

Goscinska, Daria; Winkler, Till J.

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Providing organizations with a validated instrument for an Enterprise Service Management capability

Daria Goscinska¹ · Till J. Winkler^{1,2}

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Abstract

In light of new digital opportunities, enterprises require modernization also with regard to intra-organizational business and IT management. Enterprise Service Management (ESM) is an organizational capability aimed at a more efficient and effective IT and business service management in organizations. Although ESM has been recognized as an approach to improve customer and employee satisfaction and to create digital competitive advantage, there is a methodological and analytical void for organizations in how to measure their ESM capability. Motivated by this lack of measurability and tangibility, we aim to empirically validate the ESM capability model. Our contribution to this paper is empirical, as we provide a measurable instrument for further ESM studies. We aim to initiate a broader debate on ESM and thereby add to the scholarly establishment of the concept in the Information Systems and IT Management literature. Practically, we contribute by offering companies a validated and actionable set of ESM characteristics.

Keywords Enterprise Service Management · Service systems · Empirical construct validation · Organizational transformation · PLS-SEM analysis

JEL Classification M15

Introduction

Enterprise Service Management (ESM) is an organizational capability aimed at a more efficient and effective IT and business service management (SM) in organizations (Porscheidl 2021; Mitrakis, 2019). Although ESM has been recognized as an approach to improve customer and employee satisfaction (O’Connell & Drogseth, 2019) and to create digital competitive advantage (Tisson 2019), there is a conceptual

and methodological void for organizations in how to measure their ESM capability.

In light of new technological or digital opportunities, enterprises require modernization also with regard to intra-organizational business and IT management (Landis, 2017). ESM has been defined as an approach that focuses on the transformation and management of organizational workflows as services, to be used by customers to fulfill IT or business requests (Goscinska & Winkler 2023). The ESM capability of an enterprise comprises five resources: a service-oriented organization, a modular IT architecture, an SM supported by modern technologies, organization-widely shared information, and adapted people resources (Goscinska & Winkler 2023). ESM is attractive for organizations that aim at a high customer and service satisfaction (Mitrakis, 2019; Landis, 2016). Its benefits of improved organizational efficiency, effectiveness, and stakeholder satisfaction can contribute to an increased IT and overall firm performance (O’Connell & Drogseth, 2019; Hennhöfer 2017a).

ESM research has gained interest in the IT architecture and IT organization fields since 2005 and 2016 respectively (Goscinska & Winkler 2022). The origins of ESM are based

Responsible Editor: Francesco Polese

✉ Daria Goscinska
daria.goscinska@fernuni-hagen.de
Till J. Winkler
till.winkler@fernuni-hagen.de

¹ Chair of Information Management, Faculty of Business Administration and Economics, University of Hagen, Universitätsstraße 41, 58097 Hagen, Germany

² Copenhagen Business School, Department of Digitalization, Solbjerg Plads 3, 2000 Frederiksberg, Denmark

on the one hand on the idea of an end-to-end (E2E) management of an IT service lifecycle—from IT service development and execution to administration (IT architecture field) (Huang et al., 2005). On the other hand, ESM stems from the IT Service Management (ITSM) approach and reflects the idea that ITSM best practices and processes are extended towards business (non-IT) services in the organization (IT organization field) (Pscheidl 2021, IDG 2021).

Although ESM has not been treated extensively in the academic literature (Goscinska & Winkler 2022), there has been research on ESM as a tool for enterprise-wide digitalization (Landis, 2017), on ESM as a comprehensive enterprise digitalization strategy (Pscheidl 2021), on the enhancement of ESM through artificial intelligence (Engelbrecht et al. 2021), and on ESM as a model-driven enterprise architecture for IT services (Huang et al., 2005). In one study, two aspects of ITSM/ESM were successfully applied to an internal government organization (Diedrichs 2020). In sum, the existing literature offers valuable insights on ESM and suggests an interest in the practical implementation among companies (O’Connell & Drogseth, 2019).

In light of the motivation towards ESM adaptation, precursory research has conceptualized and operationalized an ESM capability model in accordance with construct measurement procedures (MacKenzie et al., 2011; Goscinska & Winkler 2023). The conceptual model serves as a first guidance on which organizational resources pertain to an ESM capability. However, to offer a measurable and reliable instrument, the scale development procedure requires scale evaluation and model validation, since validating the measures of a construct is critical to building knowledge in Information Systems (IS) (MacKenzie et al., 2011). Validation of a scientific model increases scientific rigor, ensures reproducibility and credibility of the research, and assures a high degree of confidence in the modelled construct for both the academic and practice community (Straub et al., 2004). Only with a psychometrically sound and validated instrument can organizations quantitatively measure their ESM capability in a reliable and repeatable way and draw conclusions from these measurements. For example, should a company strive to strategically improve its ESM capability by a certain target percentage within a given timeframe.

