

When and how information and communication technology orientation affects salespeople's role stress: the interplay of salesperson characteristics and environmental complexity

Communication
technology
orientation

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Received 30 November 2021
Revised 21 March 2022
23 May 2022
13 June 2022
20 June 2022
Accepted 21 June 2022

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Abstract

Purpose – As empirical insights into when salespeople should integrate information and communication technology (ICT) into their sales tasks are limited, the purpose of this study is to investigate the impact of salespeople's ICT orientation on role stress by considering the interplay of individual salesperson characteristics and the complexity of the selling environment, differentiating between customer and supplier complexity.

Design/methodology/approach – The authors develop an empirical framework based on the Job Demands-Resources model and previous research in the area of technology in sales. They test their hypotheses by means of a survey of 255 business-to-business salespeople which is analyzed using ordinary least squares regressions.

Findings – The results of this study show that ICT orientation generally helps salespeople to reduce role ambiguity. However, the benefits salespeople derive from ICT orientation to reduce role conflict depend on an interplay of both their job tenure and the average relationship duration with customers as well as the complexity of the selling environment.

Originality/value – This study contributes to research on the impact of technology use on salespeople by enhancing the understanding of contexts that make ICT valuable for them. In particular, the findings of this study demonstrate that the impact of ICT orientation on salespeople's role stress depends on an interplay of individual salesperson characteristics, that is, resources, and environmental complexity characteristics, that is, demands.

Keywords Digitalization, Sales management, Salesperson characteristics, Complexity, Job demands-resources model

Paper type Research paper

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This research was funded by the German Research Foundation, project number 407495880. The authors thank Helene Fäßle for her support in the data collection process of this research. They also gratefully acknowledge the constructive feedback by the guest editor and their review team.



Introduction

Business-to-Business (B2B) sales are becoming more and more digital. Already in 2015, 60% of respondents in a survey among 2,745 sales managers working in B2B companies expected that the integration of digital technologies would be critical for business success in the future (Roland Berger, 2015). In 2020, Gartner's Future of Sales report predicted that 80% of interactions between suppliers and buyers will be conducted through digital channels in 2025 (Blum, 2020). Originally, the shift toward more digital sales was motivated by the high costs associated with traveling to customers (Gessner and Scott, 2009). However, since the COVID-19 pandemic, digital sales have become indispensable, as lockdowns and travel restrictions pressured firms to communicate with their customers without in-person face-to-face interaction (Mora Cortez and Johnston, 2020). Besides this trend in selling organizations, industrial purchasers also increasingly show a preference for interacting with their vendors using digital technologies (Bharadwaj and Shipley, 2020), and two-thirds of B2B buyers gather information online before they make a purchase decision (Blum, 2020). As a result, salespeople are increasingly integrating digital information and communication technologies (ICTs) into their selling activities. Such technologies encompass "telecommunications (e.g. smartphones, wireless technology), computer systems (e.g. software, audiovisual systems), and data that enable firms to access, store, transmit, and manipulate information pertinent to their daily business operations" (Grewal *et al.*, 2015, p. 201) [1]. Seminal research on the effects of ICT use provides evidence that technology is beneficial for salespeople (Rapp *et al.*, 2012) and has a positive impact on salesperson effectiveness (Johnson and Bharadwaj, 2005). For instance, Ahearne *et al.* (2007) show that technology acceptance helps to improve abilities to approach customers and enables salespeople to present value-creating offerings to customers. Recent studies also highlight the positive impact of technology on adaptive selling, that is, an adaptation of behaviors of the salesperson to a specific selling context (Ohiomah *et al.*, 2019).

However, besides enhancements in productivity, research has shown that *ICT orientation*, defined as a salesperson's propensity and proficiency towards using ICT in their jobs (Hunter and Perreault, 2006; Limbu *et al.*, 2014), can also have negative psychological effects. In general, Johnson and Bharadwaj (2005) found that ICT shifts salespeople's roles from routine tasks to more complex work. Furthermore, a lack of in-person face-to-face interaction as occurred during the COVID-19 pandemic affects salespeople's mental health and wellbeing (Mora Cortez and Johnston, 2020). Another study has shown that inside salespeople, who orchestrate selling activities through digital channels, are more strongly affected by emotional exhaustion than outside salespeople (Rutherford *et al.*, 2014). Hence, it appears that integrating ICT is not beneficial at all times and has differential psychological effects on salespeople (Bharadwaj and Shipley, 2020).

An important consideration that B2B companies have to make before ICT is integrated into selling activities is the increasingly occurring shift from a focus on selling standardized products to selling individualized solutions (Böhm *et al.*, 2020). Such offerings combine product and service components and are aimed at solving important customer problems (Tuli *et al.*, 2007). Consequently, the selling environment becomes increasingly complex for salespeople, both within their own organization and on the side of the customer (Schmitz and Ganesan, 2014). Complexity in sales refers to "the extent to which the sales task entails large numbers and a great diversity of elements in customer and organizational task environments, which the salesperson must consider to perform his or her job tasks effectively" (Schmitz and Ganesan, 2014, p. 60). Complex sales situations that involve multiple actors cannot be easily processed using ICT because of several internal and external barriers (Rodriguez *et al.*, 2020). The potential benefits of ICT integration depend on

the stage of the sales process and the business type of a company (Wengler *et al.*, 2021), and sales organizations wanting to leverage technologies for value co-creation with their customers require the right infrastructure and analytic capabilities (Lenka *et al.*, 2017). However, “specific routines that a firm uses to [...] establish long-term relationships with customers” (Jayachandran *et al.*, 2005, p. 177) play an important role in sales processes, and technologies can have either positive or negative indirect effects on both commitment and uncertainty (Hadjikhani and Lindh, 2021). Thus, an integration of ICT into sales needs to be adapted to the complexity of the selling environment (Thaichon *et al.*, 2018).

Particularly, the impact of ICT orientation in complex selling environments on a central psychological variable, namely, salesperson role stress, requires further insights. As boundary spanners, salespeople *per se* have a stressful role associated with many different tasks (Churchill *et al.*, 1974; Schmitz and Ganesan, 2014). Thereby, role stress, operationalized using the two dimensions of role conflict and role ambiguity, may arise. Role conflict refers to the perception of seemingly incompatible demands that have to be fulfilled simultaneously, while role ambiguity describes a lack of clarity of existing demands that have to be fulfilled (Dubinsky *et al.*, 1992; Schmitz and Ganesan, 2014). Tarafdar *et al.* (2015) highlight that through increased technology use, an enhanced level of role stress may arise. Table 1 shows an overview of exemplary studies that have investigated effects of salespeople’s technology use on role stress. These studies have primarily focused on the effects of IT-related salesperson characteristics and organizational variables on role stress and considered these impacts in isolation. However, researchers have highlighted the relevance of salespeople’s individual characteristics for the use of ICT (Limbu *et al.*, 2014).

Additionally, how such individual characteristics and environmental characteristics jointly affect the benefits salespeople derive from ICT has, to the best of the authors’ knowledge, not been considered at all until today. Especially in complex selling contexts, for example, when individualized offerings are sold that are specifically tailored to customer needs, many different actors are involved in the selling process, and a vast number of different tasks has to be coordinated and fulfilled by salespeople (Schmitz and Ganesan, 2014). Increasing technology use can be harmful in this context, as salespeople feel the need to fulfill all these tasks much quicker, which contributes to their perceived level of stress (Alavi and Habel, 2021).

