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# Leveraging B2B field service technicians as a “second sales force”: How service situations affect selling activity and success

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## Abstract

To extract the full revenue potential of their front line, B2B firms use their technical field service force for selling activities. However, as selling is only a complementary activity embedded in technicians’ main service tasks, they may struggle to sell effectively. The authors investigate the service situation as a key driver of (i) the technician’s decision to engage in selling (selling activity) and (ii) the customer’s decision to purchase (selling success). They identify four types of service situations with unique effects on these outcomes. Notably, technicians’ selling activity is highest (+10% compared to baseline) in service situations that offer a lower (–22%) likelihood of success, whereas activity is lower in the most promising situations. Thus, technicians do not properly exploit sales opportunities. The extent of inefficiencies moreover varies by employee-specific moderators, such that specialized technicians and those with little practical experience have particular difficulty exploiting excellent sales opportunities.

**Keywords** Service-sales ambidexterity · Service technicians · B2B · Bivariate probit · Heckman selection model

## Introduction

Frontline employees—the sales force or service force—represent the core interface with the customer for most business-to-business (B2B) firms. Traditionally, firms have assigned distinct tasks to their frontline employees, with salespeople

responsible for selling and service people responsible for service. However, to exploit the full revenue-generating potential of the frontline, firms have begun to include active selling as part of field service employees’ responsibilities—making them a “second sales force” alongside the existing (“first”) sales force.<sup>1</sup>

To better understand the scope of this development, we conducted a preliminary survey among 115 managers from B2B firms in Germany (see Web Appendix W1 for details), asking them to rate current and expected levels of selling by service employees in their respective B2B sector. 51% of the respondents stated that their firm’s service employees “frequently” perform sales tasks, while 63% expected more firms from their sector to expand service employees’ responsibilities to include sales tasks in the future.

Potentially, this expansion of responsibilities gives rise to unique sales opportunities, as service employees’ customer knowledge allows them to assess current needs and make tailored offers. However, industry evidence of selling success is mixed. While a study by McKinsey & Co. indicates that firms can increase revenues up to 10% by leveraging

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<sup>1</sup> In B2B, the selling activity of service employees is often limited to cross-selling complementary (lower-priced) products (e.g., spare parts) and additional services to existing customers, while stand-alone (higher-priced) products (e.g., new machines) are sold through the regular (“first”) sales force.

their service force for up- and cross-selling (Eichfeld et al., 2006), other sources show that many firms fail to reap these benefits (Finkel, 2015; Murcott, 2007). Thus, it is of utmost importance that managers understand how they can use their service employees effectively as a “second sales force.”

We propose that a key determinant of service employees’ selling effectiveness is the underlying service situation in which these employees—service technicians in our industrial-machinery context—interact with customers. A service situation requires a technician to visit the customer’s site for maintenance or repair tasks. Selling in these situations differs from traditional sales situations in that the service task is the primary reason for interaction. Any selling activity is secondary and occurs in the setting of that service situation, which makes selling by field service technicians highly contextual (De Ruyter et al., 2014). For example, technicians might be more inclined to make a sales offer after successfully completing their primary service job in the hope of boosting chances for a successful sale. Hence, the questions arise as to whether service situations differ in their prospects for a selling success and, if so, whether service employees can distinguish “good” from “bad” situations to increase success.

Although academic research acknowledges the ambidextrous role of service employees (e.g., Gwinner et al., 2005; Jasmand et al., 2012), answers to these important questions are still lacking. In fact, no study has examined the potentially decisive impact of the service situation on employees’ ability to engage in successful selling, leaving unaddressed whether and how they can identify the “right” situation to make a sales offer. We therefore investigate the following research questions:

- (1) What types of service situations constitute more and less promising sales opportunities for service technicians?
- (2) Do technicians exploit promising sales opportunities more often than less promising ones? If not, to what extent do they make suboptimal choices when engaging in selling?
- (3) Do these choices depend on technician-specific moderators that firms can leverage to optimize sales outcomes by service technicians?

To answer these questions, we combine exploratory and confirmatory insights: First, we use depth interviews with service technicians from two distinct B2B firms to identify four archetypal service situations that may affect both the technician’s decision to engage in selling activity and the customer’s decision to accept or reject the offer. These situations result from a combination of two factors: (1) whether the primary service task was successful, and (2) whether it was covered by a warranty. We use expectancy theory (Vroom, 1964), supported by evidence from our interviews, to develop hypotheses about technicians’ selling activity and success. Second, we test our framework on a unique set of individual-level data

from the field service organization of *DMG Mori*, a major industrial company. The data comprise about 127,000 service visits by 344 field service technicians over four years. The single-firm approach is ideal for our analysis as it provides access to many units of analysis on the service visit level, allowing us to account for the richness of possible service situations in a real-life B2B context (Hochstein et al., 2021).

Results suggest that the most promising sales opportunities (i.e., those with the highest selling success rates) arise in situations characterized by a failed service job without warranty coverage. Importantly, however, we find that service technicians do not leverage these opportunities properly: They make fewer offers in such promising situations. By contrast, technicians are most willing to make an offer during successful service visits for machines that are out of warranty, where selling success is, in fact, considerably lower. These quantitative findings are in line with our theoretical reasoning that technicians do not properly exploit sales opportunities because they develop biased expectations about whether they can sell successfully in a given service situation.

Our analysis further indicates that effects of service situations are contingent on technician-specific variables. Notably, generalist technicians are more likely to exploit (avoid) the most (least) promising service situations than specialists. Practical sales expertise can further help improve selling, while theoretical sales education through dedicated trainings is less suitable.

The study contributes to both the service and sales literatures. First, we introduce the service situation as a key determinant of service technicians’ selling activity and success. We thereby add a situational perspective to the nascent field of service–sales ambidexterity, which has focused either on organizational or employee-related determinants (e.g., Schepers et al., 2011). Second, we conceptually link the service situation to individual decision making of technicians (i.e., when to make a sales offer) and customers (i.e., whether to accept the offer) using an expectancy-theory framework to identify inefficient selling through service technicians. Prior work (e.g., Jasmand et al., 2012) analyzed the effect of service employees’ sales efforts on sales performance but did not explore discrepancies between optimal and actual selling behavior. Third, we combine depth interviews and observational behavior from longitudinal field data in a complex industrial context, exploring and testing novel characteristics of service situations and potential boundary conditions. This approach extends prior work that relied heavily on cross-sectional surveys of the service force (e.g., Gabler et al., 2017; Yu et al., 2012) and on B2C contexts such as retail banking. Compared to the latter, service visits in industrial B2B contexts are rather long (often spanning several days), technically demanding, and costly (Kumar et al., 2004; Lilien, 2016). Therefore, studying the influence of the specific service situation on technicians’ selling activity and success is particularly relevant and worthwhile in these contexts.

## Background

### Field service technicians

Many firms employ a broad range of boundary spanners, each with different roles and responsibilities (e.g., salespeople, call-center agents). We focus on service technicians, who are an important part of customer management, especially in industrial B2B after-sales services (Ulaga & Reinartz, 2011). Service technicians' main tasks include the installation of equipment, routine maintenance, emergency repair, and parts supply (Wilson et al., 1999). These tasks require a technical background (e.g., electronics, mechanics) and are usually performed at the customer site during operation of the equipment. Besides their regular tasks, technicians serve as the supplier's face to the customer, act as problem solvers, collect valuable customer information, and often identify promising sales opportunities (Rapp et al., 2015; Ulaga & Reinartz, 2011). Because of their technical skills and direct insights into customers' processes, they are ideally suited for cross-selling equipment and services (e.g., spare parts, training courses) during on-site visits (Tuli et al., 2007; Worm et al., 2017).

### Related literature

By focusing on service technicians' dual service and sales orientation, this study falls into the research field of service-sales ambidexterity.<sup>2</sup> The term ambidexterity was initially used in strategic management to describe a firm's ability to pursue the seemingly conflicting goals of exploitation and exploration (Raisch & Birkinshaw, 2008). Service-sales ambidexterity refers to the mastery of service employees' seemingly conflicting "engagement in both the customer service provision and cross-/up-selling during service encounters" (Jasmand et al., 2012, p. 22). Table 1 summarizes related literature on service-sales ambidexterity.

Prior research has studied the effects of several determinants of ambidextrous behavior on outcomes related to selling activity and/or success. These studies mainly focus on either organizational or employee-related determinants, as well as determinants related to the sales approach itself. Organizational factors include role ambiguity (Evans et al., 1999), supervisor encouragement (Schepers et al., 2011), employee empowerment (Yu et al., 2012) or employees' climate perceptions (Ogilvie et al., 2017). Employee-related factors pertain to, for instance, employees' previous sales failures (Güneş et al., 2010), locomotion orientation (Jasmand et al., 2012) or

learning orientation (Yu et al., 2015). Recently, Becker et al. (2020) examined sales-related factors like customers' motive uncertainty and privacy invasion during a service employee's sales attempt.

To our knowledge, this study is the first to focus on the underlying service situation. We thus address an important research gap, as the service situation is the primary reason for the customer encounter and thus frames every sales opportunity that emerges. Furthermore, prior work almost exclusively studies B2C service environments dominated by call-center operations, which differ significantly from our B2B context characterized by rather long, technically demanding, and costly service visits, performed on-site by frontline employees (Grewal & Lilien, 2012; Lilien, 2016). Therefore, investigating the influence of the service situation on technicians' selling activity and success is particularly relevant and worthwhile in a B2B context.

## Conceptual development

Service technicians perform selling in addition to their main service job. Thus, a successful service job is the key priority (primary task), while selling is a non-mandatory, additional activity (secondary task). A prerequisite for successful selling is that the technician explicitly decides to make a sales offer. She must be motivated to engage in selling, identify promising opportunities during the service visit, and pitch these to the customer. Only then can the customer decide how to respond.<sup>3</sup> Therefore, both selling activity (the technician's decision) and selling success (the customer's decision) represent focal outcome variables of the technician's secondary task. However, this secondary task remains embedded in the context of the primary service task, which we thus expect to influence selling outcomes.

As research on the influence of service situations on sales outcomes is scarce, we conducted two exploratory pre-studies to build our conceptual framework. Our goal was to uncover the ways in which service situations affect sales outcomes in an industrial service context. The studies follow a multi-stage design (Table 2) which has proven particularly useful for obtaining generalizable, robust, and meaningful results (e.g., Nunes et al., 2021). In pre-study I, we identify key situational determinants of selling outcomes. In pre-study II, we validate these determinants in a different setting and explore how they characterize distinct service situations. This grounded understanding of situational determinants is the basis for and supplements our hypothesis development.

<sup>2</sup> A discussion of sales-service ambidexterity, that is, the addition of service tasks to the responsibility of salespeople (e.g. Ahearne, Jelinek, and Jones 2007) is beyond the scope of this literature summary.

<sup>3</sup> The customer's decision to accept or reject a sales offer is thus contingent on the technician's decision to make an offer, which becomes important when modeling the two decisions jointly.