Motivated by this lack of measurability and validity of the existing ESM capability model, we aim to extend the model through a scale-based instrument and empirically validate the ESM capability model. In this study, we pursue the research question: how can we parsimoniously and reliably measure an ESM capability through a validated scale-based instrument? To address our research question, the ESM capability model is approached through the theoretical lens of service-dominant logic (SD-L), which views the purpose of an enterprise to provide service to all stakeholders, including customers and employees (Lusch &

Vargo, 2006). In the SD-L context, the service system lens breaks down a complex construct—like the ESM capability model—into more tangible resources (Maglio et al. 2009). Methodologically, we follow the instrument development approach suggested by MacKenzie et al. (2011). Our statistical analysis is based on data gained from a survey among German and Austrian IT consultants and international online study participants.

Our research offers an empirical, methodological, and practical contribution. First, the empirical benefit lies in presenting a validated ESM capability instrument as a foundation for future research on ESM. We aim to add conceptually to the ESM literature, which is yet embryonic in the IS and IT management fields. Next, the formative, hierarchical nature of our ESM instrument is a valuable empirical case for the partial least square structural equation model (PLS-SEM) literature, since formative measurement is rarely reported in IS journals (Hair et al., 2017). At the same time, there is a strong need for guidelines in PLS-SEM on how to use and construct hierarchical latent variable (LV) models with formative relationships (Becker et al. 2012). Beyond that, we offer recommendations for managers of enterprise services. The formative-formative-formative third-order construct is particularly beneficial for strengthening practical implications, since it allows managers to identify actionable drivers (individual items) to improve the ESM capability (Becker et al. 2012). Companies can use the validated and scale-based ESM capability model to grasp the holistic nature of ESM, while at the same time having an assessment instrument to measure their state of the enterprise service transformation journey. The remainder of the paper includes the theoretical framework and model development (“Theoretical background and construct modelling” section), followed by the methodology (“Methodology” section) and results (“Results: empirical validation and analysis” section), and concluding with a discussion (“Discussion” section) and summary (“Conclusion” section).

Theoretical background and construct modelling

Service-dominant logic and service systems

The theoretical foundation of the ESM capability model lies in SD-L (Lusch & Vargo, 2006), in particular the service system lens (Maglio et al. 2009, Maglio & Spohrer 2007). SD-L understands service as the application of specialized competences or resources for the benefit of the own or another entity. As opposed to a goods-dominant perspective, service focuses on the processes and performances of (co-)creating value for customers (Lusch & Vargo, 2006). In the case of (IT)SM, this means that IT should be delivered

to customers in the form of IT services, which include all activities from service strategy, design, and transition, to operations—also understood as E2E delivery (MacLean & Titah, 2023).

To provide a service, at least two service systems (be it organizations, businesses, departments, government agencies, or individuals) must collaborate to create value, i.e., an improvement in the system (Spohrer et al., 2007; Maglio et al. 2009). More precisely, service systems are “a dynamic value-cocreation configuration of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions” (Maglio et al. 2009, p. 399). Other authors have also placed emphasis on resources such as IT architecture, customers, or physical artifacts (Spohrer et al., 2007; Böhm et al., 2014). Service systems are thus a combination of various resources, which are capable of dynamically recombining (Maglio et al. 2009). The resource recombination generates service or business innovation, by designing new value propositions (Maglio & Spohrer 2013).

Taking a service system view allows to break down the complex construct of ESM capability into more graspable resources. Figure 1 illustrates how the service system lens translates to the depiction of ESM capability. The service system analyzed is any kind of organization that applies ESM. The ESM capability can be regarded as a meta-resource, while the process of adopting the resources towards ESM is a service innovation creating new value propositions. The ESM capability consists of five resource sub-dimensions.

ESM capability operationalization

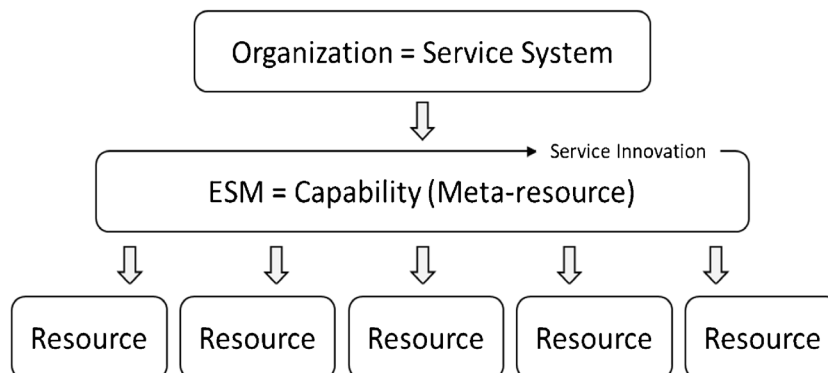
The ESM capability model builds on precursory research that has laid the groundwork for validating the ESM capability instrument. Goscinska and Winkler (2023) proposed an ESM conceptualization and literature-derived measurement indicators. Rooted in service system theory and existing literature, the ESM capability was operationalized into five resource sub-dimensions: *organizational*, *architectural*,