Authors	Focal variable	Salesperson characteristics		Environmental characteristics		Role stress
		General	IT-related	Organizational	Customer	
Delpechitre <i>et al.</i> (2019)	Information technology overload	✓ (controls)	✓			✓
Guenzi and Nijssen (2021)	Digital transformation initiatives	✓ (controls)	✓	✓		(✓)
Rangarajan <i>et al.</i> (2005)	Task complexity associated with sales force automation technology		✓			✓
Román <i>et al.</i> (2018)	Mobile technology use	✓ (controls)	✓			✓
Speier and Venkatesh (2002)	Perceptions of sales force automation implementation	✓	✓	✓		✓
This paper	Information and Communication Technology Orientation	✓		✓	✓	✓

Table 1.
Overview of exemplary studies investigating the impact of information and communication technology on role stress

This paper aims to investigate the following research question: How does salespeople’s ICT orientation affect their level of role stress, depending on specific salesperson characteristics and the complexity of the selling environment? Building on the Job Demands-Resources model (Bakker and Demerouti, 2007), we develop a conceptual framework to investigate the impact of ICT orientation on role conflict and role ambiguity, depending on several central salesperson characteristics and the complexity of the selling environment. Our findings show that while ICT orientation generally enables salespeople to reduce role ambiguity, the impact of ICT orientation on role conflict requires a more nuanced view. Particularly, salespeople with longer tenure can reduce role conflict in high levels of supplier complexity through enhanced ICT orientation, while salespeople with a longer average relationship duration with customers can reduce role conflict in an environment with high levels of customer complexity when leveraging ICT. Our study answers calls for more research on when salespeople should integrate ICT to improve their personal selling efforts (Singh et al., 2019) by shedding light on when and how ICT orientation is able to reduce salespeople’s role stress, allowing sales organizations to allocate sales tasks and technology use accordingly. Furthermore, our article opens up interesting avenues for further research on the impact of ICT on salespeople in increasingly complex selling environments, such as when providing value-creating offerings to customers.

Theoretical background and development of conceptual framework

To investigate our research question, we draw upon the Job Demands-Resources (JD-R) model and extant literature on the impact of ICT orientation on salespeople to derive hypotheses and build a conceptual framework, which is illustrated in Figure 1.

The JD-R model serves as a helpful theoretical lens to investigate the impact of ICT orientation on salespeople’s role stress depending on their individual characteristics and the complexity of their environment. It is based on the effort-reward imbalance model by Siegrist (1996) and the demand-control model by Karasek (1979), which both build on the assumption that job demands lead to job stress. Demands affecting employees’ wellbeing can be physical and psychological in nature, but they also include emotional demands and social support (Halbesleben and Buckley, 2004). The effort-reward imbalance model and the

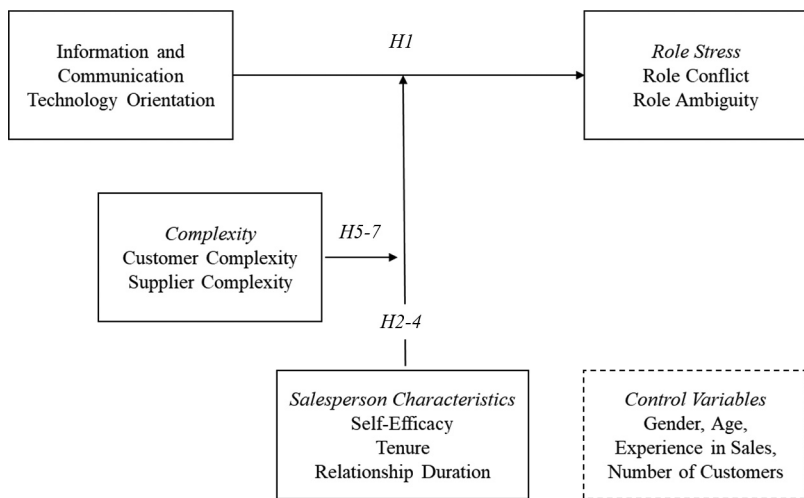


Figure 1.
Conceptual
framework

demand-control model only focus on negative aspects of employees' wellbeing, while the JD-R model also includes aspects that positively affect wellbeing, that is, job resources. Therefore, the JD-R model can be applied to a variety of different occupations, and it is particularly helpful to investigate the impact of ICT on salespeople, as such technologies serve as helpful tools, that is, resources, but in certain contexts, they can also enhance perceived demands (Bakker and Demerouti, 2007).

The basic assumption within the JD-R model is that job demands and job resources are both associated with job stress. Such resources and demands refer to physical, psychological, social or organizational aspects of a job. On the one hand, job demands require effort and skills from the salesperson and are, therefore, associated with psychological or physical costs, for example, through high work pressure or, in the worst case, burnout. On the other hand, job resources help to reduce these costs and lead to personal growth and higher achievement (Bakker and Demerouti, 2007; Halbesleben and Buckley, 2004).

Overall, the JD-R model predicts that job demands lead to emotional exhaustion and job stress, and a lack of resources may lead to disengagement from work, while the availability of job resources increases satisfaction and decreases the impact of job demands on job stress. When job demands are too high and the resources available are insufficient to fulfill these demands, employees feel stress and are less motivated. On the contrary, when resources are sufficient, employees are more motivated and engaged in their work activities (Bakker and Demerouti, 2007). In this paper, we focus on personal resources. Such resources are particularly relevant in a sales context, as salespeople draw upon resources taken from their inner self when fulfilling demands that are part of their work (Peasley *et al.*, 2020).

ICTs provide valuable resources for salespeople to structure their workload, organize their tasks and communicate efficiently with coworkers and customers (Hunter and Perreault, 2007). Eggert and Serdaroglu (2011) show that ICT is helpful for both internal administrative tasks and customer relationship management. Furthermore, salespeople often report that technology helps them to be more productive and efficient, to save time and to improve communication with customers. Similarly, Ogilvie *et al.* (2018) demonstrate that salespeople's communication and adaptability increase through modern ICT such as social media. Thus, salespeople with more pronounced ICT orientation, that is, a higher propensity and proficiency toward using ICT in their jobs (Hunter and Perreault, 2006; Limbu *et al.*, 2014), are likely to perceive less role stress, characterized by the two dimensions role conflict and role ambiguity. Role conflict refers to the perception of seemingly incompatible demands that have to be fulfilled simultaneously (Dubinsky *et al.*, 1992; Schmitz and Ganesan, 2014). This perception is likely to be reduced through ICT orientation as salespeople improve their coordination and communication skills when they use ICT to a larger extent; hence, they can orchestrate tasks and assign resources more easily. Role ambiguity, which refers to a lack of clarity of existing demands that have to be fulfilled (Dubinsky *et al.*, 1992; Schmitz and Ganesan, 2014), is likely to be reduced by enhanced ICT orientation as well. This is because information is widely available for salespeople making use of digital technologies, which equips them with the relevant knowledge to fulfill their tasks in line with their customers' and managers' expectations. Hence, we propose the following hypothesis:

- H1.* Information and communication technology orientation reduces salespeople's role stress, in particular i) role conflict and ii) role ambiguity.

The reducing impact of ICT orientation on salespeople's role stress may be stronger depending on the availability of additional personal resources to salespeople. In our

conceptual framework, we consider three different general salesperson characteristics as such resources, namely, self-efficacy, tenure and average relationship duration with customers.

Sales self-efficacy describes a salesperson's belief in her/his ability to perform sales-related tasks, for example, making customer calls and understanding customer needs (Hu *et al.*, 2007; Schmitz and Ganesan, 2014). Self-efficacious salespeople can "understand, prioritize, and articulate customer expectations" (Schmitz and Ganesan, 2014, p. 64) more easily within their organization than their less self-efficacious counterparts. This implies that self-efficacious salespeople are more capable of evaluating which tasks have to be fulfilled urgently, and they trust their personal experience to assess which technology to use to resolve conflicting demands more quickly (Delpechitre *et al.*, 2019). Furthermore, these salespeople also believe in their personal ability to have access to relevant information via ICT for their sales activities. Hence, for self-efficacious salespeople, the impact of ICT orientation on role stress is likely to be stronger or put differently:

- H2.* Salespeople's self-efficacy reinforces the negative effect of information and communication technology orientation on i) role conflict as well as ii) role ambiguity.