**Table 1** Summary of related literature on service-sales ambidexterity

Study	Determinants		Outcome variables			Research design			
	Organizational	Employee-related	Sales approach-related	Situational	Selling activity	Selling success	Industry	Research method	Type of data
Evans et al. (1999)	×					×	Retail banking	Survey	Cross-sectional
Güneş et al. (2010)		×				×	Retail banking	Observation	Longitudinal
Schepers et al. (2011)	×	×			×		Printing	Survey	Cross-sectional
Jasmand, Blasevic, and De Ruyter (2012)		×			×	×	Various industries	Survey	Cross-sectional
Yu et al. (2012)	×				×		Retail banking	Survey	Cross-sectional
Patterson et al. (2014)	×	×				×	Various industries	Survey	Cross-sectional
Yu et al. (2015)	×	×			×	×	Retail banking	Survey	Cross-sectional
Rapp et al. (2015)	×	×			×	×	Hospitality	Survey	Cross-sectional
Sok et al. (2016)		×			×		Pharmaceuticals	Survey	Cross-sectional
Ogilvie et al. (2017)	×				×	×	Hospitality	Survey	Cross-sectional
Gabler et al. (2017)	×				×	×	Hospitality	Survey	Cross-sectional
Faia and Vieira (2017)	×	×			×	×	Retail banking	Survey	Cross-sectional
Becker et al. (2020)			×			×	Telecommunication	Experiments	Cross-sectional
<i>This study</i>	(×)*	(×)*		×	×	×	<i>Machinery/B2B</i>	<i>Observation</i>	<i>Longitudinal</i>

\* Although our core focus is on situational factors, we also include organizational and employee-related factors as control variables in the analysis

**Table 2** Design of pre-studies

	Pre-study I	Pre-study II
Context	Turning and milling machines, holistic solutions in additive manufacturing	Extrusion, printing and converting machines for the production of packaging
Sample size	20 field service technicians, 1 service manager	12 field service technicians
Method	Depth interviews (field service technicians, service manager)	Defined scenarios and depth interviews (field service technicians)
Purpose	Identification of situational determinants	Validation of situational determinants and exploration of resulting service situations

### Pre-study I: Identification of situational determinants

To generate an initial list of situational determinants, we conducted depth interviews with 20 field service technicians from *DMG Mori*, a major global manufacturer of machine tools (see Table 3). *DMG*'s portfolio includes turning and milling machines, holistic solutions in additive manufacturing as well as industrial services. Focusing on a specific company is particularly meaningful when the underlying context is complex (Hochstein et al., 2021), as is the case with industrial B2B service situations. *DMG Mori* has implemented selling by service technicians since 2010, allowing for an informed view of typical situational determinants of sales outcomes.

Interviews were semi-structured, comprising technicians' general perception of selling activities, their individual selling approach, and their potential for future improvement (see Web Appendix W2 for details). We collected any factors that influence selling activities and success during a service visit. On average, the interviews lasted 28 min. We recorded, transcribed verbatim, and subjected all interviews to a thematic content analysis using the established qualitative technique of open, axial, and selective coding (Corbin & Strauss, 2008). We identified nine factors, four of which were related to the underlying service situation.<sup>4</sup> Among the four situational factors, two were mentioned particularly often (by approx. 43% of participants who mentioned at least one situational factor). These were the "success of the main service job" and the "warranty status of the machine" (for illustrative interview statements, see Table WT2 in Web Appendix W2).<sup>5</sup>

"Success of the main service job" reflects the degree to which the equipment is operational at the end of the service visit. Availability of the equipment is critical to operational excellence, because a supplier's products are part of the customer's production process and customers are sensitive to

costs associated with downtime (Wilson et al., 1999). For this reason, customers primarily evaluate the success of a service visit by the fact that the equipment is operational (again) and that there are no (further) downtimes. As one service technician explained during our interviews:

*"I just had the case...a client really only wanted to have the bare minimum done. Even though I really urged him to fix the issue properly, he said... 'the machine is back up and running, let us keep it working for now.'"* (Interview 9)

"Warranty status of the machine" denotes whether a service visit is covered by a warranty. In industrial B2B contexts, suppliers usually provide a time-limited default warranty (e.g., one year) on material and manufacturing failures. Within this period, suppliers officially assume responsibility and remedy defects free of charge. All other visits are typically invoiced to customers based on the time spent by the technician. In other words, a warranty determines and makes customers and technicians aware of who is accountable for the problem (e.g., a machine failure) and who will bear the costs of the service visit. For example, one participant noted:

*"In the case of out-of-warranty jobs, some customers already pay attention to how long I sit at the machine at X euros per hour."* (Interview 18)

Upon completion of the interviews, we discussed our findings with the company's chief service officer, responsible for the "selling" program for service technicians, who confirmed their particular importance. Thus, we conclude that the two factors are key to determine a service situation in an industrial B2B context and create different circumstances for selling.

### Pre-study II: Validation of determinants and exploration of service situations

To ensure external validity of the two situational determinants and to explore how they manifest in concrete service situations, we conducted additional fieldwork with 12 service technicians from another company, *Windmüller &*

<sup>4</sup> The other factors could be assigned to either organizational or employee-related factors and are broadly consistent with those addressed in previous research. We use them as controls in our main (quantitative) study.

<sup>5</sup> The other two situational factors, "visit duration" and "machine status upon arrival" which were each mentioned by about 15% of the interviewees, serve as controls in our quantitative study.



**Table 3** Partner companies for pre-studies and main study

	Partner company A	Partner company B
Name	DMG Mori	Windmüller & Hölscher
Website	<a href="https://en.dmgmori-ag.com">https://en.dmgmori-ag.com</a>	<a href="https://www.wh.group/int/en">https://www.wh.group/int/en</a>
Industry	Manufacturer of turning and milling machines; holistic solutions in additive manufacturing	Manufacturer of extrusion, printing and converting machines for the production of packaging
Target markets	87 countries (worldwide)	130 countries (worldwide)
Revenue (in 2020)	1,831.3 Mio. €	929 Mio. €
Number of employees (in 2022)	6,800	3,100
Number of customers (in 2022)	> 100,000 firms	5,000 firms

*Hölscher* (see Table 3), a global manufacturer of extrusion, printing and converting equipment for packaging production. In contrast to the broad scope of pre-study I, in which all possible influencing factors were collected, we focused exclusively on the effects of situational factors on selling outcomes. For this purpose, we chose a combination of open questions and pre-defined scenarios, comparable to the study by Nunes et al. (2021) (for details, see Web Appendix W3). Interviews lasted 34 min, on average, and were recorded and transcribed verbatim before analysis.

The interviews provided strong evidence for the two key determinants from pre-study I. Participants first emphasized that their main task during service visits is to successfully complete the service job. Depending on the outcome, the situation differs—both from the technician’s and the customer’s point of view. A successful service job not only contributes to mutual satisfaction and a positive atmosphere, but also fosters the customer’s trust in the technician.

*“It’s a win-win situation when the service technician gets there and does his job. And the customer can get back into production with his machine more quickly. Both are then euphoric. [...] I have shown my expertise. I did what I was supposed to do. The customer then trusts me even more.”* (Interview 11)

The opposite results from an unsuccessful service job, where the atmosphere is more stressful and both parties are dissatisfied.

*“Of course, I am dissatisfied with myself in these situations, even if it is not my fault that the machine isn’t running. But I didn’t get my job done. So I cannot imagine that the customer is particularly happy with the situation in that case.”* (Interview 11)

The interviews also revealed that the technician’s situation at a customer’s site differs depending on whether the job is under warranty conditions. On the one hand, technicians describe this situation as more relaxed because the customer does not pay for the visit. On the other

hand, this holds only as long as the technician can successfully complete the service job. In fact, participants argue that customers’ expectations toward technicians’ performance are higher during warranty visits. As one participant noted:

*“[Under warranty, the expectation of customers is like] ‘I bought it this way and it is supposed to work! Anything that does not work is up to you.’”* (Interview 12)

Thus, under warranty conditions customers view the supplier as being responsible for the problem, putting substantial pressure on the technician to succeed.

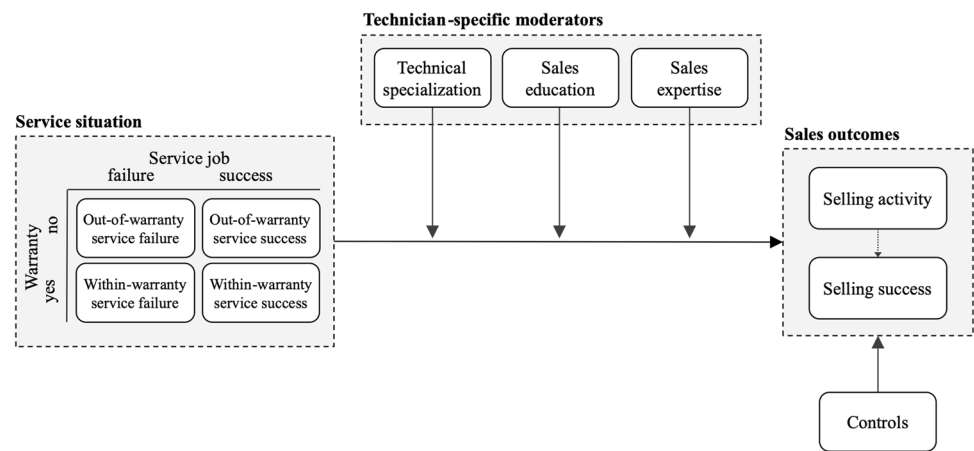
*“[The customer sees it like this:] ‘We just bought the machine, but it doesn’t work as it should.’ Then you either have to step up your performance to make it work or you can’t get it to work yourself. And then, of course, the atmosphere is different.”* (Interview 10)

Importantly, this illustrates that the success of the service job and the warranty status jointly influence the service situation and must therefore be considered in combination.

In summary, the following conclusions can be drawn: First, service situations clearly differ, depending on the success of the main service job and the warranty status of the machine. Second, we find evidence that these two situational factors are key determinants of a service situation in an industrial B2B setting. Third, the two determinants together define a service situation, with each combination representing distinct circumstances for selling.

## Conceptual framework

Based on our pre-study findings we identified four key service situations (see Fang et al., 2011 for a similar approach combining two variables to scenarios), which we include in our conceptual framework (Fig. 1) along with technician-specific moderators that we discuss below. We expect the service situations to have differential effects on service technicians’ selling activities and selling success:

**Fig. 1** Conceptual framework

- (1) *Out-of-warranty service failure*: The field service technician does not manage to complete the primary job successfully. As a result, the machine is not functional after termination of the service job. This failure leads to (further) downtime and, most likely, to (additional) income losses for the customer. Furthermore, as no warranty exists, the customer must be prepared to be charged for the service job.
- (2) *Out-of-warranty service success*: The service technician successfully completes the job and the machine is functional. However, the customer has to pay for the visit as the service is no longer covered by a warranty.
- (3) *Within-warranty service failure*: The technician does not finish the job successfully. Although the customer does not incur any costs for the work, she does have to expect downtime costs because the machine remains inoperable.
- (4) *Within-warranty service success*: The technician finishes the service job successfully, resulting in no further downtime for the customer. Likewise, the customer does not incur any service costs due to the warranty.

We draw on expectancy theory to develop hypotheses for the effects of the four service situations on the respective selling outcomes (Evans et al., 1982; Vroom, 1964). Expectancy theory builds on the intuitive notion that an individual's motivation (M) to perform a particular task is driven by three components:

- Expectancy = expectation that the task can be performed successfully,
- Instrumentality = perception that performing the task will lead to a specific outcome, and
- Valence = perceived value of the outcome.

