mechanism of analogical reasoning, where connections are established between new and existing knowledge (Bagozzi et al. 2011; Ye et al. 2012). Ideas for improvement may arise when new information is integrated with one's current knowledge base. This is in line with creativity research, where researchers argue that the more new information an employee adds to existing knowledge structures through knowledge sourcing, the more likely he/she is to develop ideas for improvement in the area of expertise (Coelho et al. 2011). For instance, an FSE working for a document solutions provider may service a copier that irregularly produces inaccurate images. In a personal conversation, the customer tells the FSE that the room temperature fluctuates over the day. Combining this new information with existing knowledge leads the FSE to adjust a series of software settings, a hitherto unknown service routine. It may prove to be a more robust and efficient solution to the problem than the existing routine of installing spare parts. Other ideas may seem mundane yet may be highly effective. For instance, personal interaction with a customer provides the FSE with a permanent visitor card, saving precious administration time on every service visit.

Improvement ideas may impact both product and service outcomes, because modern products and services are closely intertwined in a value bundle (Tuli et al. 2007; Vargo and Lusch 2004; Ulaga and Reinartz 2011). Specifically, an idea for better solving a product problem (e.g., changing software settings rather than parts) can increase recovery quality, but it also enables a faster diagnosis of similar problems in subsequent service encounters. Moreover, an idea to better structure service visits (e.g., by requesting visitor cards early on) can not only benefit an FSE's recovery speed but also leave time for more thorough repairs, which benefits one's overall recovery quality. While ideas may not always be implemented directly, nor in every service encounter, a greater effort in idea development is likely to manifest itself in performance improvements over time (West and Farr 1990).

In short, consistent with role accumulation theory (Keaveney and Nelson 1993; Sieber 1974), we expect that the FSE's innovation role provides ideas for improvement by sourcing knowledge from customers. These ideas, in turn, benefit the FSE's recovery service role through improved service procedures and product solutions, ultimately enhancing recovery speed and recovery quality. Thus, we hypothesize:

H3: FSE knowledge sourcing behavior positively influences the extent to which the FSE develops ideas for improvement.

H4: The extent to which the FSE develops ideas for improvement positively influences the FSE's (a) recovery speed and (b) recovery quality.

Detrimental effects of the FSE's innovation role

Despite its beneficial effects, knowledge sourcing may also impair recovery speed. Each action an FSE adds to the execution of core recovery behavior is likely to lengthen the duration of service encounters (Bagozzi et al. 2011; Jasmand et al. 2012). When an FSE opens up a conversation

to share knowledge and get a better understanding of customer experiences, he or she is pulled away from working directly on the product to solve the problem. This takes extra time. Besides directly affecting recovery speed, knowledge sourcing behavior may also negatively moderate the relationship between core recovery behavior and recovery speed. Specifically, when FSEs spend mental resources trying to attend to and interpret new customer information, they have fewer resources for efficient task execution (e.g., Jasmand et al. 2012). Reduced mental resources also may narrow an employee's attentional focus on problem solving, such that core recovery behavior becomes less efficient (Keating et al. 1999). In other words, because every activity added to core recovery behavior takes not only time but also energy, core recovery behavior becomes less effective to optimize recovery speed. We hypothesize:

H5a: FSE knowledge sourcing behavior negatively influences the FSE's recovery speed.

H5b: FSE knowledge sourcing negatively moderates the relationship between core recovery behavior and recovery speed.

Ideas for improvement as a moderator

To tackle productivity–quality trade-offs, scholars argue that FSEs must go beyond their scripted routines (Marinova et al. 2008; Ye et al. 2012). New ideas support a leapfrogging strategy, because workers find clever ways to avoid impractical activities in their service routines while still achieving, or even exceeding, recovery quality objectives. In other words, developing ideas can simplify recovery tasks, which makes time pressures seem less stringent and performance limiting. Research in psychology also shows that workers who identify job opportunities suffer less strain when job demands increase, whereas those without such ability experience significant strain and stop feeling responsible for high-quality job outcomes (Parker and Sprigg 1999). They stick to old, already optimized routines, which precludes faster recovery without cutting corners and quality loss. We therefore hypothesize:

H6: The extent to which the FSE develops ideas for improvement positively moderates the relationship between recovery speed and recovery quality.

Service portfolio characteristics

Knowledge sourcing activity should have both beneficial and detrimental effects, so managers need to know how to make the positive outweigh the negative. We explore the influence of job design on the relationship between knowledge sourcing behavior and ideas for improvement. Specifically, we consider three characteristics of an FSE's service portfolio: product diversity, customer familiarity, and failure complexity.

Product diversity reflects the extent to which an FSE is charged with servicing a large, diverse range of products. Employees with a diverse product portfolio encounter a variety of products with different parts, setups, and technologies. They are exposed to various customers with dissimilar product experiences. Because variety is a critical component of employee learning, workers with a diverse portfolio should find it easier to expand their knowledge structures and engage in analogical reasoning (Bagozzi et al. 2011). If all customers report similar experiences, knowledge sourcing cannot expand knowledge structures, and the likelihood of new ideas for improvement is limited. The sequential nature of diverse service visits is especially conducive to the generation of new insights (Ortega 2001). In contrast, specialization (i.e., low product diversity) can increase employees' confidence in their current problem solving capabilities, such that they are unlikely to use social interactions with customers for improvement purposes. We therefore hypothesize:

H7: The level of product diversity in the FSE's portfolio positively moderates the relationship between knowledge sourcing behavior and ideas for improvement.