technological, *shared information*, and *people resources* (OATIP). The five OATIP resources were conceptualized as second-order constructs with each two first-order constructs, measured by a total of 29 indicators (Goscinska & Winkler 2023). The conceptual model based on OATIP resources was then content validated through expert interviews and a card-sorting exercise (Goscinska & Winkler 2023). Figure 2 shows the operationalized ESM capability model based on the OATIP resources, its conceptual constructs, and the added measurement references in square brackets.

The resource *organizational resources* (OR) consider those characteristics of an organization’s structure which are needed to achieve the ESM capability. This second-order construct consists of two first-order constructs: the organization is *customer-centric* (ORC) and has a *service value-based setup* (ORV). With the SD-L lens, the center of interest lies with the customer, while the main goal of the service system is to increase value (Vargo & Lusch, 2004). This requires all elements of service to be directed towards the service paradigm—the system design, pricing, and dynamics between various service systems (Bardhan et al., 2010). An exemplary use-case is the onboarding service of new employees, which includes the same repeatable process steps executed by different departments and should therefore be provided as a standardized, (semi)-automated workflow request (Landis, 2017). At the same time, employees shall be viewed as internal customers, who, as such, expect a similarly smooth experience as in other digital settings (Pscheidl 2021). The focus on customers as well as (service) value results not only from the SD-L-based service systems lens but is also in accordance with the premises of ITSM (MacLean & Titah, 2023).

The resource *IT architectural resources* (AR) consider the overall design and relationships between an organization’s IT systems and applications (Tiwana & Konsynski, 2010). This second-order construct consists of two first-order constructs: the organization builds upon an *E2E service orchestration* (ARO) and *IT architecture modularity* (ARM). From a service systems lens, value co-creation is empowered by the connectedness of the organization’s architectural elements. The architecture view translates the value proposition of a

Fig. 1 Applying the service system lens based on SD-L to the ESM capability



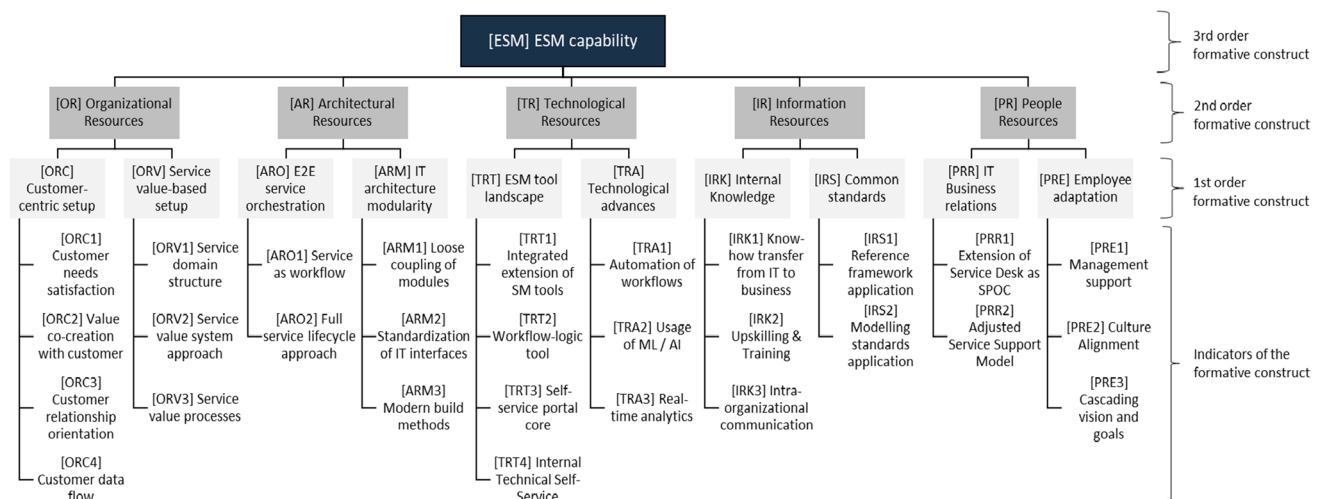


Fig. 2 The ESM capability model operationalized based on the OATIP resources (adapted from Goscinska & Winkler 2023)

service system into a composition of actors, resources, and activities of value co-creation (Böhmman et al. 2014). This design idea is in accordance with established ITSM practices based on service strategy, design, transition, and operations. Nowadays, a crucial part of modern IT architecture is the application of disruptive technologies like cloud services or containerization (Bardhan et al. 2010). A frequently referenced architecture framework based on service-components and aimed at aligning business capabilities with technical infrastructure is the service-oriented architecture (SOA) framework (Wisnosky et al., 2008).