Situational or individual factors can influence these components and thus the motivation to act (DeCarlo & Lam, 2016; Evans et al., 1982). In the B2B service context, we

argue that the service situation is a major factor influencing both (i) a technician's motivation to engage in selling (selling activity), and (ii) a customer's motivation to respond positively to selling (selling success). We use representative quotes from our pre-study interviews to substantiate our theoretical reasoning and provide evidence against alternative explanations. We start by explaining the effect on selling success to distinguish the most from the least promising service situations. We then turn to the effects on selling activity to explain in which situations technicians are most (least) likely to make sales offers and whether this is consistent with the most (least) promising situation.

**Effects of service situations on selling success** According to expectancy theory, a customer's motivation to respond positively to selling is highest in the “out-of-warranty service failure” situation. The two features of this situation (failed service job—no warranty) directly influence the components of the expectancy framework: First, maintaining functional equipment is a top priority for customers, as downtimes are usually associated with high costs (Liu et al., 2012). For example, a study by the research firm Aberdeen (2016) revealed that the cost of machine downtime is around \$260,000 per hour across all industries. Correspondingly, participants in the pre-studies indicated that “[...] customers are happiest when the machine doesn't break in the first place.” (pre-study II, interview 10) and that “First and foremost, it is important to the customer that the machine is up and running again as quickly as possible” (pre-study II, interview 9). Given that the desire for functional equipment is an “outcome” in the customer's expectancy framework, a critical situation involving prolonged machine downtime (as a result of a failed service job) immediately raises awareness of the risk and cost of downtime (Chen et al., 2015), making the outcome more valuable to the customer. This corresponds to high valence in the expectancy framework.

Second, customers are less likely to hold the supplier responsible for a machine failure that occurs after warranty



expiry. One participant explained that “[c]ustomer disappointment is higher in a warranty case than in a regular service call. Every customer knows that when a machine is ten or twenty years old and has its hours of operation, it is a little trickier. With a new machine [under warranty], there is an expectation that it must work.” (pre-study II, interview 8). This perspective is in line with previous literature about product failures, arguing that customers who attribute a failure to themselves are less likely to expect any action by the firm (Dunn & Dahl, 2012; Umashankar et al., 2016), and instead are more likely to feel responsible for solving problems themselves (Kashyap, 2001; Tojib & Khajehzadeh, 2014). Indeed, our interview participants observe that “if the machine is out of warranty, then the customer will normally first try to fix it himself.” (pre-study II, interview 9). By becoming more engaged with a particular problem and its associated negative consequences, customers should also adopt a more proactive mindset. This corresponds to increased instrumentality, that is, a stronger perception that they themselves can ensure their desired “outcome” of functional equipment. Therefore, customers should be more open towards sales offers, especially towards those suitable to preempt machine failures and downtimes in their machine park (Challagalla et al., 2009; DeCarlo & Lam, 2016; Evans et al., 1982).<sup>6</sup> Overall, because of increases in both valence and instrumentality, customers should have a high motivation to respond positively to selling in this situation.

**H1** Selling success of field service technicians is highest in the context of an “out-of-warranty service failure” situation.

By contrast, a customer’s motivation to respond positively to selling is lowest in the “within-warranty service success” situation, which directly opposes the previous situation regarding the two key characteristics. Customers’ problems are solved, preventing further machine downtime and escalating costs. As they myopically focus on the immediate operations, customers should be less inclined to pay attention to long-term maintenance, as noted by one participant: “[C]ustomers really just want production, production, production. [...] Although something should have been replaced or serviced a long time ago, they still say ‘it will work somehow’. The big bang will come at some point. But they simply take the risk” (pre-study II, interview 7). According to expectancy theory, this corresponds to relatively low valence in the expectancy framework. Moreover, the warranty coverage is likely to induce an “all-inclusive” feeling, with customer expecting the supplier to solve the issue (Kashyap, 2001), as evident statements like “Anything

that does not work is up to you!” (pre-study II, interview 12). This corresponds to a relatively low instrumentality in the expectancy framework. With low valence and instrumentality, customers are less motivated to become proactive, that is, respond positively to technicians’ sales offers. As long as production is running and problems are immediately fixed, they do not see the need for action.

**H2** Selling success of field service technicians is lowest in the context of a “within-warranty service success” situation.

Based on our previous reasoning, we can deduce the following for the two remaining situations: The situation “within-warranty service failure” is characterized by high valence (because of the failed service job) but low instrumentality (because of the warranty). On the one hand, the failed service job makes customers aware of the negative consequences of machine problems and thus triggers their motivation to respond positively to sales offers that help keep their equipment in good condition. On the other hand, they still see the supplier as responsible because of the warranty, which in turn reduces their motivation to be proactive, such as responding to sales offers. In contrast, in the “out-of-warranty service success” situation, low valence (because of the successful service job) but high instrumentality (because of no warranty) should emerge. In this case, customers pass on less responsibility to the supplier, which makes them more inclined to respond positively to sales offers. At the same time, however, the successful service job reduces their awareness of possible negative consequences of (future) machine problems and has them return their focus to their immediate operations. Thus, according to the customer’s expectancy, the motivation to respond positively to selling should be lower than in the “out-of-warranty service failure” situation and higher than in the “within-warranty service success” situation.

**H3a** Selling success of field service technicians in the context of a “within-warranty service failure” situation is lower (higher) than in an “out-of-warranty service failure” (“within-warranty service success”) situation.

**H3b** Selling success of field service technicians in the context of an “out-of-warranty service success” situation is lower (higher) than in an “out-of-warranty service failure” (“within-warranty service success”) situation.

**Effects of service situations on selling activity** Expectancy theory predicts that a field service technician’s motivation to engage in selling is lowest in the “within-warranty service failure” situation. As before, we can derive this conclusion by shedding light on the two underlying characteristics of this situation, this time from a technician’s perspective. As the pre-studies revealed, failing at their primary service task has several negative consequences for technicians.

<sup>6</sup> Literature on product failures similarly shows that customers who attribute a product failure to themselves have a higher likelihood of cross-buying (Umashankar et al, 2016).

Participants noted that they are “*dissatisfied with [themselves]*” (pre-study II, interview 11), that they feel they “*didn’t do [their] job*” (pre-study II, interview 12), and that customers may have “*a lack of trust [in their technical capabilities]*” (pre-study II, interview 3).

In addition, since the service job falls within the warranty period, the responsibility for any problems and for providing quick solutions lies with the supplier. In this situation, customers are more likely to blame the supplier for machine downtimes (Dixon et al., 2003; Kashyap, 2001) and expect the technician to take care of the problem, making an unsuccessful service visit even more unpleasant for the technician (see results of pre-study II). Given these negative situational cues, service technicians likely expect less success in secondary selling tasks (Gist & Mitchell, 1992; Yu et al., 2015). One participant highlighted that a service situation bears particular pressure if “*the machine is still under warranty [...]. Because of this tense situation, it is then very very difficult*” (pre-study II, interview 6). In expectancy theory, it is the expectancy term that captures a technician’s expectations to successfully engage in selling. Given that these are relatively low, we can directly infer that technicians are less motivated to make an offer in this situation.

**H4** Selling activity of field service technicians is lowest in the context of a “within-warranty service failure” situation.

By contrast, a field service technician’s motivation to engage in selling is highest in the “out-of-warranty service success” situation, which is the exact opposite of the previous situation in terms of the two key characteristics. In this situation, the main task of the service visit is successfully completed, which contributes to a situation described as being more “*pleasant*” (pre-study II, interview 2) and “*satisfying*” (pre-study II, interview 12). Likewise, technicians assume that they enjoy greater credibility and customers have more trust in their technical skills. As one participant noted: “*Of course, this has something to do with trust. When the customer sees that you have the problem under control, [...], then the customer knows that you know what you are doing*” (pre-study II, interview 8). Additionally, as this is an out-of-warranty service call, the customer is less likely to blame the supplier

for machine problems. Thus, technicians should expect more success in secondary selling tasks, which corresponds to relatively high expectancy. For example, one participant argued “*I believe the best moment is when you have successfully solved an issue that you had to solve. Then it is the best moment. Then you can go to the customer and say, let’s think about what we have here*” (pre-study II, interview 1). Given that expectancy is relatively high, field service technicians should be more motivated to make a sales offer.

**H5** Selling activity of field service technicians is highest in the context of a “out-of-warranty service success” situation.

Since the two remaining situations are each characterized by only one favorable (either “successful service job” or “no warranty”) and one unfavorable situational factor (either “unsuccessful service job” or “warranty”) from the technician’s point of view, the expectancy and thus the motivation of a technician to engage in selling is higher than in the “within-warranty service failure” situation, but lower than in the “out-of-warranty service success” situation.

**H6a** Selling activity of field service technicians in the context of a “out-of-warranty service failure” situation is lower (higher) than in an “out-of-warranty service success” (“within-warranty service failure”) situation.

**H6b** Selling activity of field service technicians in the context of a “within-warranty service success” situation is lower (higher) than in an “out-of-warranty service success” (“within-warranty service failure”) situation.

Table 4 summarizes our hypotheses and shows that—in line with our reasoning—the four service situations affect the two target variables asymmetrically. We expect selling success to be highest in cases when selling activity should not be highest, and selling activity to be highest in cases when selling success should not be highest. In other words, we predict that field service technicians do not properly exploit those service situations that offer the best sales opportunities and instead move their selling activities to situations less promising for successful selling.

**Table 4** Summary of expected effects

		Service situation			
		“Out-of-warranty service failure” (OWSF)	“Out-of-warranty service success” (OWSS)	“Within-warranty service failure” (WWSF)	“Within-warranty service success” (WWSS)
Selling outcomes	Selling success (SUC)	highest (H1)	lower (higher) than OWSS (WWSS) (H3b)	lower (higher) than OWSS (WWSS) (H3a)	lowest (H2)
	Selling activity (ACT)	lower (higher) than OWSS (WWSF) (H6a)	highest (H5)	lowest (H4)	lower (higher) than OWSS (WWSF) (H6b)

**Technician-specific moderators** Prior research suggests that individual characteristics may influence the components of the expectancy framework and thus affect an individual's motivation to act (DeCarlo & Lam, 2016; Evans et al., 1982). In our context, the questions arise whether some technicians do a better job than others in identifying sales opportunities and whether firms can leverage such differences to optimize selling activities. Our theoretical reasoning indicates that service technicians do not properly exploit sales opportunities because they develop biased expectations about whether they can sell successfully in a given service situation. We examine three factors that capture different facets of a technician's ability to evaluate a service situation and thus to reduce the assumed expectancy bias:

- *Technical specialization.* Companies often intentionally seek and develop employees to achieve different skill levels (Ferreira & Sah, 2012; Landier et al., 2009). In our case, some technicians are trained on many machines and thus have a relatively broad skill set (generalists), while others specialize in a few machines for a narrower but more detailed knowledge about a limited number of machines (specialists). A broader, more generalist (versus specialized) knowledge not only directly expands a technician's catalog of suitable product and service recommendations for the customer, but should also improve their ability to assess (service) situations more holistically (Bunderson & Sutcliffe, 2002; Kang & Snell, 2009).
- *Sales education.* In a traditional sales context, among the key tools companies use to improve salespeople's performance is their (theoretical) education through training programs (Farrell & Hakstian, 2001). As trainings improve knowledge, skills, attitudes and behavior, they should also foster the selling performance of service technicians, including their ability to identify sales opportunities during service visits.
- *Sales expertise.* Given that selling is an optional (secondary) task, differences in the extent of selling activities among technicians exist. Those who make frequent offers build up a relatively large body of sales-specific knowledge and skills. Similar to salespeople, technicians should learn to avoid situations expected to lead to failure, based on accumulated experience with such failures (Boichuk et al., 2014; Schulman, 1999). With this acquired expertise, technicians should be particularly capable of achieving above-average sales performances, which includes the ability to identify promising and less promising sales opportunities (Schmidt et al., 1986).