Salespeople with longer job tenure have more experience and are, therefore, more knowledgeable and informed compared to salespeople with shorter job tenure (Weitz *et al.*, 1986; Habel *et al.*, 2021). They know a supplier company's offerings, internal processes and markets served well and can, thus, easily decide which offerings are suited for customers and know how to process orders internally, which constitutes valuable human capital to deal with conflicting and ambiguous tasks (Böhm *et al.*, 2020). With longer job tenure, salespeople are, therefore, likely to be better able to prioritize tasks and process them using ICT, which results in a reduction of the perception of conflicting tasks to fulfill (Spiro and Weitz, 1990). Additionally, they might be more familiar with existing technologies and, hence, know how to get access to the relevant information or process data so that demands can be fulfilled quickly and ambiguities regarding demands can be resolved. Hence, we propose the following relationship:

- H3.* Salespeople's job tenure reinforces the negative effect of information and communication technology orientation on i) role conflict as well as ii) role ambiguity.

As a third important salesperson characteristic, we consider the knowledge base of customers because of the long-term relationships a salesperson has built up with customers. Salespeople who have been working with their customers for a longer time know about their organizations and associated processes better and can, thus, identify needs and requirements more easily (Restuccia and Legoux, 2019). When salespeople use ICT for their selling activities, their knowledge base of customers provides a valuable resource, as it enables them to build on experience when deciding which tasks to fulfill first and to access relevant, customer-specific information in the firm via digital technologies more easily (Böhm *et al.*, 2020). Thereby, role conflict and role ambiguity can be reduced more strongly, or stated formally:

- H4.* Salespeople's average customer relationship duration reinforces the negative effect of information and communication technology orientation on i) role conflict as well as ii) role ambiguity.

With enhanced complexity of the selling context, that is, sales tasks entailing large numbers and a great diversity of elements in customer and organizational task environments, the

positive moderating effects of the individual salesperson characteristics, that is, resources, on the impact of ICT orientation on role stress are likely to be less pronounced. In complex sales contexts, many different elements must be taken into consideration (Campbell, 1988). Schmitz and Ganesan (2014) differentiate between customer complexity and supplier (or organizational) complexity.

Customer complexity captures the diverse needs and personnel involved in the task to be performed on the customer side. The increasing demands arising from a multitude of actors involved in the selling process in high levels of customer complexity, for example, when providing individualized offerings such as solutions that aim at improving customers' processes (Tuli *et al.*, 2007; Macdonald *et al.*, 2016), cannot be fully captured by ICT orientation. In such instances, salespeople need to collaborate with several stakeholders who are involved in the implementation and use of the solution and acquire detailed information to understand customer requirements and complete the sale successfully. Thus, salespeople's demands go beyond the support provided by ICT-related and additional personal individual resources taken from their inner self. Consequently, salespeople feel enhanced role stress because they are unclear about which task to fulfill first, and it takes more time and effort to gather the required information to know what is expected to fulfill tasks satisfactorily. The resources available to salespeople can only facilitate the lowering of some part of role stress, as supplier and customer complexity cannot be completely evened out by ICT and personal resources, constituted by self-efficacy, job tenure and long-term relationships with customers.

Supplier complexity, on the other hand, refers to the internal complexity within a supplier's organization, which results from diverse people and policies with which salespeople must interact to perform their tasks. When supplier complexity is high, salespeople need to be in touch with several business units and associated contact persons to get their job done. In such instances, salespeople again might feel enhanced role stress because of a lack of clarity on which task to fulfill first, and they require more time and effort to gather relevant information to meet their sales targets. The resources available to salespeople, that is, ICT and personal resources constituted by self-efficacy, job tenure and long-term customer relationships, do not enable them to lower role stress as strongly compared to lower levels of supplier complexity. Therefore, we propose:

- H5a.* Customer complexity attenuates the reinforcing effect of salespeople's self-efficacy on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.
- H5b.* Supplier complexity attenuates the reinforcing effect of salespeople's self-efficacy on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.
- H6a.* Customer complexity attenuates the reinforcing effect of salespeople's job tenure on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.
- H6b.* Supplier complexity attenuates the reinforcing effect of salespeople's job tenure on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.
- H7a.* Customer complexity attenuates the reinforcing effect of salespeople's customer-relationship duration on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.

- H7b.* Supplier complexity attenuates the reinforcing effect of salespeople's customer-relationship duration on the relationship between information and communication technology orientation and i) role conflict as well as ii) role ambiguity.

Methodology

Data collection and sample

To empirically investigate our conceptual framework, we collected survey-based data from B2B salespeople using an online survey in September and October 2021. The survey was distributed on the social business network LinkedIn. The authors of this paper posted the survey on their LinkedIn page as well as in several specialized sales groups on LinkedIn. This approach resulted in a sample of 111 completed questionnaires. However, 20 respondents indicated that they did not work in sales at all or worked in business-to-consumer-sales settings, which is not the focus of our investigation, and were, thus, excluded from the analysis. To expand this data set, we collected further data by means of a panel provided by a large market research agency. The agency invited B2B salespeople to participate in the survey based on their status of employment, which yielded 164 completed questionnaires. We compared whether the two data sets differ from each other using multigroup analysis in SmartPLS3 (Ringle *et al.*, 2015), in which all relationships of the conceptual model are assessed for two groups and differences between the two groups can be revealed (Sarstedt *et al.*, 2011). The multigroup analysis showed no significant differences between the two samples. Thus, we pool the data from these two sources, which results in a final sample of 255 responses. The sample comprises experienced salespeople with an average age of 43 years and 17 years of sales experience. Of the participants, 62% indicated that they are male. An overview of the sample can be found in Table 2.

To measure the constructs included in our framework, we used established scales and slightly adapted them to fit the context of our study. Table 3 provides an overview of the measures and their associated items. We conducted a confirmatory factor analysis to assess the measurement model, which resulted in the deletion of a few items. The final confirmatory factor analysis produced acceptable fit statistics ($\chi^2 = 232.394$; $df = 137$; $p < 0.001$; comparative fit index = 0.944; and root mean square error of approximation = 0.052), supporting the predicted measurement structure. We assessed Cronbach's alpha and composite reliability (CR), as well as convergent validity using the average variance extracted (AVE). All alpha and CR values lie above 0.7 and below 0.9, and the AVE exceeds the critical threshold of 0.5, except in the cases of supplier complexity and role conflict, which are close to but slightly below 0.5 (Table 4). However, as both constructs show CR and alpha values above 0.7, their convergent validities are still considered as acceptable (Fornell and Larcker, 1981). To assess discriminant validity, we evaluated Fornell and Larcker's criterion (Fornell and Larcker, 1981). As for all constructs, the square root of the AVE exceeded the constructs' correlation with other constructs; discriminant validity is supported (Table 5).

To ensure correct model estimation, we included four control variables in our model, which are in line with recent research on the impact of technology on salespeople: age, gender, experience in sales and the number of customers managed by a salesperson. Guenzi and Nijssen (2021) argue that gender and age generally impact whether salespeople are open to technology use, while experience and the number of customers managed affect the extent to which salespeople benefit from technology use in their selling activities.