The resource *technological resources* (TR) consider how an organization uses technology to implement or enhance its ESM capability. This second-order construct consists of two first-order constructs: an *ESM tool landscape* (TRT) and the *use of technological advances* (TRA). A well-established tool landscape can foster ESM implementation as it provides a standardized and accessible means to process organization-wide service requests (Pscheidt 2021). Additional features like a self-service platform enhance the ESM adaptation (Mitrakis, 2019). Nowadays, disruptive technologies like artificial intelligence, advanced real-time analytics, or machine learning offer opportunities but also require collaboration adaptations. By creating innovative interfaces or autonomous solutions from business processes to software and data, services-oriented systems address the integration of business processes and technology (Bardhan et al. 2010). Information and communication technology developments offer the chance to innovate in terms of how service systems interact (Maglio et al. 2009).

The resource *shared information resources* (IR) consider how an organization shares its information to

implement or enhance its ESM capability. This second-order construct consists of two first-order constructs: the collection and application of *internal knowledge* (IRK) as well as the organization-wide adaption of *common standards* (IRS). Spohrer et al. (2007) identify different forms of signaling or encoding information, like language, laws, and methods, or in our case, common standards on ESM. To create value for others, a service usually applies learning processes towards different resources, including knowledge (Maglio et al. 2009; Mele & Polese, 2011). Therefore, for a service system to function well, information is crucial on multiple levels: how to share information (codification), how to channel information (communication), and how to maintain information (knowledge gathering) (Böhmman et al. 2014; Maglio et al. 2009).

The resource *people resources* (PR) consider the human element when implementing or enhancing ESM capability. This second-order construct consists of two first-order constructs: the organization's transformed *IT-Business relations* (PRR) and the needed *employee adaptation* (PRE) for ESM. To improve and innovate, increasing employee competence is crucial (Maglio & Spohrer 2013). At the same time, the relationship between the business and IT side within the organization (or outside of it in the case of IT outsourcing) changes their relationship. IT helps to mobilize human resources, through portals or self-service (Böhmman et al. 2014), and at the same time, employees are needed to deliver service. Moreover, decision-makers are encouraged to systematically reconfigure internal operations and interactions to improve or create new services (Maglio & Spohrer 2013), which is required to establish a successful ESM capability.

Outcome variables

To establish the nomological validity of a new construct, such as the ESM capability model, it is recommended to test its effects on theoretically related constructs in its nomological network (MacKenzie et al., 2011). We therefore include two outcome variables and several control variables in this study. In particular, *IT performance* (NVI) and *overall firm performance* (NVF) as two well-established performance indicators of organizational capabilities such as ESM capability (Powell & Dent-Micallef 1997).

IT performance measures the perception of the impact of IT on a firm's financial performance (Powell & Dent-Micallef 1997). With the organization-wide implementation of ESM, the role of IT is increasing, and its standing is moved from a cost center function towards an active value creation role (Tisson 2019). Although ESM, by definition, is understood on the whole enterprise level, as opposed to purely IT level, the changes and positive effects of ESM affect the IT department as well as its interactions with other departments (Pscheidl 2021). The extension of SM principles to a company's business areas would create synergies between the IT and business departments, thus creating a benefit for the IT in terms of cross-departmental incident handling and customer-oriented performance (Diedrichs, 2020). Among the measurable benefits of ESM implementation for IT are an increased budget and headcount of IT(SM) department and improved IT business relations as well as revised Service Level Agreements and IT indicators like downtimes (O'Connell & Drogseth, 2019).

Overall firm performance measures the overall firm profitability and sales growth (Powell & Dent-Micallef 1997). Although service systems execute service for and with their customers, the value co-creation shall be a positive-sum exchange with mutual benefits, also for the organization itself (Maglio & Spohrer 2013). In SD-L, a focus lies on enhancing the value created for the customer, which leads to increased revenue (Bardhan et al. 2010). ESM is said not only to lower cost but improve customer and employee satisfaction and loyalty (O'Connell & Drogseth, 2019). Research shows that customer satisfaction has proven both statistically significant and practically relevant to overall firm performance (Otto et al. 2020). ESM, with its aim to smoothen business operations and enhance organizational efficiency, has the potential to improve service and business results, thus improving overall firm performance (Pscheidl 2021). ESM is regarded as crucial to withstand competition and create a digital competitive advantage (Tisson 2019).