In expectancy theory, the expectancy term captures a technician's expectations to successfully engage in selling. Given that technicians with (a) a lower degree of technical

specialization as well as higher (b) sales education and (c) expertise evaluate a situation more objectively and are able to distinguish good from bad sales opportunities more effectively (see above), their expectancy to make a successful sale should be less susceptible to situational cues that bias their assessment (like a failed service job).

- H7** Service technicians' ability to exploit promising and avoid less promising sales opportunities is weakened by (a) their degree of technical specialization, and strengthened by their level of (b) sales education, and (c) sales expertise.

## Data and methodology

### Research setting

For our observational study, we again cooperated with *DMG Mori*. *DMG's* service technicians visit customers on site for maintenance, repair, or overhaul services. During those visits, they often notice additional issues unrelated to the reason for their service call (e.g., new parts are available, the machine setup is sub-optimal, indicators for imminent breakdown) either with respect to the serviced machine or to other *DMG* machines in the customer's machine park. Technicians are encouraged to point out such issues to the customer and offer a solution, thus engaging in selling activity. Proposed solutions range from providing simple spare parts to more complex components that are critical for the operability of the equipment, to machine upgrades for performance improvements as well as value-added services.

As an incentive, service technicians receive a 2% commission for every successful sale combined with a floor and a cap of €10 and €200, respectively (no additional incentives beyond this commission apply). Commissions do not apply to sales necessary to fulfill the original service task but only to cross- and up-selling. Furthermore, service technicians are not eligible to offer entire machines (which remains a core task of designated salespeople) but only ancillary equipment. The company uses an IT-based tool to facilitate selling by technicians. As part of the regular service report, they can enter the proposed solution into a database. Each entry triggers a process in the back office that generates a quote that is sent to the customer. After the customer decides (i.e., accepts or declines the offer, which could be months later), the "lead" entry in the database is closed via an interface with the ERP system, and in the event of a sale the technician receives a commission. On average, one field service technician makes 87 service visits per year with a duration of 10 h per visit. The ratio of selling activities to service visits is about 13%, whereas the ratio of success per selling activity is about 40%. However, success rates vary substantially across technicians, as we address in our model below.

## Data collection and variable operationalization

We worked with a unique set of secondary data from the cooperating company, which we composed from several datasets. The data comprise longitudinal observations on technicians' service visits over four full years (2012–2015) for one of the firm's key markets ("visit database"), augmented with longitudinal data on selling activities ("lead database"). The visit database contains information on the exact time of the visit, the status of the machine before and after the visit (operational vs. not operational), and the machine's warranty status. The lead database contains entries of selling activities that we matched to the respective service visits. Thus, the level of analysis is the service visit. We further enriched the dataset with information on service technicians' technical competence and sales training history, obtained from internal records of skill certificates.

Preliminary examination of the data revealed a few service technicians with a history of extremely long visits (up to 900 h) and a strong concentration of visits at a specific customer. Additionally, the data included part-time service technicians who spent their remaining time in the back office. Following a case-by-case discussion with *DMG Mori's* data manager, we decided to eliminate these observations since they were governed by a different data-generating process.<sup>7</sup> We also eliminated cases in which information about service visits, technicians, or customers was incomplete (e.g., missing the specialization level of the technician). Our final sample contains 127,659 service visits of 344 field service technicians who engaged in a total of 16,771 selling activities. Next, we describe the operationalization of the variables, focusing on the focal outcomes and situational variables. In addition to these, our model also includes a large number of variables to control for further situational factors as well factors proposed in prior research. Table 5 summarizes all variable operationalizations.

**Sales outcomes** As depicted in our framework, we use two dependent variables to measure the selling outcomes of field service technicians. The first, selling activity ( $ACT_{it}$ ), is a binary variable indicating whether technician  $i$  during service visit  $t$  engaged in selling activity. The second, selling success ( $SUC_{it}$ ), is also operationalized as a binary variable indicating whether—given a selling activity during service visit  $t$ —the selling activity was successful.<sup>8</sup> Thus, we observe selling success only if the field service technician engaged in a selling activity.

<sup>7</sup> For example, most outlier observations came from a small team of employees that worked on "special" cases. The data manager recommended separating these observations. Including them did not alter results.

<sup>8</sup> We also analyze effects on sales *revenues* as part of our robustness checks in the Web Appendix, which yield qualitatively similar results.

**Service situation** We create our four service situations by crossing the two variables success of the main service job and service warranty. We decided to split the four situations instead of specifying a model including simple effects and an interaction for better interpretability and managerial applicability, as pinning effects in four distinct situations against each other is more straight-forward than interpreting complex interaction effects. We present results of the simple effects-interaction model as robustness checks in the Web Appendix, which are identical to those obtained by crossing the variables.

Success of the main service job is a dummy variable indicating whether the equipment is operational at the time of the technician's departure. We thus consider a service job successful if the customer can readily use the machine for production after the technician's visit, regardless of whether the reason for this visit was a concrete problem or machine maintenance. Service technicians may have to shut down operations on a specific machine due to current or imminent problems during maintenance, despite the machine being operational when the technician arrived. We consider a narrower definition as a robustness check, looking only at cases in which the machine was non-operational upon the technician's arrival (see Web Appendix W6), which indicates a repair call (instead of, for instance, routine maintenance). The warranty variable denotes whether the service visit was covered by a warranty. *DMG Mori* delivers machines with a default warranty of one year, while additional warranty extensions are rare. The combination of these two indicator variables results in our four main service situations.

## Model-free evidence

Before introducing our model, we provide descriptive evidence of selling success and activity in the four service situations that may hint at differences in decision making between the customer and technician. To this end, we looked at the selling successes and activities as shares of all service visits, separated for each service situation. Figure 2 indicates that service situations differ substantially in selling success and activity rates, with the "out-of-warranty service failure" ("within-warranty service success") situation yielding a successful sale most (least) often, and selling activity being more than five times higher in an "out-of-warranty service success" compared to a "within-warranty service failure" situation. These differences further suggest potential inefficiencies in exploiting sales opportunities, as selling activities and successes do not match. For instance, selling activity is highest in "out-of-warranty service success" situations, which yields a success much less often than "out-of-warranty service failure" situations.<sup>9</sup>

<sup>9</sup> Figure WF1 in Web Appendix W4 furthermore compares the same model-free evidence for machines that were operational (versus not operational) at the time of the technician's arrival.

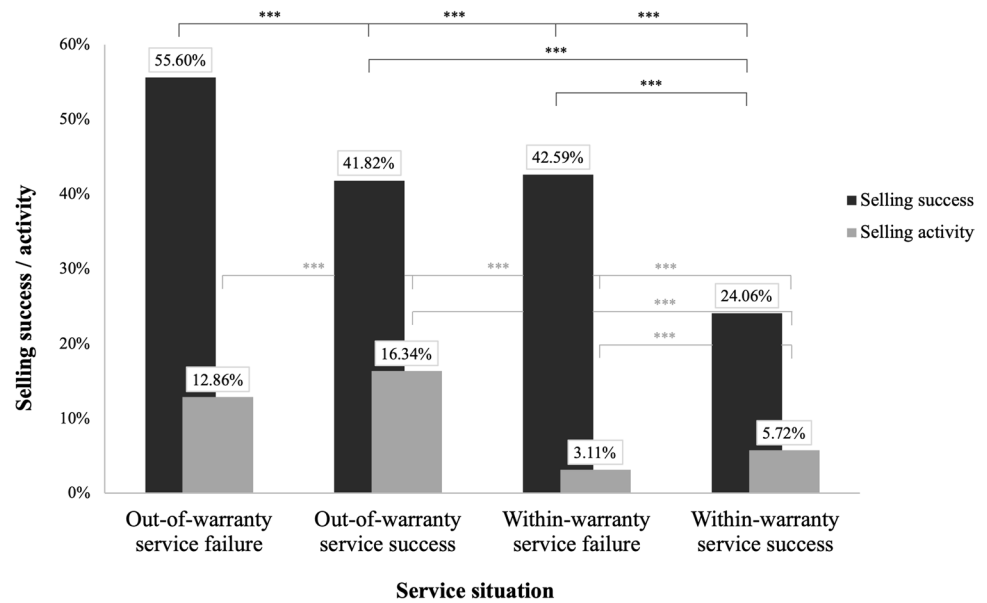
**Table 5** Variable definitions and operationalizations

Variable	Name	Definition	Operationalization
<i>Dependent variables</i>			
Selling activity	ACT	Indicator whether a service technician engaged in selling activity during a respective service visit	1 = selling activity; 0 = no selling activity
Selling success	SUC	Indicator whether a selling activity was successful (i.e. resulted in a sale)	1 = selling success; 0 = no selling success
<i>Service situations</i>			
“Out-of-warranty service failure”	OWSF	Situation characterized by unsuccessful service job and non-existence of warranty	1 if service job = unsuccessful AND warranty = non-existing; 0 otherwise
“Out-of-warranty service success”	OWSS	Situation characterized by successful service job and non-existence of warranty	1 if service job = successful AND warranty = non-existing; 0 otherwise
“Within-warranty service failure”	WWSF	Situation characterized by unsuccessful service job and existence of warranty	1 if service job = unsuccessful AND warranty = existing; 0 otherwise
“Within-warranty service success”	WWSS	Situation characterized by successful service job and existence of warranty	1 if service job = successful AND warranty = existing; 0 otherwise
<i>Covariates</i>			
Technical specialization	SPEC	Indicator for degree of specialization of the service technician (vs. generalist)	Herfindahl concentration index based on distribution of the service technician's internal skill certificates for a subset of 27 product lines offered by the company; range from 0 = generalist to 1 = specialist
Sales education	TRAIN	Indicator whether the service technician participated in specific sales training prior to the respective service visit	1 = training; 0 = no training
Sales expertise	LEAD	Indicator for overall sales activity of service technician prior to respective service visit	# of sales leads of the service technician in the quarter prior to current service visit
Technician's service experience	TEXP	A service technician's recorded service experience across all customers	# of service visits (at any customer) made prior to the focal visit
Technician's prior service success	TSERV	A service technician's track record of successful service visits (i.e., machine operational upon departure)	# of successful service visits (at any customer) made prior to the focal visit
Joiner	JOIN	Indicator whether a service technician joined the job during the observation period	1 = joiner; 0 = other
Leaver	LEAV	Indicator whether a service technician left the job during the observation period	1 = leaver; 0 = other
Customer size	SIZE	Indicator for size of customer based on internal A/B/C/D segmentation system	1 = larger customers (A, B); 0 = smaller customers (C, D)
Customer openness to selling activities	OPEN	Indicator for customer's responsiveness to service technicians's selling activities	# of total successful selling activities by all technicians for the respective customer prior to the focal service visit
Customer's service experience	CEXP	Indicator for the customer's experience with the seller's products and services	Duration of the business relationship between the customer and the cooperating company in months
Customer's prior service success	CSERV	A customer's record of successful service visits (i.e., machine operational upon departure) by any technician	# of successful service visits (by any technician) at the customer prior to the focal visit
Familiarity with the customer	FAM	Indicator for the specific knowledge the service technician has acquired about the customer	# of hours that the technician spent with the customer in the past 360 days prior to the focal visit
Machine status at arrival	ASTAT	Indicator whether the machine was operational or not operational at the beginning of the service visit	1 = operational; 0 = not operational
Visit duration	DUR	Indicator for the length of the respective service visit	# of hours that the technician spent at the customer's site during the focal service visit
Number of proposed items	ITEMS	Indicator for the number of products/services that the service technician recommended	# of technical equipment pieces offered by the service technician during the focal visit
Average lead time	LTIME	Indicator for the length of the decision process for the quote	# avg. number of days elapsed from date of the service visit to sales date by the specific service technician
Recent payout	PAY	Indicator for whether the technician recently (past 30 days) closed a sales lead and earned commission	1 = recent payout; 0 = no recent payout