Customer familiarity refers to the extent to which FSEs have considerable acquaintance with the customers they service. In B2B service contexts, some employees have a fixed pool of customers with whom they have built stable and intricate relationships; others do not. While one could argue that unfamiliar customers impose variety in service jobs and therefore benefit the payoff of knowledge sourcing, we expect that customer *familiarity* strengthens the relationship between knowledge sourcing behavior and ideas for improvement. We provide two key arguments. First, longer-lasting relationships are associated with trust, which makes people reveal more detailed and sensitive information in exchanges (Dong et al. 2008; Gremler and Gwinner 2008). Knowledge sourcing from familiar contacts thus is more likely to disclose new information that can be added to a knowledge base and lead to new ideas. Second, if an FSE is familiar with a B2B customer, he or she can locate the right people within the customer organization easily. Information sharing then becomes more likely and more meaningful, because the FSE interacts with somebody with a similar mental structure (Reeves and Weisberg 1994). The new information provided thus fits more easily into existing knowledge structures and facilitates the generation of ideas for improvement (Finke et al. 1995). In contrast, FSEs who serve unfamiliar customers tend to have impersonal contacts that lack a basis of trust. This makes it hard to source insightful information and develop new ideas. We therefore hypothesize:

H8: The level of customer familiarity in the FSE's portfolio positively moderates the relationship between knowledge sourcing behavior and ideas for improvement.

Finally, the effects of employee behavior on customer evaluations are contingent on the magnitude of the failure (e.g., Liao 2007; Smith et al. 1999). It remains unclear how failure severity influences the potential for generating new ideas based on knowledge sourcing, however. We posit that complex failures shape the information exchange between the FSE and the customer to facilitate idea generation. That is, during a routine failure situation, a customer accepts an employee's explanation of why the failure occurred and what scripted actions he or she executed (Conlon and Murray 1996). The knowledge sourcing information therefore is routinized and repetitive in nature. In contrast, during a complex service failure, information exchange takes on a more detailed character. The FSE needs in-depth insights from the customer to recover a problem that falls outside existing service scripts. Moreover, customers likely will not settle for a surface-level explanation and demand instead a fine-grained analysis of the events (Conlon and Murray 1996; Liao 2007). Rather than simply stating activities, both parties must cooperate to identify the nature of and recover from the failure. This information exchange therefore contains more new insights than one in a routine failure recovery situation. We posit that FSEs' existing knowledge structures are likely to be extended when dealing with complex failures, which enables the generation of new ideas (Finke et al. 1995). Formally:

H9: The level of failure complexity in the FSE's portfolio positively moderates the relationship between knowledge sourcing behavior and ideas for improvement.

Method

Sample and data collection

We test our framework using a sample of Dutch field service engineers working for a major international manufacturer of print and document management solutions for professional environments. These FSEs specialize in delivering onsite repair services and have unique, individual portfolios of products and customers serviced. Customers report a product failure by contacting customer support by telephone or e-mail. In response, the firm offers immediate standardized instructions and solutions, but if the problem persists, a request for service is passed on to the planning department. This department then contacts an available FSE who is geographically close to the customer's' facilities and certified to recover the malfunctioning product.

The duration of each service visit is monitored and standardized in accordance with formalized norms that prescribe the targeted duration of a single visit for a specific combination of product type and failure. These standardized scores are then aggregated to a monthly average per employee to yield a Mean Time to Repair score (MTTR), indicating whether each employee has conducted service visits faster or slower than the norm (as a percentage). The firm also records the average number of service visits per day, aggregated to a monthly average and corrected for the number of working days in the respective month. In addition, it measures each machine's uptime between two consecutive failures, standardized relative to product-specific uptime norms, and adds this information to the personal file of the FSE who conducted the service job before the last breakdown. This Mean Time between Failures score (MTBF) represents the FSE's recovery quality. Both MTTR and MTBF inform the FSEs' monthly evaluations.

We collected data with paper-and-pencil surveys, personally distributed and collected during monthly meetings of FSEs with their managers at headquarters. The survey included a cover letter describing the purpose of the study. To facilitate truthful responses, we handed out the surveys after the manager left the room, promised confidentiality, and offered the respondents an opportunity to receive a summary of the results. A code was used to match each employee's survey responses with objective performance data from the firm's database. From a total of 184 distributed surveys, we received 134 usable responses, resulting in a response rate of 72.8%. With one exception, all respondents were men, which corresponds with labor force statistics for technical service jobs (U.S. Bureau of Labor Statistics 2010). Their mean age was 46.6 years (SD=11.8 years), and their tenure averaged 19.6 years (SD=12.1 years).