Age	Minimum = 21 years Maximum = 68 years Mean = 43 years	
Gender	Male = 158 Female = 95 Other = 2	
Selling experience	Minimum = 0 years Maximum = 45 years Mean = 17	
Industry	Manufacturing and Mechanical Engineering	57
	B2B-Trade and Distribution	47
	Transport and Logistics	23
	IT and Software	22
	Financial Services	18
	Telecommunication, Internet, and Media	17
	Chemistry and Raw Materials	15
	Automotive	10
	Construction	10
	FMCG	8
	Energy and Supply	7
	Pharma and Healthcare	6
	Consultancy	4
	other	11
Number of employees	1–9	13
	10–49	42
	50–250	51
	250–499	37
	500–999	20
	1,000–2,499	9
	2,500–4,999	13
	5,000–9,999	14
	10,000 or more	56
Annual revenue in EUR	Less than 50,000	6
	50,000–250,000	12
	250,000–1m	14
	1–2m	18
	2–5m	20
	5–10m	18
	10–25m	28
	25–50m	18
	50–100m	10
	100–500m	37
	500m–1bn	8
	more than 1bn	66

Table 2.
Sample descriptive

Common method bias. As we use the same source of data to measure all variables included in our framework, common method bias, which refers to “variance that is attributable to the measurement method rather than the constructs the measures represent” (Podsakoff *et al.*, 2003, p. 879), might be a concern. However, we used several remedies *ex ante* to limit the possibility of common method bias harming the integrity of our findings. For instance, we guaranteed anonymity and confidentiality of responses, ensured respondents that there are no right or wrong answers and proximally separated the independent and dependent variables by including them in different parts of the questionnaire (Böhm *et al.*, 2020).

Construct	Items (factor loadings)	Source
Information and communication technology (ICT) orientation	<ul style="list-style-type: none"> I extensively use ICTs to perform my job (0.845) I try to link different ICTs so that they work together well (0.727) Compared to other salespeople, I am technology oriented (0.654) 	Limbu <i>et al.</i> (2014), based on Hunter and Perreault (2006)
Self-efficacy	<ul style="list-style-type: none"> I am good at selling (0.736) It is not difficult for me to put pressure on a customer (*) I know the right thing to do in selling situations (0.724) I find it easy to convince a customer who has a different viewpoint than mine (0.717) It is easy for me to get customers to join my point of view (0.798) 	Schmitz and Ganesan (2014), based on Sujian <i>et al.</i> (1994)
Customer complexity	<ul style="list-style-type: none"> Customer needs are complex and diverse (*) Many different customer personnel are involved in the purchase process (0.740) The customers' buying process involves executives from many different departments (0.769) Our customers require customized products and services (*) Each customer wants to be treated as a unique entity (*) 	Schmitz and Ganesan (2014)
Supplier complexity	<ul style="list-style-type: none"> Internally, there are many different contact people (0.612) Often, I do not clearly know who is responsible for various decisions (0.642) In general, individual business areas operate very differently (0.784) Different ways of action of my headquarters make sales processes complicated (0.753) 	Schmitz and Ganesan (2014)
Role conflict	<ul style="list-style-type: none"> I receive incompatible requests from two or more people (0.575) I receive assignments without the manpower to complete it (0.718) 	Schmitz and Ganesan (2014), based on Singh <i>et al.</i> (1996)

Table 3.
Measurements and loadings

(continued)

Construct	Items (factor loadings)	Source
	<ul style="list-style-type: none"> I work with two or more departments who operate quite differently (*) I receive assignments without adequate resources and material to execute it (0.794) 	
Role ambiguity	<ul style="list-style-type: none"> Clear, planned goals and objectives exist for my job (reverse coded [R]) (0.718) I know exactly what is expected of me (R) (0.792) I know how my performance is going to be evaluated (R) (0.790) 	Schmitz and Ganesan (2014), based on Singh <i>et al.</i> (1996)
Tenure	<ul style="list-style-type: none"> How many years have you been working in your current firm? ____ Years 	Autry <i>et al.</i> (2013)
Relationship duration	<ul style="list-style-type: none"> For how long have you been working with your customers on average? ____ Years 	Alavi <i>et al.</i> (2016)
Number of customers	<ul style="list-style-type: none"> How many customers are you currently serving simultaneously? 	Guenzi and Nijssen (2021)
Sales experience	<ul style="list-style-type: none"> How many years of experience in sales do you have? ____ Years 	Autry <i>et al.</i> (2013)

Notes: Unless indicated otherwise, participants were asked to indicate their agreement to the statements on seven-point Likert scales anchored at strongly disagree (1) and strongly agree (7). * = Item deleted because of low factor loading

Table 3.

	Cronbach's alpha	CR	AVE	Mean	SD
ICT orientation	0.799	0.788	0.557	5.387	1.206
Self-efficacy	0.831	0.832	0.554	5.319	0.935
Customer complexity	0.723	0.726	0.569	4.600	1.537
Supplier complexity	0.787	0.793	0.492	4.447	1.394
Role conflict	0.735	0.741	0.492	3.867	1.444
Role ambiguity	0.810	0.811	0.589	2.522	1.208

Notes: CR = composite reliability, AVE = average variance extracted, SD = standard deviation; ICT = information and communication technology

Table 4.
Reliability and
validity of constructs

Furthermore, we ascertained the comprehensibility of the scale items in a pre-test to further reduce common method bias concerns (Podsakoff *et al.*, 2003). As a statistical remedy ex post, we inspected the smallest correlation between core constructs of our study, which serves as a proxy for common method bias (Guenzi and Nijssen, 2021). The smallest

correlation observed in our data is not significantly different from 0 (0.056, between self-efficacy and supplier complexity; Table 5). Finally, interaction terms, which are a main part of our analysis, are far less affected by common method biases (Vomberg *et al.*, 2020). Hence, we are confident that common method bias is not a critical concern for our study.

Data analysis and results. To test our hypotheses, we estimated two ordinary least squares regressions, one with the dependent variable being role conflict and the other with the dependent variable being role ambiguity. We included the salesperson characteristics and the two dimensions of complexity that are part of our model. Furthermore, we included the control variables age, gender, experience and number of customers. We estimated the two models in three different steps; in the first step, only direct effects were included in the model (Table 6); in the second step, we added two-way interactions (Table 7); and in the final step, we estimated full models including three-way interactions (Table 8). The variables were not mean-centered for the calculation of interaction effects. When reporting the results, we refer to the models including only direct effects when testing the hypothesized direct effects, while we refer to the models including the two- and three-way interactions when testing the hypotheses pertaining to these effects [2]. The adjusted R^2 values increase with the addition of the interaction effects. The adjusted R^2 values of the full models indicate that both models explain a substantial amount of variance of role conflict (32.8%) and role ambiguity (19.5%). Table 9 provides an overview of our results with regard to our hypotheses.

Table 5.
Fornell and Larcker's
criterion of
discriminant validity

	1	2	3	4	5	6
1. ICT orientation	<i>0.746</i>					
2. Self-efficacy	0.338	<i>0.744</i>				
3. Customer complexity	0.323	0.153	<i>0.755</i>			
4. Supplier complexity	0.124	0.056	0.470	<i>0.701</i>		
5. Role conflict	0.114	0.100	0.413	0.654	<i>0.702</i>	
6. Role ambiguity	-0.295	-0.356	-0.076	0.214	0.354	<i>0.767</i>

Notes: ICT = information and communication technology. Italics values on diagonal represent the square root of the AVE, off-diagonal values represent correlations

Table 6.
Results of ordinary
least squares
regressions (direct
effects only)

	Role conflict			Role ambiguity		
	Coefficient	<i>t</i> -value	<i>p</i> -value	Coefficient	<i>t</i> -value	<i>p</i> -value
<i>ICT orientation (ICTO)</i>	0.042	0.708	0.480	<i>-0.142</i>	<i>-2.201</i>	<i>0.029</i>
Customer complexity (CC)	0.145	2.414	0.017	-0.085	-1.322	0.187
Supplier complexity (SC)	0.434	7.314	0.000	0.203	3.171	0.002
Self-efficacy	0.039	0.663	0.508	-0.228	-3.623	0.000
Tenure	-0.047	-0.688	0.492	-0.120	-1.639	0.102
Relationship duration	0.140	2.034	0.043	0.138	1.868	0.063
Number of customers	-0.064	-1.157	0.248	-0.030	-0.499	0.618
Experience	0.085	0.927	0.355	0.032	0.328	0.743
Age	-0.152	-1.876	0.062	-0.155	-1.787	0.075
Gender	0.003	0.056	0.955	0.005	0.081	0.935