In some cases (<10% of all observations), technicians serviced more than one piece of equipment during the same service visit. We coded the machine status at arrival/departure for each machine separately as (1) fully operational (coded as 1), (2) partly operational (coded as 0), and (3) non-operational (coded as -1) before aggregating the (possibly different) machine statuses by taking their average. If the average exceeded zero (i.e., if the average of the serviced machines were at least partly operational), we coded the aggregate machine status for the respective service visit as operational (and non-operational otherwise). Several robustness analyses with different aggregation procedures all yielded qualitatively identical results



**Fig. 2** Model-free evidence. Selling success (selling activity) as percentages of all selling activities (customer visits). All differences are statistically significant ( $p < .01$ ) except for the difference in selling success between “out-of-warranty service success” (41.82%) and “within-warranty service failure” (42.59%)



For a more complete picture of our variables, we also show correlations and descriptive statistics in Table 6, and Table 7 provides values for all variables split between cases in which the underlying service job was successful (unsuccessful). The splits support insights from our interviews that technicians prefer making sales offers after successful service jobs.

### Model specification and estimation

We have to consider that service technicians self-select to engage in selling activity on the basis of factors we do not observe, which might cause the errors in stage 2 (selling success) and stage 1 (selling activity) to be correlated and bias results (Heckman, 1979; Maddala, 1983). For example, technicians could be inclined to make a sales offer when they are in a good mood due to a successful service job (Challagalla et al., 2009), possibly also affecting the quality of such an offer and thus the probability of success.

To account for this possibility, we formulate an extended bivariate probit model with random intercepts (capturing

individual differences between service technicians) and cluster-robust standard errors (capturing correlations of observations for each technician over time), and add a broad set of covariates (Heckman, 1976; Cameron & Trivedi, 2005, p. 523). This model augments the well-known sample-selection procedure proposed by Heckman (1976) for repeated observations with a binary outcome variable (selling success). By explicitly modeling the error correlation between the selling-success and selling-activity equations we address potential endogeneity through technicians' self-selection and incorporate the dependence of the customer's purchase decision on the technician's decision to make a sales offer. The Heckman (1976) procedure assures that although we only observe customers' purchase decisions (accept or reject) in case the technician makes an offer, estimates in the sales equation are unconditional, reflecting purchase decisions as if sales offers were made at random.  $P_{sct}^{SUC}$  measures the probability that the customer  $c$  makes a purchase as a result of the selling activity by field service technician  $s$  during visit  $t$ , and  $P_{sct}^{ACT}$  measures the probability that the technician engages in the activity in the first place.

$$\begin{aligned}
 P_{sct}^{SUC} &= P(SUC_{sct} = 1 | x) = \Phi(Z_{sct}) \\
 Z_{sct} &= \alpha_s^{SUC} + \beta_1 OWSS_{sct} + \beta_2 WWSF_{sct} + \beta_3 WWSS_{sct} + \beta_4 SPEC_{st} + \beta_5 TRAIN_{st} \\
 &+ \beta_6 LEAD_{st} + \beta_7 TEXP_{st} + \beta_{10} TSERV_{st} + \beta_8 JOIN_{st} + \beta_9 LEAV_{st} + \beta_{11} SIZE_{ct} + \beta_{12} OPEN_{ct} \\
 &+ \beta_{13} CEXP_{ct} + \beta_{14} CSERV_{ct} + \beta_{15} FAM_{sct} + \beta_{16} ASTAT_{sct} + \beta_{17} DUR_{sct} + \beta_{18} ITEMS_{sct} \\
 &+ \beta_{19} LTIME_{sct} + \sum_{y=2}^4 \beta_y YEAR_t + \sum_{m=2}^{12} \beta_m MONTH_t + \rho \sigma_{suc} IMR_{sct} + \epsilon_{sct}^{SUC} \\
 \text{where } \alpha_s^{SUC} &= \alpha_0^{SUC} + \mu_s^{SUC} \text{ and } \mu_s^{SUC} \sim N(0, \sigma_{\mu^{SUC}}^2)
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 P_{sct}^{ACT} &= P(ACT_{sct} = 1 | x) = \Phi(K_{sct}) \\
 K_{sct} &= \alpha_s^{ACT} + \gamma_1 OWSS_{sct} + \gamma_2 WWSF_{sct} + \gamma_3 WWSS_{sct} + \gamma_4 SPEC_{st} + \gamma_5 TRAIN_{st} + \gamma_6 LEAD_{st} \\
 &+ \gamma_7 TEXP_{st} + \gamma_{10} TSERV_{st} + \gamma_8 JOIN_{st} + \gamma_9 LEAV_{st} \\
 &+ \gamma_{11} SIZE_{ct} + \gamma_{12} OPEN_{ct} + \gamma_{13} CEXP_{ct} + \gamma_{14} CSERV_{ct} + \gamma_{15} FAM_{sct} + \gamma_{16} ASTAT_{sct} \\
 &+ \gamma_{17} DUR_{sct} + \delta PAY_{sct} + \sum_{y=2}^4 \gamma_y YEAR_t + \sum_{m=2}^{12} \gamma_m MONTH_t + \epsilon_{sct}^{ACT} \\
 \text{where } \alpha_s^{ACT} &= \alpha_0^{ACT} + \mu_s^{ACT} \text{ and } \mu_s^{ACT} \sim N(0, \sigma_{\mu^{ACT}}^2)
 \end{aligned} \tag{2}$$

**Table 6** Correlation matrix

Variables	Name	1	2	3	4	5	6	7	8	9	10	11
1	Selling activity	ACT	1.000									
2	Selling success	SUC	.191	1.000								
3	“Out-of-warranty service failure”	OWSF	-.002	.081	1.000							
4	“Out-of-warranty service success”	OWSS	.131	.048	.002	1.000						
5	“Within-warranty service failure”	WWSF	-.035	.002	-.032	-.161	1.000					
6	“Within-warranty service success”	WWSS	-.131	-.122	.025	-.056	.010	1.000				
7	Technical specialization*	SPEC	-.082	-.072	.010	.051	-.004	-.008	1.000			
8	Sales education	TRAIN	.016	.010	.008	.044	-.000	-.042	.053	1.000		
9	Sales expertise	LEAD	.217	.051	.004	.034	-.002	.025	.113	.170	1.000	
10	Technician's service experience	TEXP	-.006	.037	.041	.034	-.002	.034	.117	.174	.990	1.000
11	Technician's prior service success	TSERV	-.003	.037	.041	.034	-.002	.034	.164	.002	-.200	-.203
12	Joiner	JOIN	.007	.003	-.017	-.001	-.001	.001	-.033	-.057	-.058	-.059
13	Leaver	LEAV	-.017	-.007	-.008	-.034	-.001	.016	-.006	-.001	-.059	-.053
14	Customer size	SIZE	-.006	.096	-.027	-.034	.012	.049	.071	.119	.137	.145
15	Customer openness to selling activities	OPEN	.067	.134	-.006	.068	-.009	-.040	.001	.001	.068	.066
16	Customer's service experience	CEXP	.024	.061	.032	.095	-.004	-.067	.022	.057	.227	.230
17	Customer's prior service success	CSERV	.019	.110	-.001	.046	-.001	-.044	.069	.026	-.043	-.040
18	Familiarity with the customer	FAM	.029	.089	-.026	.016	.000	-.003	-.018	.005	-.062	-.058
19	Machine status at arrival	ASTAT	.011	-.010	-.220	.023	-.101	.127	-.002	.005	-.160	-.153
20	Visit duration	DUR	.132	.128	-.040	.060	-.008	.041	-.009	.010	-.015	-.012
21	Number of proposed items	ITEMS	.835	.127	-.005	.116	-.030	-.074	.014	.199	-.015	-.012
22	Avg. lead time	LTIME	NA	-.264	-.028	-.038	-.002	.005	-.073	-.074	-.169	-.169
23	Recent payout	PAY	.122	.088	-.003	.037	-.011	-.129	.038	.443	.121	.127
N			127,659	16,771	127,659	127,659	127,659	127,659	127,659	127,659	127,659	127,659
Min			0	0	0	0	0	-1.246	0	0	1	0
Max			1	1	1	1	1	3.324	1	49	1355	1086
Mean			.131	.407	.067	.656	.014	.263	.135	5.069	254.564	230.353
SD			.338	.491	.251	.475	.116	.440	.341	5.418	198.771	175.783

Table 6 (continued)

Variables	12	13	14	15	16	17	18	19	20	21	22	23
1 Selling activity												
2 Selling success												
3 “Out-of-warranty service failure”												
4 “Out-of-warranty service success”												
5 “Within-warranty service failure”												
6 “Within-warranty service success”												
7 Technical specialization*												
8 Sales education												
9 Sales expertise												
10 Technician’s service experience												
11 Technician’s prior service success												
12 Joiner	1.000											
13 Leaver	-.023	1.000										
14 Customer size	.028	-.001	1.000									
15 Customer openness to selling activities	.097	-.027	.232	1.000								
16 Customer’s service experience	.007	-.008	.209	.180	1.000							
17 Customer’s prior service success	.085	-.028	.314	.669	.228	1.000						
18 Familiarity with the customer	-.017	-.007	.182	.283	.094	.271	1.000					
19 Machine status at arrival	.029	-.005	.018	.012	-.018	.006	.030	1.000				
20 Visit duration	.029	.024	.124	.102	.071	.101	.191	-.062	1.000			
21 Number of proposed items	.012	-.016	.008	.081	.025	.029	.046	.011	.175	1.000		
22 Avg. lead time	-.033	.060	-.061	-.112	-.006	-.118	-.057	-.013	-.017	-.001	1.000	
23 Recent payout	-.009	-.036	.014	.103	.005	.059	.034	.005	-.006	.107	-.123	1.000
N	127,659	127,659	127,659	127,659	127,659	127,659	127,659	127,659	127,659	127,659	16,771	127,659
Min	0	0	0	0	0	0	0	0	.250	0	0	0
Max	1	1	1	72	76	356	775,250	1	199,750	17	510	1
Mean	.069	.007	.559	1.464	20,746	20,512	13,441	.523	10,198	.178	70,538	.281
SD	.253	.083	.497	3.718	11,899	29,862	38,652	.499	12,555	.549	85,180	.449

\* Technical specialization is mean-centered to represent the variable operationalization used in the model specifications. Significant correlations ( $p < .05$ ) are in bold