Measures

We drew on existing literature to operationalize all latent constructs with multi-item scales. The operationalization of knowledge sourcing was developed specifically for this study. We pretested the measures with eight service employees and fine-tuned the items according to their feedback. We asked respondents to reflect on their behavior and ideas over the past 6 months. An overview of the subjective measures for our core constructs appears in Table 2.

To operationalize *core recovery behavior*, we used a two-dimensional, reflective, second-order construct that captured problem solving and courtesy behaviors. These items were adapted from Bettencourt and Brown (2003) and Liao (2007) and relied on seven-point Likert scales, with 1="strongly disagree" and 7="strongly agree" as anchors.

We modeled *knowledge sourcing behavior* as a reflective, second-order construct with two dimensions: acquiring

Table 2 Items, constructs and measurement model

Constructs	Factor Loading
Core recovery behavior	
***Problem solving* (α=.70)**	
During my service visits in the last 6 months…	
1. I always made sure that the customer could re-use the product as soon as possible.	.85
2. I very efficiently solved the entire product problem that I was called for.	.83
***Courtesy* (α=.82)**	
During my service visits in the last 6 months…	
3. I always treated my customers considerately and respectfully, even if I was in a bad mood.	.89
4. I constantly made sure that I served the customer in a courteous manner, even if I was really busy.	.80
5. I was always polite to my customers, even if I was in a bad mood.	.88
Knowledge sourcing behavior	
***Acquiring information* (α=.89)**	
During my service visits in the last 6 months…	
1. I always took the initiative to obtain detailed information on customers' experiences with our solutions.	.74
2. I actively sought feedback from customers to get information about their satisfaction with the product or service.	.83
3. I always took time to actively solicit suggestions from customers about the company's products and services.	.91
4. I explicitly asked customers about their ideas for product or service improvement.	.87
5. I always obtained diagnostic information on product or service performance from my customers, even if this cost me some extra time.	.81
Providing information (α=.82)	
During my service visits in the last 6 months…	
1. I always completely informed customers about my way of working with the product.	.87
2. I made sure that my customers were informed about my repair activities.	.88
3. I always provided the customers with information on the actions I took during my service visit.	.84
Ideas for improvement (α=.87)	
1. Over the last 6 months, how often did you think of new product solutions that can really improve the products that you work with?	.86
2. Compared with your colleagues, how many ideas for product improvement did you have over the past 6 months?	.90
3. Over the last 6 months, how often did you think of new solutions that can really improve the company's service delivery process?	.77
4. Compared with your colleagues, how many ideas for service process improvement did you have over the past 6 months?	.86
Product diversity (α=.78)	
1. Compared with other service engineers, the technology in the products that I service is very diverse.	.88
2. The types of products that I service are very different from each other.	.92
Customer familiarity (α=.75)	
In general…	
1. I am very familiar with my customer contact persons.	.83
2. The contact persons of my customers are usually present when I visit.	.94

All t-values are significant at $p<.001$

information (five items) and providing information (three items). The items were based on work by Gray and Meister (2004) and Challagalla et al. (2009). We used the same seven-point Likert scale.

Ideas for improvement captured the extent to which FSEs had product and/or service ideas over the last 6 months that could significantly improve the results of their work. Respondents first read a short introduction that defined ideas for improvement and offered some examples (e.g., faster service delivery to particular customers, product adaptations that could increase performance), which we derived from ideas mentioned in the preliminary interviews. Then respondents answered four items, based on scales provided by Kanter (1988) and Scott and Bruce (1994) but revised to be context specific. We used seven-point semantic differential scales to obtain the answers (1="never" or "few" to 7="always" or "many"). Thereafter, we presented a free format text field and asked FSEs to illustrate the ideas they had reported. For example, one employee decided to take and store snapshots of machine interiors to be able to quickly locate and identify

anomalies. To validate our assumption that FSEs would have useful and implementable ideas, we asked five managers to rate the idea descriptions described in the free format text field. In total, 59 ideas were reported by the FSEs. Idea relevance was rated with a mean score of 7.2 on a 10-point scale, and idea usefulness was rated with a mean score of 7.5, which provides ample evidence that ideas for improvement captured implementable insights instead of unrealistic thought experiments.

With regard to the *performance measures*, both recovery speed and recovery quality were obtained from company records. The FSE's average recovery speed was represented by two indicators, average problem solving speed (MTTR) and average number of service visits per day. We calculated these statistics over a 6-month interval to reduce the impact of outliers, such as performance dips resulting from a unique, extremely persistent problem—this interval size was most effective to smooth out such incidents. The interval started 3 months before and ended 3 months after the time of survey data collection. In our context, this was the most appropriate timing, because preliminary interviews with FSEs revealed that it may take up to 3 months to implement an idea across a large enough part of the FSE's service portfolio to observe performance effects. As the survey is retrospective over the past 6 months, we maximize the chance to capture the effects of ideas, whether they were generated 6 months ago or just a couple of days before our survey.

Because each FSE services different products with different uptime norms, we assessed recovery quality as the average of all MTBF scores that resulted from a single FSE's activities over a 10-month period. Again, this interval started 3 months before the survey. Our choice was informed by discussions with firm managers; as some employees recover products with long uptimes, a 10-month timeframe would be most appropriate to capture valid recovery quality measures. Any shorter interval would not allow us to calculate recovery quality statistics for those FSEs that only worked on machines with long MTBF norms.