Control variables

When assessing the impact of ESM capability on the outcome variables, we take into account four

organizational-level and five individual-level variables as potential confounding influences. First, we include the *organization size* based on the total number of employees, as the most common indicator of firm size. Research shows that there might be a difference between smaller and larger companies in terms of resources and overall abilities to benefit from technologies or adapt information systems (Goode & Gregor 2009). Moreover, we used the *industry sector*, *business type*, and *organization's location* to check for differentiation markers across firms. Researchers found differences between industry types with regard to their IT participation and IT business relations (Kearns & Lederer, 2004); differences between business-to-business and business-to-customer business types in terms of customer relations motivation or level of service expertise (Gligor & Maloni 2021); and differences in ITSM implementation in relation to the organization's geographical location, organization size, and industry sector (Marrone et al., 2014).

Second, individual control variables include the respondent's *work level*, *tenure*, *years of SM experience*, *an SM certification* ownership, and the belonging to either the consultant or crowdsourcing survey pool (*sourcing pool*). Those indicators have primarily a methodological motif and aim at controlling for possible response biases. Those could range from indicator complexity or ambiguity for the respondent (years of SM experience, SM certification) to the leniency or social desirability bias towards its own organization (tenure, work level) (Podsakoff et al. 2003). Figure 3 presents the final third-order formative ESM capability model with its outcome and control variables.

Methodology

Instrument development and construct operationalization

As we aim to validate the ESM capability instrument, we follow the guidelines for construct development by MacKenzie et al. (2011). As precursory research (Goscinska & Winkler 2022, Goscinska & Winkler 2023) has conducted the first steps of construct development (conceptualization, development of measures, and model specification), the focus of this paper is the instrument evaluation and refinement as well as statistical validation of the construct. The conceptual ESM capability model is translated into a scale-based instrument, in which each construct aligns with a measurable item and a response scale. Particularly, we developed a comprehensive questionnaire and collected data for a pre-test to purify the instrument, before gathering a new sample of data and finally validating the instrument (MacKenzie et al., 2011).

We opted for a broad understanding of ESM and therefore included multiple facets of ESM capability. This matches