**Table 7** Observations according to technicians' service success

Dimension	Service success					
	Overall		Yes		No	
# Unique technicians	344		344		344	
# Unique customers	10,641		10,471		4,187	
# Visits	127,659		117,310		10,349	
<i>Dependent variables</i>						
# Visits w/ selling activity	16,771	(13.1%)	15,609	(13.3%)	1,162	(11.2%)
# Visits w/ successful sale	6,826	(5.3%)	6,187	(5.3%)	639	(6.3%)
<i>Focal independent and moderator variables</i>						
# Visits w/ warranty	35,258	(27.6%)	33,523	(28.6%)	1,735	(16.8%)
Avg. technical specialization*	.346		.345		.364	
# Visits after sales education	17,206	(13.5%)	15,961	(13.6%)	1,245	(12.0%)
Avg. number of recent sales leads (sales expertise)	5.069		5.084		4.901	
<i>Covariates</i>						
Avg. technician's service experience [# visits]	254.357		251.810		285.782	
Avg. technician's prior service success [# visits]	230.353		228.411		252.368	
# Visits by joiners	8,769	(6.9%)	8,201	(7.0%)	568	(5.5%)
# Visits by leavers	888	(0.7%)	837	(0.7%)	51	(0.5%)
# Visits at large customers (A/B segments)	71,361	(55.9%)	65,911	(56.2%)	5,450	(52.7%)
Avg. customer openness to selling activities	1.464		1.474		1.347	
Avg. customer's service experience [months]	20.746		20.643		21.918	
Avg. customer's prior service success [# visits]	20.512		20.593		19.597	
Avg. familiarity with the customer [h]	13.441		13.711		10.383	
# Visits with non-operational machine at arrival	60,954	(47.7%)	51,757	(44.1%)	9,197	(88.9%)
Avg. visit duration [h]	10.198		10.348		8.498	
Avg. proposed items per visit	.178		0.181		.145	
Avg. lead time [days]	70.538		71.193		61.744	
Avg. visits w/ recent payout	.281		0.282		.269	

\*Herfindahl index [0: each training on different machine (generalist), 1: all trainings on same machine (specialist)]

In both equations, we specify a panel-specific constant  $\alpha_s$ , which controls for unobservable individual characteristics of the respective technician, and capture their influence in the random terms  $\mu_{sct}$ , which are assumed to be normally distributed with zero mean and standard deviations  $\sigma_{\mu_{SUC}}^2$  and  $\sigma_{\mu_{ACT}}^2$ , respectively. In addition, we allow the idiosyncratic error component for stage 1 and stage 2 to correlate across time points for each service technician, because ignoring the nested structure of our data could lead to biased inference (Cameron & Miller, 2015). The model includes the situational variables of interest as well as a vector of covariates and time dummies. To account for sample selection (as we only observe selling success when technician engaged in selling activity), we include the inverse Mills Ratio (IMR) as a control term (Heckman, 1976; Maddala, 1983). A significant coefficient  $\rho$  would signal error term correlation between the selection equation (selling activity) and the outcome equation (selling success), indicating sample selection endogeneity (Heckman, 1979). We estimate the parameters simultaneously using a maximum likelihood procedure based on the Gauss-Hermite quadrature approximation because the

likelihood function cannot be derived analytically (Cameron & Trivedi, 2005, p. 623).

Although the bivariate probit model is theoretically identified by its functional form (Cameron & Trivedi, 2010, p. 558–562; Wilde, 2000), adding exogenous excluding restrictions can improve estimation (Bushway et al., 2007). In the second equation (selling activity), we thus add service technicians' recent payouts from the month prior to the focal service visit as an exclusion restriction. High recent payouts should motivate service technicians to engage in selling activity because the financial benefits of making sales offers become immediately salient. Technicians who recently experienced that they can earn additional money by selling equipment and services should thus have an extra incentive to offer them to their customers during future service visits. However, recent payouts should directly, by definition, only affect the technician's decision to make an offer and not the customer's investment decision, with payouts typically being unknown to the customer. Furthermore, they should also not affect technicians' selling success indirectly beyond the variables already included in our

model (such as a technician's service experience, completed sales training, or her sales talent, which we capture through technician-specific effects). In particular, recent sales success refers to a previous service visit that typically took place at another customer and should thus be unrelated to customer characteristics or the technician-customer relationship during the focal visit.

## Results

### How service situations affect selling success and how well technicians exploit them

We first tested the possibility of a selection bias, as well as the strength and validity of our exclusion restriction—the technician's recent payout. Results (detailed in Web Appendix W5) suggest that coefficients are unlikely to be biased; however, we follow a conservative approach and report our findings based on the bivariate probit model rather than estimating both stages (selection and outcome) separately. Tests regarding our exclusion restriction confirm its appropriateness to improve identification of the selection equation.

Next, we present the results of the focal model, summarized in Table 8. In support of these results, Web Appendix W6 shows additional robustness checks pertaining to sales revenues as our focal outcome variable, different operationalizations of the moderators, a fixed-effects model specification, several sub-sample analyses, and a model featuring simple effects and an interaction.

In the first column of Table 8, we report effects of the service situation on selling success and in the second column, we report effects on selling activity (please refer to Web Appendix W7 for a complete model including dummies). We omit one service situation ("out-of-warranty service failure"), which serves as the baseline in our model. Therefore, estimates are to be interpreted as deviations from that baseline.

Results show that customers are most likely to make additional purchases when the warranty period has ended but the machine is still down after the service intervention (i.e., failure of the main service job)—our baseline situation. Coefficients of the remaining three situations are all negative (and significantly so for the two situations with successful service jobs), meaning that these situations tend to decrease the probability of selling success relative to the baseline, in line with H1. We also find that successful service jobs under warranty decrease the probability of selling success most substantially ( $b = -0.669$ ,  $p < 0.001$ ), in support of H2, followed by successful service jobs without warranty ( $b = -0.371$ ,  $p < 0.001$ ) and unsuccessful service jobs within the warranty period ( $b = -0.145$ ,  $p > 0.1$ ), as proposed in H3a and H3b.

With respect to selling activity, the results in column 2 suggest that technicians are least likely to make a sales offer

after a visit under warranty but a failed service job ( $b = -0.768$ ,  $p < 0.01$ ), in line with H4. According to our theoretical arguments, technicians behave this way because they assume responsibility for the failure and thus do not feel confident that they can successfully engage in their secondary task (until they have completed the primary task). By contrast, technicians are most likely to make an offer after successfully repairing machines no longer covered by a warranty ( $b = 0.073$ ,  $p < 0.01$ ), supporting H5. As postulated in H6a and H6b, the remaining service situations fall in-between ("within-warranty service success":  $b = -0.528$ ,  $p < 0.001$ ; "out-of-warranty service failure" is the baseline condition).

Altogether, the identified optimal selling situations are evidently counterintuitive from technicians' perspective, who fail to understand customers' rationale for responding to sales offers. They are especially reluctant to make an offer after an unsuccessful job under warranty (-72% compared to baseline), a situation promising high selling success. Instead, technicians are eager to engage in selling activities after a successful service job without warranty (+10.4% compared to baseline), which decreases the probability of a successful sale significantly compared to the "best" situation (-22%). Extensive robustness analyses (Web Appendix W7) confirm these results. We thus find support for our theoretical reasoning that technicians have difficulty putting themselves in customers' shoes, centering on their own role in the service encounter instead of seeking to solve the customer's problem of machine downtimes for the long term.

### Technician-specific moderators

Our previous analysis reveals that technicians struggle to identify when they should engage in selling, and when they should be reluctant. The questions that follow from these findings pertain to whether some technicians do a better job than others in identifying sales opportunities and how suppliers can use this information to optimize selling. Insights could help set up training programs and create effective selling guidelines (Antioco et al., 2008). As depicted in our framework, we consider three important technician-specific moderators (*technical specialization*, *sales education*, and *sales expertise*) that capture different facets of the technician's ability to identify service situations suitable for selling. We operationalize them as follows.

First, technicians can attend machine training that is specific to each product line and is recorded over the technician's tenure via collectible certificates. We measure the degree of technical specialization to reflect whether a technician has been trained on a few products (making her a specialist) or has received broader training across products (making her a generalist). For this, we construct a continuous variable based on the Herfindahl–Hirschman index of concentration (Herfindahl, 1950), where a value of one



**Table 8** Results of focal bivariate probit model

	Name	Expectation [success activity]		Selling success		Selling activity	
				Estimate	Robust SE	Estimate	Robust SE
Common intercept				.371	(.308)	-1.600***	(.035)
<i>Service situation</i>							
“Out-of-warranty service success”	OWSS	mid	high	-.371***	(.041)	.073**	(.035)
“Within-warranty service failure”	WWSF	mid	low	-.145	(.221)	-.768***	(.035)
“Within-warranty service success”	WWSS	low	mid	-.669***	(.096)	-.528***	(.035)
<i>Technician-specific covariates</i>							
Technical specialization	SPEC			-.061*	(.028)	-.131***	(.026)
Sales education	TRAIN			-.034	(.062)	.110**	(.035)
Sales expertise	LEAD			.004	(.004)	.021***	(.002)
<i>Covariates</i>							
Technician’s service experience	TEXP			.001	(.001)	.000	(.000)
Technician’s prior service success	TSERV			-.001	(.001)	-.000	(.000)
Joiner	JOIN			-.128	(.082)	-.107	(.074)
Leaver	LEAV			.310	(.263)	-.287	(.214)
Customer size	SIZE			.140***	(.022)	-.072***	(.011)
Customer openness to selling activities	OPEN			.015***	(.004)	.013***	(.002)
Customer’s service experience	CEXP			.002	(.001)	.001**	(.000)
Customer’s prior service success	CSERV			-.000	(.001)	-.002***	(.000)
Familiarity with the customer	FAM			.000	(.000)	-.000	(.000)
Machine status at arrival	ASTAT			.019	(.022)	.057***	(.013)
Visit duration	DUR			.005**	(.002)	.011***	(.000)
Number of proposed items	ITEMS			.191***	(.017)		
Avg. lead time	LTIME			-.006***	(.000)		
Recent payout	PAY					.042**	(.013)
Year dummies	YEAR			Yes		Yes	
Month dummies	MON			Yes		Yes	
Technician-specific random effects				Yes		Yes	
Technician-clustered standard errors				Yes		Yes	
Rho <sup>a</sup>				-.173	(.153)		
Pseudo log likelihood				-53,157.242			
# technicians				344			
# customers				10,641			
Observations (# visits)				127,659			

Standard errors are in parentheses; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Technical specialization (SPEC) is standardized to assure comparability with moderation analysis. Effects of the service situations (OWSS, WWSF, WWSS) are relative to baseline (OWSF)

<sup>a</sup>Rho denotes the error correlation between the selection equation (selling activity) and the outcome equation (selling success). Statistically significant error correlations would indicate a selection bias

indicates the highest possible specialization (all training was conducted on the same product line). Second, our partner company offered dedicated sales training for field service technicians when they started employing the service force as a “second sales force.” In our context, sales training aimed to convey basic knowledge about selling activities and the company’s product portfolio to enable and encourage technicians to identify sales opportunities and make suitable offers. This

training reflects theoretical sales education to be put into practice by the service technicians. Finally, we investigate the technicians’ practical sales expertise using the number of recent sales leads (within the past 90 days) that the technician entered into the company’s lead database.