Service portfolio characteristics were derived for each individual FSE from the survey and company records. We operationalized product diversity with two survey items that captured the extent to which FSEs perceive the product types they service as truly different. For customer familiarity, we used two survey items that captured the degree to which the employee is familiar with customers and the key contact persons. With regard to failure complexity, we assessed the number of "escalations" relative to the employee's total number of service visits. Company quality guidelines dictate that the service job should be passed back to the organization ("escalated") if a failure falls outside the FSE's field of expertise and is thus likely to severely exceed the MTTR norm. This does not reflect a lack of competence, as each employee is certified to service the products in his/her portfolio. Because some products are more likely to produce complex failures than others, escalated service visits are not included in FSEs' MTTR and MTBF scores.

Finally, we included seven variables to control for the most likely alternative explanations for ideas for improvement, recovery speed, and recovery quality. More specifically, we examined the influence of FSEs' innovation orientation, learning orientation, age, job experience, tenure, job autonomy, and self-efficacy.[2] An overview of the operationalization of control variables, as well as the objective variables, can be found in Appendix A.

Analyses

We analyzed our data using SPSS 15 and Smart PLS 2.0 (Chin 1998; Ringle et al. 2005). We applied SPSS to examine the descriptive statistics, perform an exploratory factor analysis, and compute the reliability of the individual constructs (including the first-order dimensions of the second-order constructs). All constructs proved reliable; the Cronbach's alphas equaled or exceeded Nunnally's (1978) threshold of .7 (see Table 2). We used SmartPLS to assess the correlations, average variances extracted, and shared variances of our key latent constructs (Table 3). Convergent validity was satisfactory; the average variance extracted for all study constructs exceeded .5. The discriminant validity guidelines also were met for all constructs; Fornell and Larcker's (1981) procedure showed that for any construct, its average variance extracted exceeded the squared correlations (i.e., shared variance) with any other study construct.

We obtained the estimates for the parameters of our structural model through partial least squares (PLS) analysis, which

[2] We included direct paths from innovation orientation (de Jong et al. 2003) and learning orientation (Sujan et al. 1994) to ideas for improvement. Prior literature argues that innovation- and learning-oriented workers are more inclined to look for improvement, due to their disposition to leverage new and existing knowledge (Scott and Bruce 1994). Age, job experience, and organizational tenure were modeled as controls for ideas for improvement as well as the performance outcomes. Experience and tenure refer to seniority, which may enhance idea development and performance because senior employees have more elaborate knowledge about the firm's procedures and processes and therefore more easily spot inefficiency. Increasing age, instead, is generally associated with a loss of innovativeness and degeneration of employee capabilities (e.g., Fu 2009). This may negatively impact ideas for improvement and recovery performance. Job autonomy and self-efficacy were also modeled as controls for ideas for improvement and the performance outcomes. Prior research has found that increased autonomy provides employees with more opportunities to be creative (George 2007). Moreover, it increases employee adaptability to customer needs, but may also lead to unnecessary variability which slows service delivery (Marinova et al. 2008). Finally, higher levels of self-efficacy may increase employees' confidence that idea development will lead to performance gains (i.e., it may be an antecedent to ideas for improvement). It may also impact performance outcomes directly because self-confident employees are more focused and make fewer mistakes (Bandura and Locke 2003).

Table 3 Means, standard deviations, average variances extracted, correlations, and shared variances (N=134)

	Variable	M	SD	1	2	3	4	5	6	7	8
1	Core recovery behavior	6.02	.62	(.54)[a]	. 11[c]	.03	.07	.01	.01	.06	.00
2	Knowledge sourcing behavior	4.19	.88	.33**	(.50)	.11	.00	.01	.00	.02	.00
3	Ideas for improvement	2.94	1.26	.16[b]	.33**	(.72)	.04	.01	.00	.00	.00
4	Recovery speed	2.34	1.53	.26**	−.03	.21*	(—-)	.03	.00	.03	.02
5	Recovery quality	.69	14.80	−.10	−.10	.09	−.16	(—-)	.03	.01	.01
6	Product diversity	4.52	1.61	.10	.06	.04	.06	.16	(.81)	.01	.00
7	Customer familiarity	5.22	1.17	.25**	.14	−.04	−.18*	.12	.11	(.79)	.01
8	Failure complexity	9.50	3.77	−.03	.01	−.06	−.14	−.10	.02	−.12	(—-)

[a] The average variance extracted of the subjective constructs are shown on the diagonal, between brackets

[b] Correlations are reported in the lower half of the matrix

[c] Shared variances are reported in the upper half of the matrix

*$p \leq .05$. **$p \leq .01$ (two-tailed)

simultaneously estimates all relationships, without stringent assumptions about the sample size or distribution of variable scores. To test the statistical significance of the hypothesized relationships, we applied a bootstrapping procedure with 500 samples (Chin 1998). For an accurate estimation of the hypothesized moderation effects, we also added the direct effects of the moderator variables on their dependent variables.