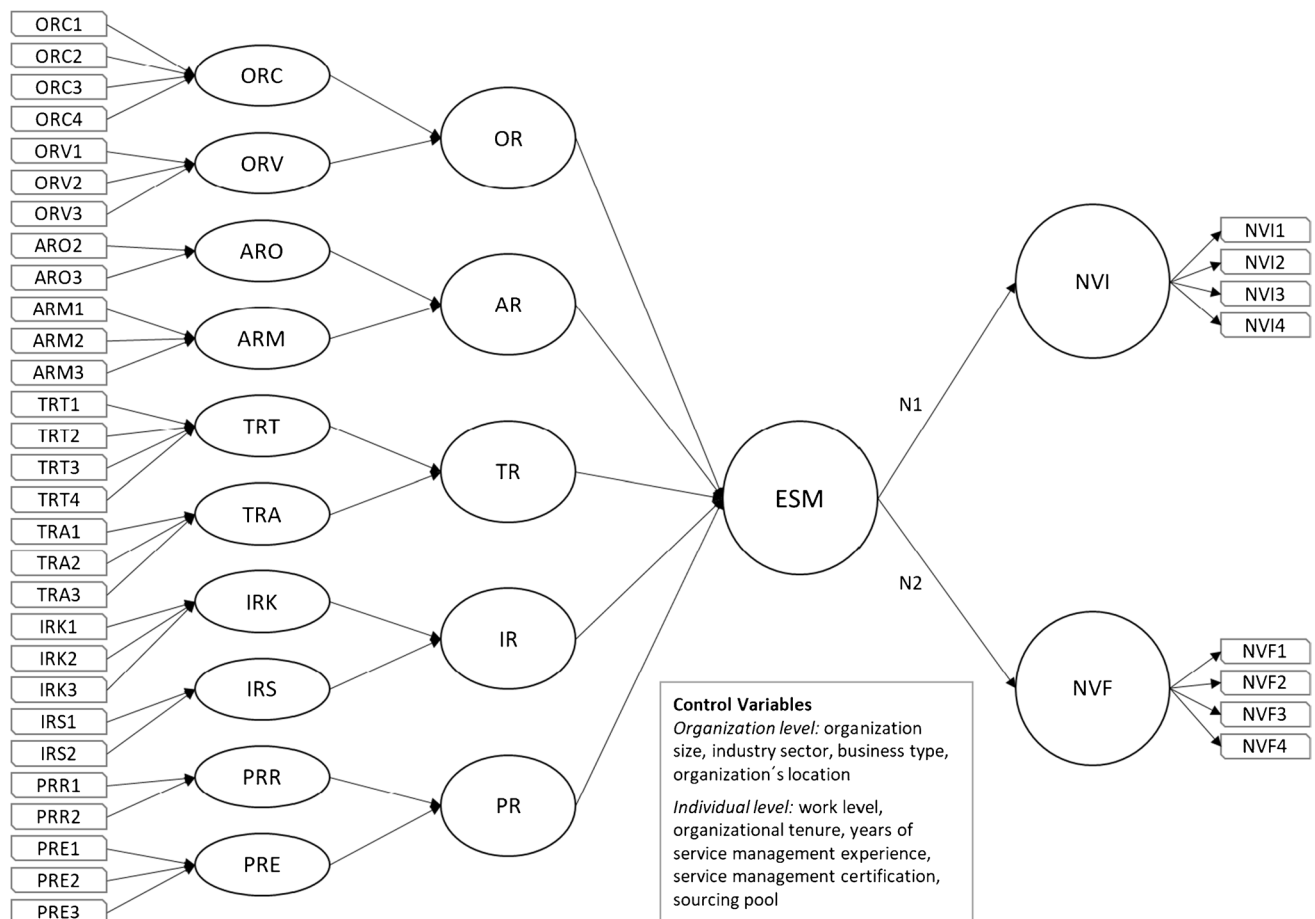


Fig. 3 The ESM capability model with outcome and control variables

with the idea of formative constructs, which must cover all facets of the conceptual domain (Freeze & Raschke, 2007; MacKenzie et al., 2011). The hierarchical instrument of ESM capability is a higher-order construct, which allows to achieve model parsimony by limiting the number of path model relationships and, at the same time, increasing the bandwidth of content through sub-constructs (bandwidth-fidelity tradeoff) (Hair et al. 2023). Our ESM capability model classifies as a type IV third-order formative-formative-formative hierarchical construct (Becker et al. 2012), where the sub-constructs are themselves constructs with specific components (Edwards 2001). Formative indicators are often called causal indicators, meaning that the indicators cause the construct (Freeze & Raschke, 2007).

In order to estimate the ESM instrument, we opted for the disjoint two-stage approach as advocated by Becker et al. (2012, 2022) and Hair et al. (2023). Becker et al. (2012, 2022) recommend the two-stage approach (embedded or disjoint)¹

when formative hierarchical LVs are involved, since it is more flexible in allowing other antecedents to explain further variance.² The specification towards the disjoint approach resulted from the indication that measures involving the repeated indicator approach (incl. the embedded two-stage approach) might lead to a weight bias if the lower constructs are unevenly distributed across the higher constructs (Hair et al. 2023). In the first stage, LV scores are calculated based on the first-stage model without the second-order construct. In the second stage, those scores are used as indicators for the second-order construct in a separate second-order analysis. In the ESM capability case, we conduct the disjoint two-stage approach twice, to achieve the second-order constructs (i.e., OR, AR, TR, IR, PR) and to achieve the third-order construct (i.e., ESM). We model the constructs based on the LV scores and the outcome constructs IT performance (NVI) and overall firm performance (NVF) on their direct multi-indicators.

¹ The term disjoint in the two-stage approach means, as opposed to embedded, that some constructs are measured by their LV scores and some by their direct indicators (Becker et al. 2012).

² As opposed to the repeated indicator approach where R^2 is 1.

Statistical analysis

To validate the ESM instrument, we opted for the well-established PLS-SEM method, which measures the outer model (relationship between indicators and LV) and the inner model (relationships between LVs) of the construct (Hair et al. 2022). It is a common method to estimate complex models with multiple indicator variables, constructs, and structural paths (Hair et al., 2019). PLS-SEM is often used in cases where the phenomenon is new and its theoretical framework is not yet fully established (Hair et al., 2017; Patel et al. 2016). The literature suggests, although not indisputably, that applying weighted composites of indicator variables, as is the case in PLS-SEM, produces lower parameter bias compared to other statistical models using sum scores (Hair et al. 2023). PLS-SEM is the recommended approach when, as in our case, the analysis includes a complex model and higher-order constructs, includes formatively measured constructs, and deals with testing a theoretical framework from a prediction perspective (Hair et al., 2019).

PLS-SEM enables researchers to parallelly model and estimate variable relationships, thereby providing precise measures by accounting for measurement error in the observed variables (Hair et al. 2022). PLS-SEM's causal-predictive paradigm is optimal for generating recommendations and managerial implications from academic research (Sarstedt et al. 2020, Hair et al. 2022), which is our practical contribution. To conduct the PLS-SEM calculations, we used SmartPLS (version 4.0.9.6) (Ringle et al. 2024).