Notes: Adjusted R^2 s: Role conflict = 0.266 and Role ambiguity = 0.149. Values in italics highlight significant effect pertaining to *H1*

	Role conflict			Role ambiguity		
	Coefficient	t-value	p-value	Coefficient	t-value	p-value
ICT orientation (ICTO)	0.282	0.808	0.420	0.189	0.506	0.614
Customer complexity (CC)	0.173	0.413	0.680	0.446	0.996	0.320
Supplier complexity (SC)	-0.229	-0.552	0.581	-1.009	-2.269	0.024
Self-efficacy	0.098	0.367	0.714	-0.220	-0.770	0.442
Tenure	-0.154	-0.432	0.666	-0.183	-0.478	0.633
Relationship duration	0.036	0.132	0.895	-0.340	-1.171	0.243
ICTO × self-efficacy	-0.553	-1.186	0.237	-0.630	-1.262	0.208
CC × self-efficacy	-0.636	-1.410	0.160	-0.445	-0.921	0.358
SC × self-efficacy	1.101	2.646	0.009	1.163	2.609	0.010
ICTO × tenure	0.129	0.328	0.743	-0.150	-0.355	0.723
CC × tenure	0.307	1.178	0.240	-0.085	-0.303	0.762
SC × tenure	-0.322	-1.399	0.163	0.308	1.246	0.214
ICTO × relationship duration	0.017	0.053	0.958	0.650	1.930	0.055
CC × relationship duration	0.203	0.746	0.456	-0.293	-1.006	0.316
SC × relationship duration	-0.111	-0.463	0.644	0.127	0.493	0.622
ICTO × CC	0.454	1.220	0.224	-0.057	-0.142	0.887
ICTO × SC	-0.184	-0.519	0.604	0.079	0.210	0.834
Number of customers	-0.072	-1.299	0.195	-0.017	-0.290	0.772
Experience	0.095	1.035	0.302	0.062	0.623	0.534
Age	-0.142	-1.699	0.091	-0.206	-2.305	0.022
Gender	0.022	0.384	0.701	0.035	0.565	0.572

Notes: Adjusted R^2 s: Role conflict = 0.276 and Role ambiguity = 0.168

Table 7.
Results of ordinary
least squares
regressions (two-way
interactions only)

We start by describing the findings for the first part of the hypotheses that relate to the role stress dimension of role *conflict*. Our regression analysis reveals that ICT orientation has no significant direct effect on role conflict ($\beta = 0.042$ and $p > 0.10$). Hence, we do not find that enhanced ICT orientation leads to a reduction of role conflict, meaning that $H1(i)$ cannot be confirmed.

In $H2-H4$, we hypothesized positive moderating effects of the salesperson characteristics of self-efficacy, tenure and relationship duration on the relationship between ICT orientation and role stress. However, our regression results are not able to support these hypothesized effects. For the salesperson characteristics self-efficacy, tenure and relationship duration, we find no significant direct effects on role conflict ($\beta_{Self-Efficacy} = 0.098$ and $p > 0.10$; $\beta_{Tenure} = -0.154$ and $p > 0.10$; and $\beta_{Relationship\ Duration} = 0.036$ and $p > 0.10$). In addition, none of the three variables moderates the impact of ICT orientation on role conflict ($\beta_{ICTO \times Self-Efficacy} = -0.553$ and $p > 0.10$; $\beta_{ICTO \times Tenure} = 0.129$ and $p > 0.10$; and $\beta_{ICTO \times Relationship\ Duration} = 0.017$ and $p > 0.10$). Hence, we do not find support for $H2(i)$, $H3(i)$ and $H4(i)$. In other words, the impact of ICT orientation on role conflict is not dependent on the level of the three salesperson characteristics self-efficacy, tenure and relationship duration.

However, our analysis reveals that while ICT orientation does not directly affect perceptions of role conflict, whether ICT orientation affects role conflict seems to depend on an interplay of the individual salesperson characteristics tenure and relationship duration and the two complexity dimensions of customer and supplier complexity. In total, we find four significant three-way interactions. The effects of relationship duration and tenure on the association between ICT orientation and role conflict are both moderated by customer complexity and supplier complexity. For self-efficacy, however, we do not find a three-way interaction effect, such that $H5a(i)$ and $H5b(i)$ cannot be confirmed.

	Role conflict			Role ambiguity		
	Coefficient	<i>t</i> -value	<i>p</i> -value	Coefficient	<i>t</i> -value	<i>p</i> -value
ICT orientation (ICTO)	0.772	0.895	0.371	-1.582	-1.677	0.095
Customer complexity (CC)	0.297	0.172	0.863	-1.956	-1.038	0.300
Supplier complexity (SC)	0.385	0.288	0.774	-1.149	-0.785	0.434
Self-efficacy	0.720	1.139	0.256	-1.614	-2.333	0.021
Tenure	-0.802	-0.675	0.500	-0.868	-0.668	0.505
Relationship duration	-0.104	-0.156	0.876	1.396	1.909	0.057
ICTO × self-efficacy	-1.565	-1.257	0.210	2.285	1.677	0.095
CC × self-efficacy	-0.478	-0.223	0.824	3.115	1.326	0.186
SC × self-efficacy	-0.396	-0.247	0.805	1.176	0.671	0.503
ICTO × tenure	0.830	0.666	0.506	0.753	0.552	0.582
CC × tenure	-4.396	-3.014	0.003	-0.397	-0.249	0.804
SC × tenure	4.431	3.287	0.001	1.699	1.151	0.251
ICTO × relationship duration	0.126	0.163	0.871	-1.370	-1.615	0.108
CC × relationship duration	4.302	4.093	0.000	-1.624	-1.412	0.159
SC × relationship duration	-3.458	-3.849	0.000	-0.755	-0.768	0.443
ICTO × CC	0.556	0.239	0.812	3.311	1.297	0.196
ICTO × SC	-1.086	-0.595	0.552	0.559	0.280	0.780
ICTO × CC × self-efficacy	-0.442	-0.158	0.875	-4.777	-1.562	0.120
ICTO × SC × self-efficacy	1.946	0.934	0.351	-0.434	-0.190	0.849
<i>ICTO × CC × tenure</i>	<i>4.674</i>	<i>3.201</i>	<i>0.002</i>	<i>0.265</i>	<i>0.166</i>	0.868
<i>ICTO × SC × tenure</i>	<i>-4.690</i>	<i>-3.552</i>	<i>0.000</i>	<i>-1.543</i>	<i>-1.068</i>	0.287
<i>ICTO × CC × relationship duration</i>	<i>-3.920</i>	<i>-3.902</i>	<i>0.000</i>	<i>1.399</i>	<i>1.272</i>	0.205
<i>ICTO × SC × relationship duration</i>	<i>3.026</i>	<i>3.455</i>	<i>0.001</i>	<i>1.156</i>	<i>1.207</i>	0.229
Number of customers	-0.058	-1.083	0.280	-0.011	-0.182	0.856
Experience	0.032	0.342	0.732	0.038	0.373	0.709
Age	-0.091	-1.112	0.268	-0.189	-2.117	0.035
Gender	-0.015	-0.259	0.796	0.046	0.737	0.462

Table 8.
Results of ordinary
least squares
regressions (full
models)

Notes: Adjusted R^2 s: Role conflict = 0.328 and Role ambiguity = 0.195. Values in italics highlight significant effects pertaining to our hypotheses

We begin by assessing the three-way interaction between ICT orientation, customer complexity and tenure ($\beta = 4.674$ and $p < 0.01$). [Figure 2](#) shows the simple slopes of ICT orientation at low (one standard deviation below mean), medium (mean) and high (one standard deviation above mean) levels of customer complexity and different levels of tenure. We see that for shorter tenure, ICT orientation weakly reinforces perceived role conflict for all levels of customer complexity. However, for longer tenure, levels of role conflict are similar for low levels of ICT orientation, but as ICT orientation increases, role conflict is enhanced, and this effect is stronger for higher levels of customer complexity. Therefore, we can confirm *H6a(i)*.