To test the multidimensionality of the second-order constructs, core recovery behavior and knowledge sourcing behavior, we assessed the path weights of the underlying dimensions (Chin 1998). For core recovery behavior, the weights were large and positive: .91 for courtesy and .78 for problem solving (p<.001). Similarly, acquiring information and providing information represented knowledge sourcing behavior (.88 and .76 respectively, p<.001). The correlations between the underlying constructs also were significant and moderate (.43 for courtesy and problem solving; .35 for acquiring and providing information, p<.01), indicating both convergence and discriminant validity.

Results

In Table 4 we report the standardized path coefficients for three PLS models.[3] First, a main effects model (including only direct effects) and a hypothesized model (including the moderating effects) were calculated. Then, a final model was calculated, which included a direct path from knowledge sourcing behavior to recovery quality to test for mediation, and the direct effects of the portfolio variables on recovery speed and quality (under the heading "Additional paths"). The final model explains 22.0% of the variance in ideas for improvement, 29.3% in recovery speed, and 20.2% in recovery quality. These outcomes compare favorably with the values obtained in other frontline employee studies using objective performance outcomes (e.g., Ahearne et al. 2010).

Direct effects

The significant positive effect of core recovery behavior on recovery speed (β=.24, p<.01) supports H1a. However, contrary to our expectations, core recovery behavior was not significantly related to recovery quality (β=−.05, n.s.), so we must reject H1b. The effect of recovery speed on recovery quality was negative and significant (β=−.19, p<.05); the effect of knowledge sourcing behavior on ideas for improvement was positive and significant (β=.20, p<.01). Thus we found support for both H2 and H3. Consistent with H4a and H4b, ideas for improvement showed a significant positive effect on recovery speed (β=.17, p<.05) and recovery quality (β=.17, p<.05). Furthermore, the direct effect knowledge sourcing behavior on recovery speed was negative and significant (β=−.18, p<.05), supporting H5a.

Moderating effects

We found a negative moderating effect of knowledge sourcing behavior on the relationship between core recovery behavior and recovery speed (β=−.15, p<.05), lending support to H5b. In Fig. 2 we plot the relationship between core recovery behavior and recovery speed under low (two SD below the mean) and high (two SD above the mean) knowledge sourcing behavior conditions. Knowledge sourcing reduces the positive relationship between core recovery behaviors and recovery

[3] While PLS is particularly suited for assessing complex models like ours, we also estimated the main model with covariance-based structural equation modeling to prove the robustness of our model. We used AMOS, which led to identical findings in terms of the (in)significance of parameter estimates and their signs.

Table 4 PLS results of estimated path coefficients in the research model (N=134)

		Standardized path coefficients		
	Hypotheses	Main Effects Model	Hypothesized Model	Final Model
Direct effects				
Core recovery behavior→recovery speed	H1a	.25**	.23**	.24**
Core recovery behavior→recovery quality	H1b	–.06	–.05	–.05
Recovery speed→recovery quality	H2	–.20*	–.20*	–.19*
Knowledge sourcing behavior→ideas for improvement	H3	.27**	.20*	.20*
Ideas for improvement→recovery speed	H4a	.20**	.20**	.17*
Ideas for improvement→recovery quality	H4b	.17*	.15*	.17*
Knowledge sourcing behavior→recovery speed	H5a	–.21**	–.18*	–.18*
Product diversity→ideas for improvement			.03	.03
Customer familiarity→ideas for improvement			–.10	–.09
Failure complexity→ideas for improvement			–.07	–.07
Moderating effects				
Knowledge sourcing behavior x core recovery behavior→recovery speed	H5b		–.16*	–.15*
Ideas for improvement x service speed→recovery quality	H6		.26**	.22**
Product diversity x knowledge sourcing behavior→ideas for improvement	H7		.18**	.18**
Customer familiarity x knowledge sourcing behavior→ideas for improvement	H8		.13*	.13*
Failure complexity x knowledge sourcing behavior→ideas for improvement	H9		.04	.04
Additional paths				
Knowledge sourcing behavior→recovery quality				–.10
Product diversity→recovery speed				.06
Product diversity→recovery quality				.12
Customer familiarity→recovery speed				–.22**
Customer familiarity→recovery quality				.10
Failure complexity→recovery speed				–.13*
Failure complexity→recovery quality				–.12*
Control variable paths (non-significant effects omitted)				
Age→ideas for improvement		–.35**	–.29**	–.28*
Age→recovery speed		–.27*	–.32*	–.29*
Organizational tenure→ideas for improvement		.28*	.27*	.27*
Autonomy→recovery quality		.12*	.10	.07
Variance explained (R^2)				
Ideas for improvement		16.1%	22.0%	22.0%
Recovery speed		22.6%	24.6%	29.3%
Recovery quality		10.9%	17.1%	20.2%

* p<.05. **p<.01

speed. Moreover, ideas for improvement positively moderate the relationship between recovery speed and recovery quality (β=.22, p<.01). The plot of this effect in Fig. 3 reveals that a greater extent of idea development alleviates the negative relationship between recovery speed and recovery quality, as we hypothesized. In contrast, employees low in idea development experienced a detrimental effect of recovery speed on their recovery quality, in support of H6.