The statistical analysis in PLS-SEM is twofold: we assess the measurement model and in the next step the structural model. The measurement model (outer model) depicts the relationships between a construct and its indicators, while the structural model (inner model) depicts the relationships between the constructs (Hair et al. 2022). Depending on the type of constructs, there are different criteria for assessment. For formative constructs, no high correlation between indicators is expected nor needed, nor are factor analysis or internal consistency relevant (Freeze & Raschke, 2007). Instead, “validity for formative constructs is concerned with the strength and significance of the path from the indicator to the construct” (Freeze & Raschke, 2007, p. 1486). Thus, in the case of formative measurement models, the convergent validity, indicator collinearity, and the significance and relevance of indicator weights are assessed (Hair et al. 2022).

To assess convergent validity, i.e., the correlation of each construct with an alternative measure of the same concept, we conducted a redundancy analysis for each construct with one global indicator per construct (Hair et al., 2019). The indicator collinearity is checked with the variance inflation factor (VIF), which assesses the degree of overlap or distinction between indicators (the lower the multicollinearity, the more distinct the indicators among one construct) (MacKenzie et al., 2011). The indicator weights were assessed with the bootstrapping method,

a procedure based on processing a large number of randomly drawn subsamples from the original dataset to estimate paths and significance values (Hair et al. 2022). Our final decision-making on keeping or deleting the formative indicators was based on the decision tree presented by Hair et al. (2021). There, the significance of the weights is assessed as well as the indicator's loading and the loading's significance.

Once the measurement model assessment has been determined to be sufficient, the structural model is evaluated. Standard criteria for structural model evaluation include the construct collinearity, the significance and relevance of path coefficients,³ the coefficient of determination R^2 , the effect size f^2 , and predictive relevance metric Q^2 (Hair et al. 2022). The R^2 value is a model's explanatory power, measured as the variance explained in each endogenous construct (Hair et al. 2022). The effect size f^2 is closely related to R^2 as it evaluates how the removal of a chosen predictor construct influences the endogenous construct's R^2 value (Hair et al. 2022). The out-of-sample predictive relevance Q^2 indicates a model's ability to predict future observations by estimating a model on a training and holdout sample in $PLS_{predict}$ (Hair et al. 2022). When assessing the model's predictive power, the latest research advised to further include linear models and naïve benchmarks to complement the analysis of Q^2 . We therefore include the cross-validated predictive ability test (CVPAT) in $PLS_{predict}$ to check whether the structural model's average loss value (calculated on the prediction error) is significantly lower than the average loss of the benchmarks (Sharma et al., 2023).

Moreover, in a further analysis, we conducted a test for common method variance (CMV). PLS-SEM researchers have recently been encouraged to extend model robustness checks to include the CMV check (Sarstedt et al. 2020). This is particularly important as only 29% of IS articles reflect upon CMV in their studies (Podsakoff et al., 2024). CMV is a systemic bias that can occur when the variables are measured with the same sample source or method. The error can be viewed as a third variable impacting the estimated relationships, and the variance is not caused by the constructs but by the measurement method itself (Tehseen et al. 2017, Podsakoff et al. 2003).

As our data on the predictor and explanatory variables were collected from the same respondents, at the same time and using the same survey, we provided several techniques to control for a potential CMV. We acknowledge the latest research recommending procedural rather than statistical post hoc measures to mitigate CMV resulting from rater, item, or context characteristics (Podsakoff et al., 2024). In terms of questionnaire design, we guaranteed anonymity and ensured participants that there was no right or wrong answer (to minimize social desirability or tendency biases). Moreover, social desirability towards presenting one's own company in a good perspective might be lower, as we included also external consultants who rated third-party

³ Construct collinearity and the significance and relevance of paths/weights analogous to formative indicators.

clients. Furthermore, with the questions on SM certification and self-assessed SM know-how, we tried to ensure a proper level of response ability and the selection of an appropriate response sample (Podsakoff et al., 2024). For statistical post hoc methods, we applied the measured latent marker variable (MLMV) approach to account for CMV (Tehseen et al. 2017, Podsakoff et al. 2003). The MLMV approach by Chin uses a “marker,” i.e., an unrelated variable, and assesses the correlation between the marker variable and the LVs (Chin et al., 2013; Tehseen et al. 2017). For that purpose, we incorporated three questions regarding the preference of the color blue into our questionnaire (Miller & Chiodo 2008).