Next, we analyze the three-way interaction between ICT orientation, supplier complexity and tenure, illustrated in [Figure 3](#) ($\beta = -4.690$ and $p < 0.01$). Interestingly, for salespeople with shorter tenure, ICT orientation helps to combat role conflict at high levels of supplier complexity but enhances role conflict at low levels of supplier complexity. For salespeople with longer tenure, we observe that increased ICT orientation reduces role conflict, particularly for high levels of supplier complexity. Thus, we observe an effect opposing to what was hypothesized in *H6b(i)*.

The three-way interaction between ICT orientation, customer complexity and relationship duration is displayed in [Figure 4](#) ($\beta = -3.920$ and $p < 0.01$). For salespeople

Hypothesis	Salesperson characteristic	Complexity dimension	Role stress dimension	Effect observed?
H1(i)			Role conflict	n.s.
H1(ii)			Role ambiguity	✓
H2(i)	Self-efficacy		Role conflict	n.s.
H2(ii)	Self-efficacy		Role ambiguity	n.s.
H3(i)	Tenure		Role conflict	n.s.
H3(ii)	Tenure		Role ambiguity	n.s.
H4(i)	Relationship duration		Role conflict	n.s.
H4(ii)	Relationship duration		Role ambiguity	n.s.
H5a(i)	Self-efficacy	Customer complexity	Role conflict	n.s.
H5b(i)	Self-efficacy	Supplier complexity	Role conflict	n.s.
H6a(i)	Tenure	Customer complexity	Role conflict	✓
H6b(i)	Tenure	Supplier complexity	Role conflict	✓ (opposing)
H7a(i)	Relationship duration	Customer complexity	Role conflict	✓ (opposing)
H7b(i)	Relationship duration	Supplier complexity	Role conflict	✓
H5a(ii)	Self-efficacy	Customer complexity	Role ambiguity	n.s.
H5b(ii)	Self-efficacy	Supplier complexity	Role ambiguity	n.s.
H6a(ii)	Tenure	Customer complexity	Role ambiguity	n.s.
H6b(ii)	Tenure	Supplier complexity	Role ambiguity	n.s.
H7a(ii)	Relationship duration	Customer complexity	Role ambiguity	n.s.
H7b(ii)	Relationship duration	Supplier complexity	Role ambiguity	n.s.

Note: n.s. = non-significant

Table 9.
Results of hypothesis testing of the impact of information and communication technology orientation on role stress

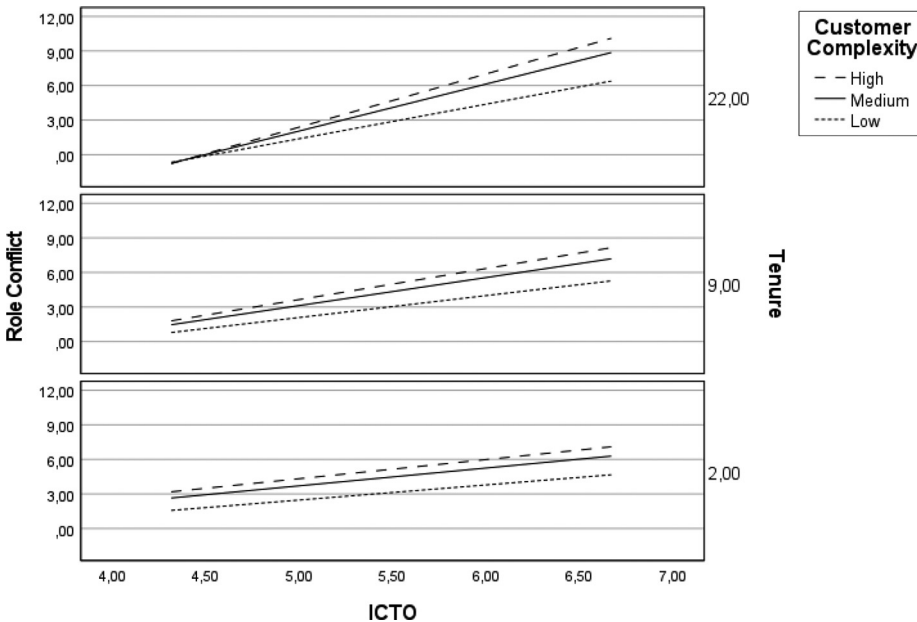


Figure 2.
Impact of the three-way interaction between information and communication technology orientation, customer complexity and tenure on role conflict

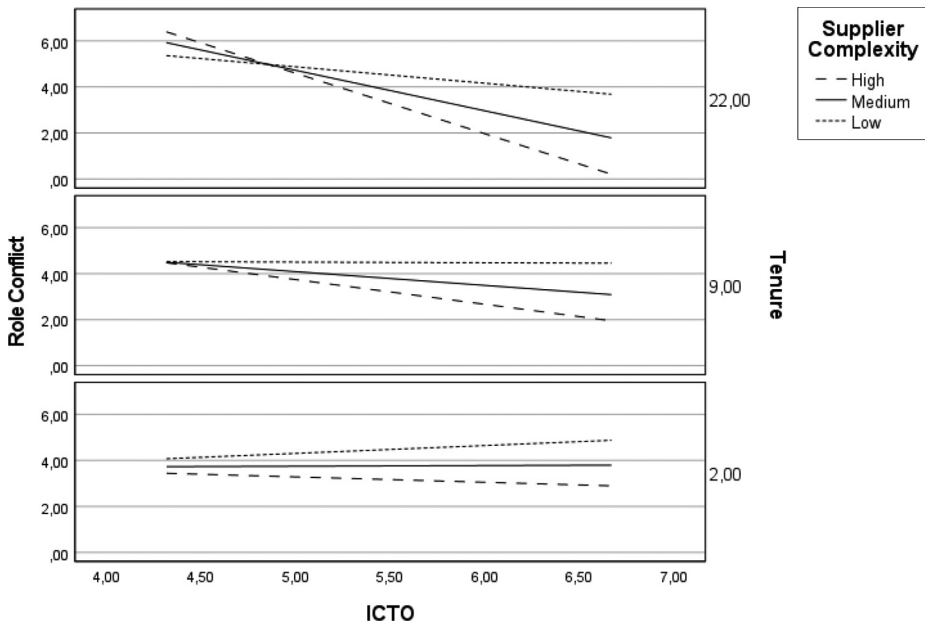


Figure 3.
Impact of the three-way interaction between information and communication technology orientation, supplier complexity and tenure on role conflict

with a low to medium average relationship duration with their customers, ICT orientation reinforces role conflict for all levels of customer complexity. For salespeople with an above-average relationship duration with their customers, ICT orientation reduces role conflict for high levels of customer complexity, thus again showing an effect opposing to what was hypothesized in *H7a(i)*.

Finally, the three-way interaction between ICT orientation, supplier complexity and relationship duration is investigated ($\beta = 3.026$ and $p < 0.01$; Figure 5). We see that for salespeople that have a shorter average relationship duration with their customers, ICT orientation reinforces role conflict at all levels of supplier complexity. For salespeople with a longer average relationship duration with their customers, ICT orientation enhances role conflict for all levels of supplier complexity, even more strongly than in the case of shorter average relationship duration, which is in line with *H7b(i)*.