With regard to employees' service portfolios, we found that product diversity (β=.18, p<.05) and customer familiarity (β=.13, p<.05) both positively moderated the relationship between knowledge sourcing behavior and ideas for improvement, in support of both H7 and H8. Failure complexity did not affect this relationship though (β=.04, n.s.), so we must reject H9. The plot in Fig. 4 depicts the interactions between portfolio variables and knowledge

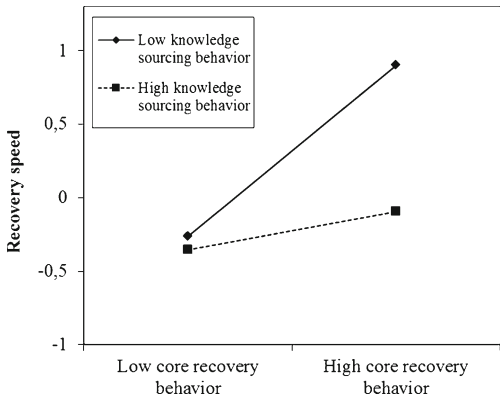


Fig. 2 Moderating effect of knowledge sourcing behavior

sourcing behavior. As Panel A shows, a highly diverse product portfolio strengthened the positive effect of knowledge sourcing behavior on ideas for improvement. Panel B further reveals that FSE idea development was highest when both knowledge sourcing and customer familiarity were high. When customer familiarity was lower, the level of knowledge sourcing exerted little effect on idea development. Notably, the extent of idea generation remained relatively high for high customer familiarity, a finding we return to in the Discussion section.

Additional paths

To test whether the impact of knowledge sourcing on FSE performance outcomes was mediated by ideas for improvement, we checked the direct paths from knowledge sourcing behavior to the dependent variables. As Table 4 shows, ideas for improvement partially mediated knowledge sourcing and recovery speed; both the direct and indirect paths were significant. We added a direct path from knowledge sourcing behavior to recovery quality; it was not significant, which indicates multiple mediation through ideas for improvement and recovery speed.

As the last column of Table 4 indicates, we found that some of the portfolio characteristics impact performance

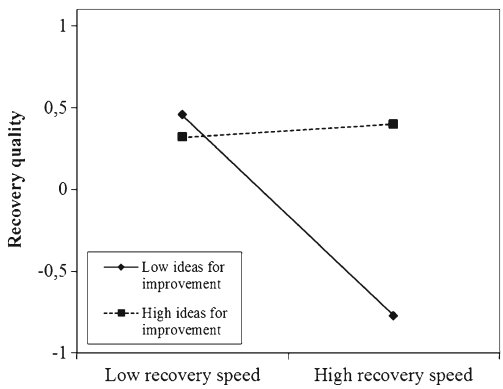


Fig. 3 Moderating effect of ideas for improvement

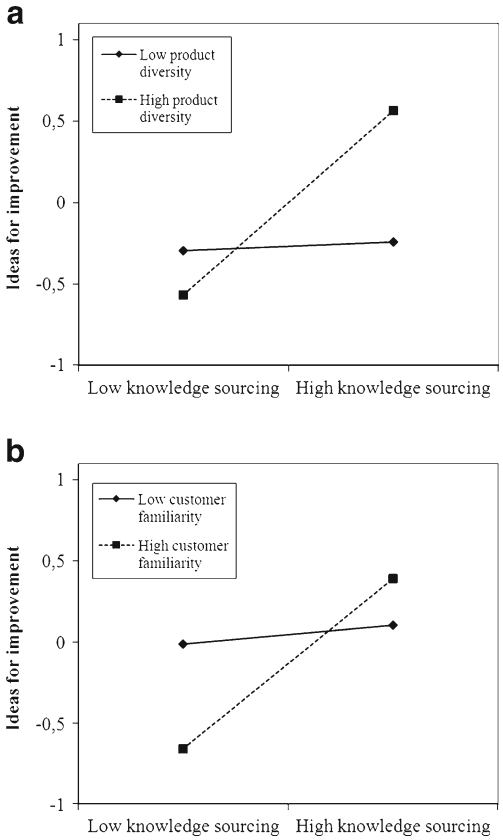


Fig. 4 Moderating effects of product diversity and customer familiarity

outcomes directly. Interestingly, we found a significant negative effect of customer familiarity on recovery speed ($\beta = -.22$, $p < .01$). It could be that time is lost in socializing when an employee becomes too connected to the customer. We also found negative direct effects from failure complexity to recovery speed ($\beta = -.13$, $p < .05$) and recovery quality ($\beta = -.12$, $p < .05$), even when accounting for the fact that complex failures have less strict norms for time-to-repair. It could be that complex tasks are psychologically disrupting and therefore reduce task performance (Speier et al. 2003). None of the other direct effects of the portfolio variables on recovery performance outcomes were significant.