We summarize results of the moderation analysis in Table 9 and visualize their marginal effects on the probability of engaging in selling activities (i.e., how changes

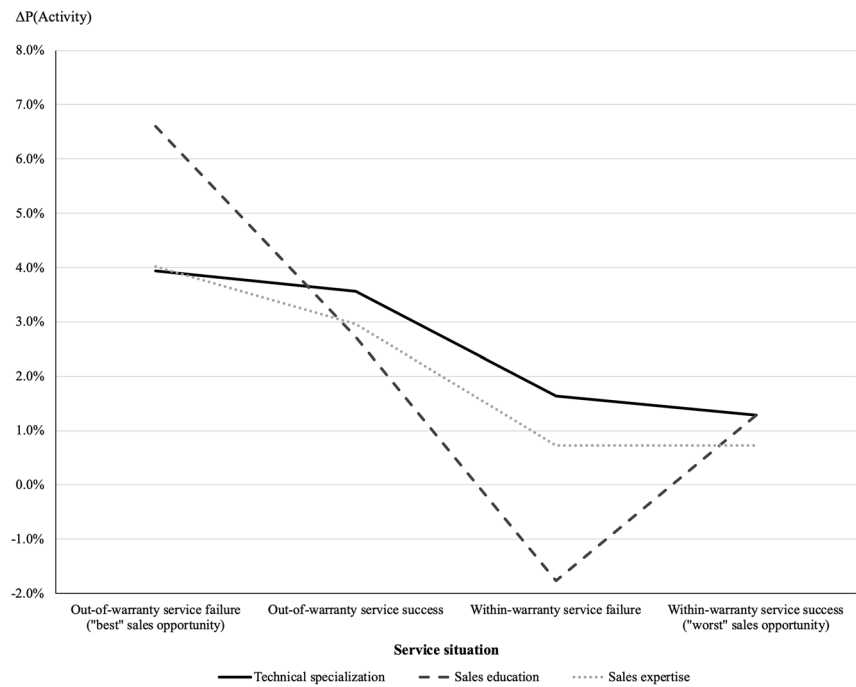
**Table 9** Results of the moderation analysis

	Name	Selling success		Selling activity	
		Estimate	Robust SE	Estimate	Robust SE
Common intercept		.504	(.306)	-1.695***	(.053)
<i>Service situation</i>					
“Out-of-warranty service success”	OWSS	-.445***	(.073)	.155***	(.042)
“Within-warranty service failure”	WWSF	-.364	(.320)	-.607***	(.093)
“Within-warranty service success”	WWSS	-.700***	(.112)	-.362***	(.046)
<i>Technician-specific moderations</i>					
Technical specialization	SPEC	-.055	(.047)	-.160***	(.036)
Sales education	TRAIN	-.084	(.113)	.249**	(.076)
Sales expertise	LEAD	-.004	(.007)	.033***	(.006)
“Out-of-warranty service success” × tech. specialization	OWSS × SPEC	-.006	(.041)	-.017	(.025)
“Within-warranty service failure” × tech. specialization	WWSF × SPEC	-.714*	(.299)	.021	(.025)
“Within-warranty service success” × tech. specialization	WWSS × SPEC	.040	(.053)	.062*	(.030)
“Out-of-warranty service success” × sales education	OWSS × TRAIN	.040	(.113)	-.147*	(.067)
“Within-warranty service failure” × sales education	WWSF × TRAIN	-.219	(.553)	-.465	(.264)
“Within-warranty service success” × sales education	WWSS × TRAIN	.131	(.155)	-.155	(.085)
“Out-of-warranty service success” × sales expertise	OWSS × LEAD	.008	(.006)	-.017	(.010)
“Within-warranty service failure” × sales expertise	WWSF × LEAD	.005	(.021)	-.010	(.006)
“Within-warranty service success” × sales expertise	WWSS × LEAD	.004	(.006)	-.021***	(.006)
<i>Covariates</i>					
Technician’s service experience	TEXP	.000	(.001)	.000	(.000)
Technician’s prior service success	TSUC	-.001	(.001)	.000	(.000)
Joiner	JOIN	-.128	(.082)	-.108	(.074)
Leaver	LEAV	.318	(.264)	-.287	(.212)
Customer size	SIZE	.142***	(.021)	-.072***	(.011)
Customer openness to selling activities	OPEN	.015**	(.004)	.013***	(.002)
Customer’s service experience	CEXP	.002	(.001)	.001**	(.000)
Customer’s prior service success	CSUC	.000	(.001)	-.002***	(.000)
Familiarity with the customer	FAM	.000	(.000)	.000	(.000)
Machine status at arrival	ASTAT	.017	(.022)	.059***	(.013)
Visit duration	DUR	.005**	(.001)	.011***	(.000)
Number of proposed items	ITEMS	.190***	(.017)		
Avg. lead time	LTIME	-.006***	(.000)		
Recent payout	PAY			.042**	(.013)
Year dummies	YEAR	Yes		Yes	
Month dummies	MON	Yes		Yes	
Technician-specific random effects		Yes		Yes	
Technician-clustered standard errors		Yes		Yes	
Rho <sup>a</sup>		-.204	(.146)		
Pseudo log likelihood		-53,114.497			
# technicians		344			
# customers		10,641			
Observations (# visits)		127,659			

Standard errors are in parentheses; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ . Technical specialization (SPEC) is standardized to assure comparability with moderation analysis. Effects of the service situations (OWSS, WWSF, WWSS) are relative to baseline (OWSF)

<sup>a</sup>Rho denotes the error correlation between the selection equation (selling activity) and the outcome equation (selling success). Statistically significant error correlations indicate a selection bias

**Fig. 3** Predicted marginal probabilities of moderating variables for selling activity. The figure shows marginal predicted probabilities for the four service situations, holding other variables constant at their means. Values of technical specialization denote the impact on the probability of making a sales offer, changing from a specialist technician (Herfindahl index of specialization = 1) to a generalist technician (Herfindahl index of specialization = 0). Values of sales education denote the impact on the probability of making a sales offer, changing from a technician who received no sales training (sales training = 0) to one that received sales training (sales training = 1). Values of sales expertise denote the impact of the number of recent sales leads on the probability of making a sales offer, changing from no recent sales lead (# recent sales leads = 0) to five recent sales leads (# recent sales leads = 5), based on a reasonable number of sales leads observed in our dataset



in the moderators affect technicians' sales offer probability) in Fig. 3. Estimates show that, in general, the moderators affect decision making mainly on the technicians' side (selling activity), having almost no direct impact on the customer (selling success) in the four service situations. This finding is reasonable in that technician-level moderators influence the technicians' ability to identify fruitful sales opportunities, leaving the customer's decision unaffected.

In particular, generalists are better than specialists at exploiting sales opportunities in certain situations, in support of H7a. The simple effect of technical specialization represents a conditional estimate for the case of an unsuccessful service job without warranty. Here, we find that although higher specialization does not affect a technician's selling success significantly ( $b = -0.055, p > 0.1$ ), it does decrease his or her likelihood to make a sales offer ( $b = -0.160, p < 0.001$ ) in the situation most likely to yield a successful sale. Thus, in the best selling situation, specialized technicians engage in selling activity significantly less often than generalist technicians. By contrast, specialized technicians are relatively more likely to engage in selling activities after a successful service job within the warranty period ( $b = 0.062, p < 0.05$ ), which is the situation least likely to yield a sale. The more specialized a technician is, the worse she does in avoiding situations with relatively less hope for success.<sup>10</sup>

<sup>10</sup> We find one situation in which more specialized technicians are less successful ("within-warranty service failure"). However, the large standard error suggests a cautious interpretation owing to a smaller number of observations.

Based on our theoretical considerations, these findings can be interpreted such that specialists have more narrow knowledge about the company's products limited to particular knowledge domains (i.e., particular machines), while generalists have a broader knowledge base that spans different fields (i.e., multiple machines) (Jasmand et al., 2012). Generalists also have a better ability to assess (service) situations comprehensively (Bunderson & Sutcliffe, 2002) as well as a larger repertoire of skills that can be used in alternative situations (Kang & Snell, 2009). They thus seem to be better able to adapt to the specific service situation, evaluating it more comprehensively (McCall et al., 1988) and being able to distinguish good from bad sales opportunities more effectively than specialists.

With regard to sales education and expertise results are mixed: Whereas education universally lowers the barrier to engage in selling activity ( $b = 0.249, p < 0.01$ ), not helping to identify particularly favorable or unfavorable service situations, practical expertise appears to help technicians in a more targeted way. The latter is associated with (1) a significant increase in selling activity during the most promising service situations for additional selling ("out-of-warranty service failure,"  $b = 0.033, p < 0.001$ ) and (2) a significant decrease in selling activity in the worst service situations ("within-warranty service success,"  $b = -0.021, p < 0.001$ ). These findings are in line with research on salespeople performance, indicating that salespeople learn to avoid situations expected to lead to failure, based on accumulated experience with such failures (Boichuk et al., 2014; Schulman, 1999). We conclude that practical expertise trumps (our company's specific) sales

**Table 10** Summary of findings

Effects of the four service situations				
Hypothesis		Perspective	Result	Rel. change in probability
H1	Selling success is highest in the context of an “out-of-warranty service failure” situation	Customer	(Partially) supported	0% (baseline)
H2	Selling success is lowest in the context of a “within-warranty service success” situation	Customer	Supported	-40%
H3a	Selling success in the context of “out-of-warranty service success” and “within-warranty service failure” situations is lower (higher) than in an “out-of-warranty service failure” (“within-warranty service success”) situation	Customer	(Partially) supported	“Out-of-warranty service success”: -22%
H3b				“Within-warranty service failure”: -5%
H4	Selling activity is lowest in the context of a “within-warranty service failure” situation	Technician	Supported	-72%
H5	Selling activity is highest in the context of an “out-of-warranty service success” situation	Technician	Supported	+ 10%
H6a	Selling activity in the context of “out-of-warranty service failure” and “within-warranty service success” situations is lower (higher) than in an “out-of-warranty service success” (“within-warranty service failure”) situation	Technician	Supported	“Out-of-warranty service failure”: 0%
H6b				(baseline) “Within-warranty service success”: -14%
Technician-specific moderations				
H7a	<i>Technical specialization</i> Selling activity is higher for generalists than for specialists in the context of the most promising service situation (“out-of-warranty service failure”) Selling activity is lower for generalists than for specialists in the context of the least promising service situation (“within-warranty service success”)			
H7b	<i>Sales education</i> Selling activity is higher for technicians that underwent sales training; however, no significant difference in the context of the most and least promising service situations			
H7c	<i>Sales expertise</i> Selling activity is higher, the more sales leads technicians generated during recent visits in the context of the most promising service situation (“out-of-warranty service failure”) Selling activity is lower, the more sales leads technicians generated during recent visits in the context of the least promising service situation (“within-warranty service success”)			

training when it comes to developing a feeling for good and bad sales opportunities. Table 10 summarizes our findings.

## Discussion and implications

### Understanding selling in service situations

Leveraging service employees as a “second sales force” in B2B interactions seems like a natural extension of their primary service tasks. However, firms struggle to exploit the full revenue-generating potential that this extension promises. We posit that a major point of differentiation from “regular” selling efforts by dedicated salespeople is the service situation that underlies technicians’ selling activities.