Next, we assess the regression model for role ambiguity to test the second part of our hypotheses. Supporting *H1(ii)*, we find that ICT orientation has a significant negative effect on role ambiguity ($\beta = -0.142$ and $p < 0.05$). While we were not able to confirm that ICT orientation is helpful to reduce role conflict, role ambiguity is significantly reduced by ICT orientation.

In *H2(ii)*, *H3(ii)* and *H4(ii)*, we hypothesized moderating effects of the salesperson characteristics self-efficacy, tenure and relationship duration for the impact of ICT orientation on role ambiguity. For all three salesperson characteristics, we find no significant moderation effects ($\beta_{ICTO \times Self-Efficacy} = -0.630$ and $p > 0.10$; $\beta_{ICTO \times Tenure} = -0.150$ and $p > 0.10$; and $\beta_{ICTO \times Relationship\ Duration} = 0.650$ and $p > 0.05$). Hence, we do not find support for *H2(ii)*, *H3(ii)* and *H4(ii)*; the impact of ICT orientation on role ambiguity does not depend on the three salesperson characteristics considered in our model, namely, self-efficacy, tenure and relationship duration.

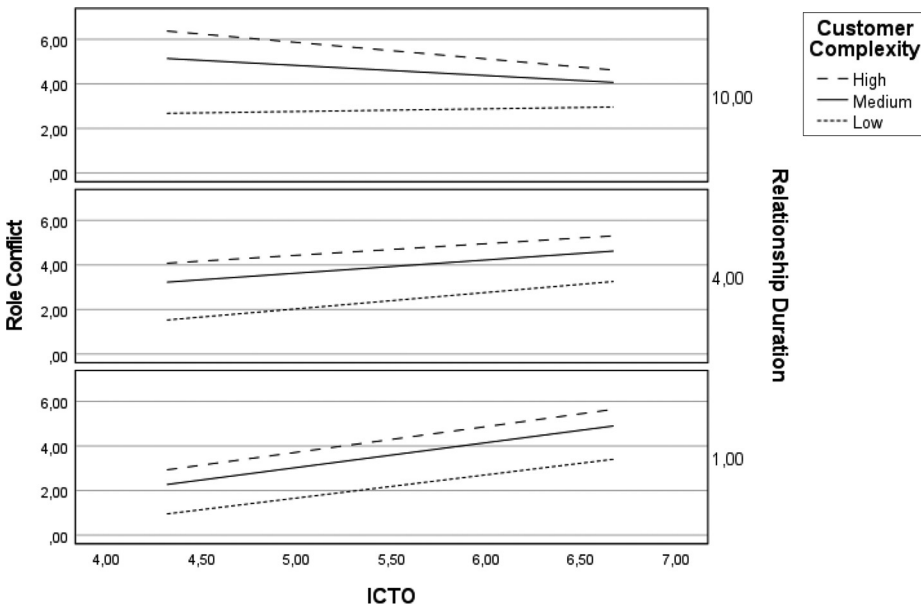


Figure 4. Impact of the three-way interaction between information and communication technology orientation, customer complexity and relationship duration on role conflict

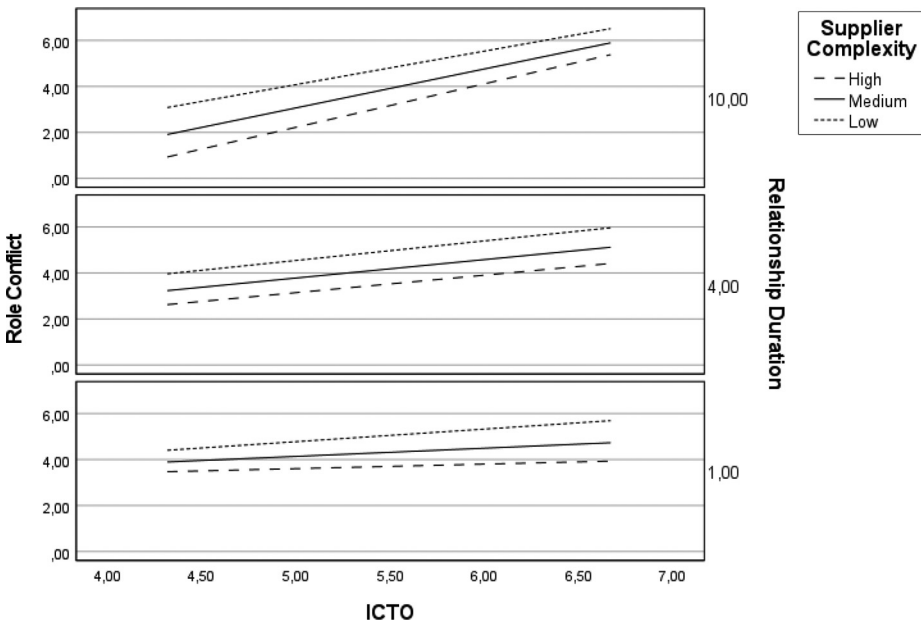


Figure 5. Impact of the three-way interaction between information and communication technology orientation, supplier complexity and relationship duration on role conflict

Contrary to our findings for role conflict, we do not find that the three-way interactions between ICT orientation, the three salesperson characteristics considered and the two complexity dimensions affect role ambiguity differentially. Thus, we find no support for *H5a(ii)/b(ii)*, *H6a(ii)/b(ii)* and *H7a(ii)/b(ii)*. We can, therefore, conclude that ICT orientation enables salespeople to reduce their role ambiguity, regardless of the level of complexity of their selling environment.

General discussion

Recent developments pertaining to the sales profession have made ICT orientation indispensable for many salespeople. Previous research has outlined the bright and dark sides of technology use for salespeople (Alavi and Habel, 2021) and provided first evidence that the benefits of technology use are dependent on the selling environment, in particular the level of complexity of the selling situation (Rodríguez *et al.*, 2020). As many suppliers shift their focus from selling products to providing added value to customers, for example, through selling individualized offerings such as solutions, the question arises as to which personal resources support salespeople in reducing role stress when using technology and whether ICT orientation can benefit salespeople even in complex sales settings (Bond *et al.*, 2020; Bharadwaj and Shipley, 2020). Thus, the aim of this paper was to investigate how salespeople's ICT orientation affects their level of role stress, depending on specific salesperson characteristics, namely, self-efficacy, tenure and the average relationship duration a salesperson has with customers, and the complexity of the selling environment, differentiated by customer and supplier complexity. In doing so, our research sheds light on when and how the integration of ICT is able to reduce salespeople's role stress. Our findings add to existing research on the impact of ICT on role stress (Román *et al.*, 2018) by showing that ICT orientation has differential effects on salespeople's role stress perceptions. We show that while ICT orientation is generally helpful to reduce role ambiguity, the effects of ICT orientation on role conflict are best explained through an interplay of central salesperson characteristics, namely, tenure and the average relationship duration a salesperson has with customers, and environmental demands caused by customer and supplier complexity. Self-efficacy, on the contrary, does not affect the impact of ICT orientation on salespeople's role stress. Thereby, our research contributes to the theoretical understanding of when and how salespeople should integrate technology into their sales tasks (Singh *et al.*, 2019), by providing a nuanced view on the interplay of both individual resources and environmental demands that affect to what extent ICT is beneficial to reduce salespeople's role stress (Guenzi and Nijssen, 2021).