Control variables

The effects of our control variables show that older FSEs had fewer ideas for improvement ($\beta = -.28$, $p < .05$) and a lower recovery speed ($\beta = -.29$, $p < .05$) than their younger counterparts. Workers' organizational tenure positively affected their ideas for improvement ($\beta = .27$, $p < .05$). This is consistent with previous findings on the degeneration of employee capabilities with age and increasing knowledge about organizational processes with experience (Fu 2009). The effects of the remaining control variables were not significant. We were

surprised by the lack of significance for job experience, so we tested whether the control variables had any moderating effects. The relationship between knowledge sourcing and ideas was stronger for employees with more years of experience in their current job ($\beta = .14$, $p < .01$), an issue we return to in the Managerial Implications section.

Post-hoc tests

Although we conceptualized the portfolio characteristics to moderate the knowledge sourcing behavior–ideas for improvement relationship, these characteristics could also affect FSE behavior. For example, an employee servicing very diverse products may have more opportunities to engage in knowledge sourcing behavior. We therefore calculated an alternative model in PLS, including direct paths from product diversity, customer familiarity, and failure complexity to core recovery behavior and knowledge sourcing behavior. Surprisingly, none of these effects were significant. Apparently, portfolio characteristics influence the effectiveness of behaviors for specific outcomes (e.g., idea development) but do not drive such behaviors directly. It could be that individual motivation (or orientation) drives behavior, not contextual factors. Therefore, we also modeled employees' learning orientation (i.e., a person's tendency to focus on developing competence) and performance orientation (i.e., an individual's tendency to demonstrate and validate competence to others) as direct antecedents of the FSE behaviors. Results indeed reveal that employees with a high learning orientation exhibit stronger tendencies to display knowledge sourcing behavior ($\beta = .25$, $p < .01$) than core recovery behavior ($\beta = .19$, $p < .05$). In contrast, employees with a high performance orientation are more inclined to display core recovery behavior ($\beta = .20$, $p < .01$) than knowledge sourcing behavior ($\beta = .13$, $p < .05$). We return to this issue in the Managerial Implications section.

Portfolio characteristics could also moderate the relationship between core recovery behavior and recovery performance. The alternative PLS model revealed that product diversity positively moderated the relationship between core recovery behavior and recovery speed ($\beta = .24$, $p < .01$). A possible explanation could be that following the service scripts of core recovery behavior becomes boring under low product diversity. An employee may execute all scripts, but this does not optimally translate into service speed because of low motivation. Indeed, task variety activates employees as it provides them with more perspectives on work solutions (Shalley et al. 2004). High product diversity requires employees to act out more diverse service scripts and challenges them to stay alert in script execution. We did not find any other significant moderating effects between core recovery behavior and our objective outcome variables.

Discussion

While prior research considers maintaining or restoring customer satisfaction as the key purpose of recovery services, it has largely overlooked the fact that FSEs can learn from recovery situations and improve their performance accordingly. This study is the first to empirically demonstrate that firms may benefit from assigning FSEs an innovation role in addition to their recovery service role. Aligning the innovation role with the right service portfolio greatly benefits recovery performance and is thus crucial for firm competitiveness. We next discuss the key implications of our work.

Theoretical implications

Employee's innovation role Many managers consider it their duty to save on personnel costs and urge FSEs to work *efficiently* in their recovery actions (Ye et al. 2007). As a shift from this paradigm, we find that informing customers and gathering additional information gives FSEs a foundation from which they explore new directions and come up with creative ideas. Acting on these ideas benefits their recovery performance. The potential for improvement through employees' innovation roles is not institutionalized. It offers a different route to product and service enhancement than formal idea management systems aimed at New Product and Service Development (NPD/NSD). While such formal systems may require a lead time of several years before suggestions are transformed and implemented organization-wide, frontline idea development is a continuous and day-to-day process (Robinson and Schroeder 2009; Vandenbosch et al. 2006).

Frontline service employees act as knowledge interfaces and build on the combination of their own and customer insights to improve recovery performance. This may be especially valuable if employees interact with customers who are forward-looking and capable of thinking outside the box. These so-called "lead users" can lead future trends and currently experience needs still unknown to the rest of the market (Von Hippel 1986). FSEs may be able to identify lead users, act as effective filters of their proposals, and move ahead only those which are really actionable by the firm.

Solving the productivity–quality trade-off We demonstrate that FSEs' ideas for improvement alleviate the negative relationship between recovery speed and recovery quality. This finding empirically addresses the scholarly debate on tackling the productivity–quality trade-off in the frontline, which had hitherto been limited to anecdotal claims (e.g., Marinova et al. 2008; Ye et al. 2012, p. 1). As Fig. 3 shows, for less creative employees, working faster decreases the

quality of their repairs. In contrast, employees who have more ideas for improvement combine a timely finish of recovery activities with a high-quality end result. When recovery speed is less important, employees with fewer ideas can produce a higher recovery quality; this may be due to the fact that creative employees need some performance pressure to rise to the occasion (Shalley et al. 2004).