Based on a unique set of individual-level data from the field service organization of *DMG Mori*, a major industrial company, we find that service technicians behave inefficiently in exploiting different service situations for up- and cross-selling activities. We propose the roots for this

behavior to lie in technicians’ expectancy about how their primary service task affects whether they can successfully perform their secondary sales task. Our two (qualitative) pre-studies support this reasoning: If the service job is not successful, technicians are dissatisfied with themselves and believe the customer to have less confidence in their abilities. Warranty service situations are particularly challenging, as technicians perceive the warranty claim leads customers to see the supplier as responsible for restoring a functioning machine park. Often, they then refrain from further sales. Conversely, situations without warranty claims are associated with lower perceived expectations towards technicians. If the service job still succeeds in this case, it is the best situation for additional selling from technicians’ point of view, as they believe they have more credibility and customer trust. A similar rationale can be found in self-efficacy research, which argues that situational cues (here: the specific characteristics of the service situation) form individuals’ level of self-efficacy, corresponding to service technicians’ beliefs in their ability to successfully carry out

**Table 11** Economic impact

Service Situation	Predicted revenues per sales offer	Optimized revenues					
		$\Delta$ Main effects		$\Delta$ Technical specialization		$\Delta$ Sales expertise	
“Out-of-warranty service failure”	989.15 €	+ 331,367 €	(+ 22.32%)	+ 760,659 €	(+ 65.56%)	+ 114,742 €	(+ 11.01%)
“Out-of-warranty service success”	338.43 €	$\pm 0$ €	( $\pm 0\%$ )	- 7,445 €	(- 0.13%)	+ 98,821 €	(+ 2.34%)
“Within-warranty service failure”	392.51 €	$\pm 0$ €	( $\pm 0\%$ )	+ 3,533 €	(+ 16.98%)	+ 393 €	(+ 1.59%)
“Within-warranty service success”	129.61 €	- 43,418 €	(- 13.19%)	- 98,113 €	(- 58.37%)	- 10,239 €	(- 3.79%)
Total		+ 287,948 €	(+ 3.94%)	+ 658,634 €	(+ 11.40%)	203,716 €	(+ 3.70%)

Optimized revenues are calculated based on the same predicted revenues per sales offer

Main effects: calculated by shifting sales offers from the worst service situation (“within-warranty service success”) to the best service situation (“out-of-warranty service failure”) while holding the total number of sales offers constant; Technical specialization: calculated by using predicted probabilities of selling activity for specialist (technical specialization=0; baseline) versus generalist technicians (technical specialization=1) while holding the total number of sales offers constant; Sales expertise: calculated by using predicted probabilities of selling activity for technicians without a recent sales lead (sales leads=0) versus technicians with five recent sales leads (sales leads=5) while holding the total number of sales offers constant

any additional selling job (Gist & Mitchell, 1992; Yu et al., 2015).<sup>11</sup>

## Economic impact

To assess the economic impact of reallocating service technicians’ selling activities, we performed simulations. Specifically, we aimed to answer the question of how much additional revenue technicians can generate by shifting selling activities from the least to the most promising service situations. To this end, we estimated the impact of reallocating one percentage point of all sales offers (i.e., 335 offers) from the worst (“within-warranty service success”) to the best (“out-of-warranty service failure”) situation, while keeping their overall number constant.

For comparability, we performed simulations on the same basis for our significant moderators (technical specialization and recent sales leads), this time changing the variables from specialized (technical specialization=0) to generalized (technical specialization=1) technicians, and from low expertise (recent sales leads=0) to high expertise (recent sales leads=5), respectively. Table 11 shows the results of our simulation analyses, which demonstrate uplifts between 3.9% (corresponding to about 288,000 €) and 11.4% (approx. 660,000 €) in overall revenues from selling activities based on these isolated optimizations alone. Thus, economic implications of incorporating the identification of service situations strategically into technicians’ selling activities are substantial.

<sup>11</sup> Indeed, social psychology argues that the expectancy concept in expectancy theory is similar to self-efficacy in self-efficacy theory (Locke, Motowidlo, and Bobko 1986).

## Theoretical implications

Assuming that service technicians can naturally function as an effective “second sales force” is likely to yield lost opportunities and suboptimal economic outcomes. Sales literature, focused on the decision making of dedicated salespeople (e.g., Ahearne et al., 2010; Verbeke, Dietz, and Verwaal 2011), provides limited guidance for avoiding such outcomes and optimizing technicians’ selling behavior because it does not distinguish between primary and secondary tasks. Our research extends knowledge about ineffective selling behavior (Payne et al., 1992) by showing the importance of the underlying service situation (the technician’s primary task) to determine how service technicians evaluate and exploit sales opportunities (the technician’s secondary task). Interestingly, literature on service-sales ambidexterity, which considers dual job responsibilities, has also neglected the service situation as a possible determinant of ambidextrous behavior. Thus, unraveling the effect of the service situation on service employees’ dual responsibilities provides an important piece of the puzzle towards a comprehensive theory of service-sales ambidexterity (Ahearne et al., 2007; De Ruyter et al., 2020; Gwinner et al., 2005).

Our research also highlights the importance of explicitly differentiating between a service employee’s decision to engage in selling (selling activity) and the customer’s decision to accept or decline the offer (selling success). Extant sales literature does not need to make this distinction, as a salesperson’s visit is always made with the intention to sell. Service employees with sales responsibilities, however, have a choice, and may indeed refrain from making sales offers. While some studies on service-sales ambidexterity have looked at *either* selling activity (e.g., Sok et al., 2016) *or* selling success



measures (Patterson et al., 2014), others have linked the two, but only to estimate their direct relationship (e.g., Jasmand et al., 2012) and not to identify discrepancies between optimal and actual selling behavior. Given the economically relevant effects we find, this novel perspective should be integrated in future frameworks of service-sales ambidexterity research.

Finally, our framework, by highlighting the role of the underlying primary job for secondary task fulfilment, may be informative for other contexts in which employees must reconcile multiple (seemingly) conflicting tasks, such as salespeople who are asked to perform additional service jobs (e.g., Ahearne et al., 2007), frontline employees who must simultaneously meet productivity and quality goals (e.g., Singh, 2000), or creative workers expected to follow conflicting modes of innovation (Andriopoulos & Lewis, 2010).

### Managerial implications

The inefficiencies uncovered by our empirical analysis should not discourage firms from using their technical service force as a “second sales force.” If service technicians forewent selling activities altogether, *all* instead of only *some* opportunities for cross-selling and upselling would be lost. The alternative of relegating (part of) these activities to other employees could raise new issues (e.g., lack of customer trust and technical expertise) and thus leave even more sales potential on the table. Thus, we advocate for optimizing rather than abolishing selling activities by service technicians so that firms can leverage the entire revenue potential of their frontline.

Against this background, our study provides several implications. First, as service technicians are not dedicated salespeople, firms need to enable technicians to understand and act upon the customers’ logic for making buying decisions, always with the goal in mind to find the right circumstances for a sales offer. Concretely, firms should foster (i) transparency, (ii) training, and (iii) tracking opportunities to raise awareness of technicians’ decision biases and tackle them with a data-driven approach. While we show that service situations asymmetrically affect technicians’ selling activity and customers’ purchase decisions, most technicians will not be aware that their behavior is inefficient. Thus, reflecting on their selling activities is a good first step. The company could complement these actions with targeted training in which real-world cases are recapped and technicians are equipped to go against their intuition on making an offer. To optimize over time, the company needs to establish a functioning tracking system of sales offers and successes to arrive at ever more nuanced situational insights that help improve selling success, preferably on the individual technician level. Many companies track selling activities by service employees either anecdotally or in fragmented and complex database structures—to which our collaborating partner was no exception—such that generating timely insights is almost impossible. Tracking

these activities and especially linking a sale to a service visit across time need to be highly automated. But these endeavors are not easy given the substantial lead times prevalent in B2B. Implementing recommendation systems that indicate which products sell well in a given situation, such as “next best action” software applied in B2C contexts (Wiegand et al., 2018), could be a viable mid- to long-term goal.

Second, service technicians need to embrace their dual service–sales role to generate value for themselves and their customers (Kelley, 1992). Some technicians may feel uncomfortable selling during service encounters. However, selling in these situations can be rewarding and the success rate of selling efforts is rather high, owing to the often longstanding relationship between technicians and their customers and technicians’ ability to recognize and address customer needs. Nevertheless, many technicians, especially those with a high technical specialization and little sales knowledge, are reluctant to engage in selling activity, which leaves potential revenues on the table. To overcome this reluctance, firms should adopt monetary and non-monetary sales force incentive systems to gradually make selling part of their technicians’ DNA (Antioco et al., 2008).

To this end, managers need to find out what motivates their service force and leverage technology to address these factors. Responses could include creating support systems to make successes salient, for example, by highlighting recent deals on a dashboard, facilitating internal competition through badges and leadership boards, or simply using congratulatory e-mails. In our interviews, experts also suggested that having the technicians take psychological ownership for the operability of the equipment could be effective. In a second step, managers could segment service technicians according to their internal drive and selling abilities to allow incentive systems to be personalized to individuals (Steenburg and Ahearne 2012).

At the same time, firms need to strike a balance between incentivizing service technicians’ primary service task and secondary sales task. Some technicians might (consciously or subconsciously) neglect their service task, knowing that their sales performance could benefit as a result. Such action is not only ethically reprehensible but could also hurt long-term customer relationships. Although our collaborating companies stressed that technicians perceive themselves as problem solvers first and salespeople second, managers need to assure that service employees tasked with selling do not exploit their dual role for personal gains. Tracking and incentivizing both service and selling activities could thus be important steps to prevent unethical behavior. This way, selling by service technicians does not become a source of irritation but a vital part of the technician–customer relationship.

Finally, to make selling by service technicians more effective, B2B firms should also direct actions to the customer. Specifically, they could take measures to raise customers’

awareness of the dangers posed by machine downtimes and the importance of early prevention. We find support for our theory that customers are most likely to purchase additional equipment if downtime costs become immediately salient, such as after unsuccessful service jobs. To evoke similar feelings after successful service, firms could showcase the consequences of customer inaction, stress the benefits of taking proactive steps to head off downtime, and train technicians to explicitly point out imminent problems. Importantly, the threat of machine downtimes should not be misused to sell customers unnecessary equipment. Rather, technicians should employ their knowledge of customer processes to benefit both the supplier and the customer.

## Limitations and future research

Our study is the first to leverage a large-scale observational dataset of selling in B2B service situations. However, this dataset has several limitations that could open up directions for future research. First, while quantitatively analyzing selling through service employees has clear benefits, a better understanding of the underlying mechanisms might emerge from combining field observations with survey information from service employees and/or customers. In fact, our pre-study interviews provide an initial indication of possible reasons for the identified inefficient selling behavior of service technicians, rather than formal evidence of the underlying mechanisms. Second, our study cannot make detailed claims about why service technicians are called on for duty—the data do not include this information. We control for the machine status at arrival to proxy for repair jobs and use a selection model to account for any unobservables that could bias estimation. However, future research could distinguish between different types of service calls (e.g., maintenance, noncritical repairs, emergencies) to provide a more finegrained analysis of technicians' selling activities and success. Third, we focused on the service situation as an important driver of selling outcomes, describing the situation with two key variables that emerged from our interviews. An interesting follow-up would be investigating the negative consequences that could arise from our results. For example, does the integration of primary and secondary tasks induce service employees to perceive role conflicts or increase their cognitive load so that performance of one or both tasks suffers? Could adding sales tasks without prioritizing service tasks lead to ethical predicaments, for example, by inducing service employees to not fulfil their service task properly in the face of sales opportunities? Leveraging real-world company data to answer these and other important questions could substantially advance the still nascent literature on service-sales ambidexterity.

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**Data Availability** The data used in this study is proprietary to the companies and not permitted to be disclosed. The authors may discuss a possible release of transformed (e.g., indexed) data with the corresponding companies upon request.

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

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