Considering the interplay between tenure and customer complexity and their joint impact on the relationship between ICT orientation on role conflict, we find that salespeople with shorter tenure perceive enhanced role conflicts from increased technology orientation for low, medium and high levels of customer complexity. This effect becomes even stronger for salespeople with longer tenure. Hence, it appears that tenure does not offset but further enhances conflicting demands that salespeople perceive when interacting with complex customers. As Schmitz and Ganesan (2014) point out, increasingly complex customer demands make it more difficult for salespeople to find innovative solutions to customer problems. This issue seems to be particularly relevant for longer-tenured salespeople who try to process customer demands via an extensive use of ICT. Existing data from customers might be accessible in the company, but salespeople with longer tenure might lack the relevant capabilities to interpret this data (Lenka *et al.*, 2017). Thus, salespeople feel enhanced role conflict because of growing task complexity (Rangarajan *et al.*, 2005). This finding is in line with Rodríguez *et al.* (2020), arguing that complex sales processes cannot easily be processed via ICT.

When it comes to the interplay of tenure and supplier complexity, salespeople with shorter tenure seem to benefit from ICT orientation at high levels of supplier complexity. When salespeople have recently joined a company, it might be easier for them to resolve conflicting demands by leveraging ICT to a larger extent. As IT infrastructures are potentially better in larger, more complex firms, these salespeople benefit from supplier complexity to resolve conflicting demands. Furthermore, we find that salespeople with longer tenure benefit from increased ICT orientation and are able to reduce role conflict perceptions, particularly within high levels of supplier complexity. This might be the case because complex supplier organizations provide more access to ICT-related training and update internal systems more frequently such that appropriate infrastructure and capabilities are available within the company to facilitate the use of ICT for complex sales tasks (Lenka *et al.*, 2017). This in turn enables longer-tenured salespeople to benefit from ICT orientation to a greater extent because of enhanced ease-of-use, that is, reduced task complexity (Rangarajan *et al.*, 2005).

Considering the impact of customer complexity on the moderating effect of relationship duration, we find that salespeople that have been interacting with customers for a shorter period of time (lower average relationship duration) perceive higher role conflict from ICT orientation when interacting with customers in all levels of customer complexity. A longer relationship duration with customers, however, constitutes important social capital, as it equips salespeople with valuable knowledge about offerings and markets, as highlighted by Böhm *et al.* (2020). This knowledge helps to buffer the impact of high customer complexity, such that role conflict can be reduced by ICT orientation.

With regard to supplier complexity, our results show that in the case of shorter average relationship duration, role conflict is enhanced for all levels of supplier complexity, and this effect becomes even stronger when customer relationship duration increases. When salespeople have been working with customers for a longer time, they might struggle with finding innovative answers to their problems (Restuccia and Legoux, 2019). Working in a complex supplier organization can be especially harmful in this regard, as accessing relevant information and data becomes more and more difficult. However, it seems that supplier complexity contributes positively in this regard, as the overall level of role conflict is lower for higher levels of supplier complexity. Highly complex supplier organizations might be able to provide adequate infrastructures and training for salespeople to access relevant information (Lenka *et al.*, 2017), so the overall perceptions of role conflict can be reduced. Still, ICT orientation enhances role conflict overall, which is in line with research arguing that technology can cause enhanced levels of stress (Tarafdar *et al.*, 2015).

Managerial implications

Our research offers several valuable insights for managers into the benefits that salespeople derive from ICT orientation with regard to a reduction of role stress. Particularly, managers should keep in mind that ICT orientation is generally helpful to reduce role ambiguities, that is, a lack of clarity regarding demands to fulfill, while the impact of ICT orientation on role conflict, that is, seemingly conflicting demands, requires a nuanced view, as it depends on varying levels of customer and supplier complexity as well as individual salesperson characteristics.

When it comes to resolving ambiguities regarding expectations and goals, sales managers should rely on providing relevant information via ICT and should generally encourage their sales force to integrate ICT into their jobs. In addition, they should provide ICT-related training and infrastructure to resolve role ambiguity.

Whether role conflict can be reduced through enhanced ICT orientation cannot be answered easily, based on our research. Rather, the benefits salespeople derive from technology orientation to reduce role conflict depend on an interplay of several salesperson characteristics as well as the level of complexity of the selling environment. Our findings show that particularly the salesperson characteristics tenure and average relationship duration should be considered before integrating ICT into selling activities.

First, salespeople with longer tenure benefit less from increased ICT orientation when dealing with increasingly complex customers. With longer tenure, salespeople may struggle to find innovative solutions for complex customers. Our findings indicate that the increasingly complex demands of customers cannot be captured by enhanced ICT orientation, but rather require in-person face-to-face meetings with customers to understand current organizational issues. Following this line of argument, ICT orientation should be less focused on by salespeople with longer tenure that are facing increasing customer complexity. However, such experienced salespeople benefit from ICT orientation in complex supplier organizations. This might be the case because complex supplier organizations offer additional support to salespeople with regard to the use and implementation of ICT. Continuous support over a longer period of time helps salespeople to resolve conflicting demands within their organizations via ICT orientation. Overall, ICT helps longer-tenured salespeople to resolve conflicts within their own complex organization but cannot capture demands arising from increasing customer complexity.

Second, a long relationship with customers equips salespeople with the required knowledge of customers and markets to enable them to reduce their perceived level of role conflict using digital technologies in complex customer interactions. Salespeople should, thus, be encouraged to make use of ICT if they are very familiar with their customers and confident about their needs. However, salespeople that are unfamiliar with a specific group of customers struggle with understanding their needs in complex environments. In such a context, technology orientation would even reinforce their level of role conflict. Highly complex supplier organizations should additionally provide necessary infrastructures and training for salespeople to make them more capable to address customer needs with the help of ICT.

Limitations and future research

While our research enhances the understanding of the impact of technology orientation on salespeople in complex sales settings, it also has its limitations.

The data gathered to investigate our conceptual framework is primarily based on convenience sampling and includes a variety of different industries from only one country. Future research might investigate to what extent the moderating role of complexity for the relationship between technology orientation and role stress varies between industries or countries. In doing so, researchers could also consider a further dimension of complexity, namely, cultural complexity [3].

As ICT orientation is our central independent variable, we cannot differentiate between different types of technology used by salespeople and whether these affect salesperson role stress differently. This offers promising opportunities for future research. For instance, researchers might compare virtual and augmented reality or video conferencing tools with regard to their ability to offset the impact of high levels of customer complexity on role stress.

A further limitation concerns the moderating and dependent variables considered in our framework. Although we investigated central salesperson characteristics, there might be other characteristics that affect the impact of complexity on the relationship between technology orientation and role stress. For instance, the impact might differ between

traditional field salespeople and inside salespeople, as the latter orchestrate tasks via digital technologies throughout the entire sales cycle. In addition, analytical skills and communication competence[3] might play an important role in the reduction of role stress. Furthermore, besides a focus on role stress, research might investigate to what extent technology use enhances or attenuates salesperson performance in varying degrees of complexity of the selling situation. Ideally, future research can also supplement survey-based data with objective performance metrics to investigate this aspect.

In line with the topic of this special issue, it might also be worthwhile to investigate to what extent technology orientation facilitates the implementation of value-based selling (Terho *et al.*, 2012) or the management of customers' value-in-use (Prohl and Kleinaltenkamp, 2020) given varying degrees of customer and supplier complexity. In particular, the benefits salespeople derive from enhanced technology orientation for their value-creating selling strategies might differ throughout the phases of the sales cycle (need recognition, development and implementation of an offering and post-purchase support) (Blocker *et al.*, 2012; Bond *et al.*, 2020). A longitudinal investigation of the impact of ICT orientation on the different phases of selling value-creating offerings would likely enhance our understanding of whether and how ICT orientation affects salespeople in the face of increasingly complex supplier and customer organizations and provide interesting implications for managers.

Notes

1. We leave the term ICT rather ambiguous as industries and firms vary greatly regarding their technological progress and the exact technologies used. For a similar line of argument, see Wengler *et al.* (2021).
2. We thank the Guest Editor of this special issue for this suggestion.
3. We thank an anonymous reviewer for this suggestion.

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