Optimizing the FSE's innovation role Finally, the innovation and recovery service roles exhibit an intricate relationship. Although FSEs' ideas for improvement benefit recovery performance, the activity of knowledge sourcing is time consuming and reduces FSEs' focus on their recovery tasks. Adding knowledge sourcing activities to core recovery behaviors thus can impair service recovery when not implemented carefully. We show that a portfolio characterized by diverse product types enhances opportunities for developing an array of ideas for improvement from knowledge sourcing activities. This finding is consistent with prior research on information diversity, which indicates that experiencing varied information input facilitates creative thinking (e.g., George 2007). In addition, with a portfolio of familiar customers, knowledge sourcing activities uncover in-depth customer insights and can spark more ideas. FSEs who service unfamiliar customers may also generate ideas, but the extent to which they do so is less dependent on their knowledge sourcing behavior. Apparently, in such service environments even little interaction can offer some previously unknown facts to an FSE, whereas too much knowledge sourcing might lead to information overload. The payoff of knowledge sourcing thus is particularly salient for employees who have close relationships with their customers.

Surprisingly, we found no moderating effect of product failure complexity on the knowledge sourcing–ideas relationship. Employees involved in complex recoveries may be so consumed with their repair tasks that they lack the time and energy to draft ideas based on information gathered. Faced with uncertain and difficult situations, employees adopt routine problem-solving procedures and first fulfill their core tasks to avoid risk (Liao et al. 2008).

Managerial implications

Our study offers useful insights and recommendations for service managers. First, we challenge the efficiency focus most manufacturers adopt in their recovery efforts. Our results support an emerging view that recovery service can and should lead to performance improvements. Some firms lead the way; Dell increased its service spending by 35% and stopped recording customer "handling times" to encourage service technicians to engage in more extensive customer interactions (Jarvis 2007). As a result, the percentage of recoveries that needed to be redone decreased from 45 to 18%, and customer satisfaction rates increased by more than 22%. In addition, customers generally appreciate personal attention from FSE, as is typical of knowledge sourcing (Dong et al. 2008).

Second, managers looking to optimize the innovation potential of their FSEs should carefully shape their service portfolios. A service portfolio does not determine an FSE's behavior per se, but it is a vital tool to optimize performance outcomes. Our findings are in line with the motivation-opportunity-ability (MOA) framework: while frontline behaviors are driven by individual characteristics, the effectiveness of such behaviors is highly contingent upon contextual characteristics (e.g., Schmitz 2012). Managers seeking to boost frontline innovation should therefore focus on recruiting learning-oriented employees, stimulate them to knowledge source intensively, be careful with rotating customers across the service workforce, and train FSEs to repair and maintain a broader range of products. Alternatively, managers that have employees less capable of knowledge sourcing (e.g., because they are less socially skilled) may opt to constantly assign FSEs customers they do not know well. Even without much knowledge sourcing, such encounters may spark ideas while interactions remain goal-oriented and functional.

Third, managers should carefully consider employee demographics in their recruitment and support decisions. In our sample, younger FSEs and those with a longer organizational tenure generated more ideas for improvement. Furthermore, the relationship between knowledge sourcing and ideas was stronger for employees with more experience in their current job. Therefore, managers should hire young frontline talent and keep them employed in the organization, preferably in the same position. This recommendation is a daunting challenge though, because frontline job mobility is high, in line with the image of employees as overworked and underpaid (Singh 2000). A potential solution could be to install "service seniors" who work closely with FSEs and continue to have customer contacts, but who also have more responsibility and in-office time. This allows managers to secure the idea generating potential of the frontline by providing young, talented FSEs with an attractive career path in the organization.

Limitations and further research

Our study has several limitations that also offer opportunities for research. First, our empirical study is based on a sample of FSEs from a single firm context and thus has an explorative character. Replicating this study in markets

other than a capital goods industry would be an interesting avenue; in other service domains, the interaction between knowledge sourcing and core recovery behavior may look different. In high-touch consumer services such as hotels or restaurants, employees can easily ask customers how they might improve service quality. For banking or financial services, the innovation role may be much narrower, because technology increasingly mediates the relationship between customers and the organization.

Second, we assess FSE behavior and performance outcomes over time. Considering encounter-specific variables rather than service portfolios may offer a more fine-grained assessment or service innovation processes and allow researchers to investigate the effects on customer satisfaction with the recovery service. Additional research should also confirm whether customers appreciate knowledge sourcing activities in the frontline. For example, customers might perceive that a proactive service provider has devoted time, resources, and effort to assure the reliability of future services (Dong et al. 2008; Van Vaerenbergh et al. 2012). Although this could lead to customer satisfaction and loyalty, B2B customers may be more interested in keeping contractual promises and consider proactivity a loss of time.

Finally, this study captures the main concepts of innovation roles (i.e., knowledge sourcing and ideas for improvement). Further research should investigate the process of knowledge acquisition, storage, and application. Newly acquired knowledge cannot be deployed unless it is integrated with the FSE's existing stock of knowledge (Finke et al. 1995). This updated stock of knowledge then can transform into new ideas that can be directly applied or articulated to others in the firm (Ye et al. 2012). We recommend a longitudinal approach to trace how ideas are used in new product or service development processes or transformed into new strategies that are implemented organization-wide.

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