Survey development and data collection

Grounded on a content-validated construct in the form of the ESM capability model (see Fig. 2) (Goscinska & Winkler 2023), we prepared a survey instrument divided into sections according to the model. Our holistic instrument included questions related to various theoretical and methodological aspects described above. Mainly, each formative indicator was attributed to one measurable item; we further added controlling global (reflective) statements for each formative construct. The answers about the extent of each indicator were collected in a 7-point Likert-type scale ranging from “not at all” (1) to “to a full extent” (7). Special attention was put to ensure that the Likert scale is perceived as symmetric and equidistant, so it can approximate an interval scale and thus be applicable to PLS-SEM calculations (Hair et al. 2022). Moreover, we incorporated questions to account for the outcome variables, the control variables, and the CMV marker.

As a pre-test, the survey was distributed via Limesurvey to ten fellow IS researchers and affiliated IT professionals, as recommended by MacKenzie et al. (2011). The resulting changes from the qualitatively evaluated pre-test included content-related modifications (rephrasing of statements, providing context to the introductory page, adding pre-screening questions) and structural changes (e.g., allowing going backwards, adjusting scales on control variable items). The two pre-screening questions requested information about any SM certifications and a self-assessment on SM know-how. While the certification was not a prerequisite to survey participation, the self-assessed SM know-how was a necessary condition to continue with the questionnaire.

The main data collection took place between July and August 2023 and followed a two-pronged data sourcing strategy: on the one hand, the survey was distributed via Prolific, a crowdsourcing platform with high data quality (Peer et al. 2022); on the other hand, it was shared among German and Austrian employees of an IT consulting company with the request to fill the survey from the perspective of a client organization they are most knowledgeable about. In sum,

we received 274 fully completed and valid questionnaires, 218 from Prolific-participants and 56 from IT consultants.

Results: Empirical validation and analysis

Descriptive statistics

Overall, 274 respondents with self-assessed SM knowledge in at least one organization filled out the ESM capability survey. The survey sample meets the minimum sample size requirement of the inverse square root method, when assuming a common power level of 80%, a significance level of 5%, and a minimum path coefficient of 0.15 (Hair et al., 2021).

Half of the respondents (54%) have an SM-related certificate, ranging from ITIL, CompTIA, and HDI to ServiceNow. Moreover, we also found a balanced response rate regarding affiliation to either the IT side (54%) or the business side (46%). In terms of work level, most respondents belong to (senior) management level (52%), followed by staff level (35%), external consultants (7%), and executives (5%). About a third of the respondents have between 3 and 6 years of SM experience (36%), another third up to 2 years (35%), and the last portion more than 7 years of SM experience (29%). The company size based on total employees is quite evenly distributed across very small organizations (1–49 employees; 16%), small (50–249 employees; 19%), medium (250–999 employees; 19%), large (1000–9999 employees; 26%), and very large (more than 10,000 employees; 19%). In terms of IT employees, 17% of organizations have between 0 and 4 staff, 37% between 15 and 99 staff, 28% between 100 and 999 staff, and 17% above 1000 staff. The top three industries⁴ are Technology, Information and Media (30%), Financial Services (16%), and Manufacturing (9%). Lastly, the three main headquarter locations are South Africa (28%), Germany (16%), and Portugal (9%).

Assessment of first-order measurement model

First, we checked the formative measurement model validity criteria for the first-order constructs (ORC, ORV, ARO, ARM, TRT, TRA, IRK, IRS, PRR, PRE). Convergent validity was assessed with a redundancy analysis conducted for each first-order construct using one global indicator per construct. All first-order constructs were above the recommended threshold

⁴ The industry list was guided by the LinkedIn categories, as they were more consolidated and updated than the classic industry list. For details, see <https://learn.microsoft.com/en-us/linkedin/shared/references/reference-tables/industry-codes-v2>

Table 1 Results of the first step of the disjoint two-staged approach

	<i>Outer weight, T-statistics (IO/STDEVI)</i>	<i>Outer weight, p-values</i>	<i>Outer loadings, original sample (O)</i>	<i>Significant and kept</i>
ARM1 → ARM	2.087	0.037	0.465	Y
ARM2 → ARM	1.783	0.075	0.692	Y
ARM3 → ARM	7.324	0.000	0.941	Y
ARO2 → ARO	11.592	0.000	0.991	Y
ARO3 → ARO	1.435	0.151	0.682	Y
IRK1 → IRK	0.426	0.670	0.724	Y
IRK2 → IRK	5.431	0.000	0.950	Y
IRK3 → IRK	3.624	0.000	0.887	Y
IRS1 → IRS	2.486	0.013	0.855	Y
IRS2 → IRS	7.059	0.000	0.978	Y
ORC1 → ORC	0.251	0.802	0.772	Y
ORC2 → ORC	3.130	0.002	0.887	Y
ORC3 → ORC	0.114	0.909	0.774	Y
ORC4 → ORC	4.489	0.000	0.911	Y
ORV1 → ORV	1.245	0.213	0.606	Y
ORV2 → ORV	4.458	0.000	0.935	Y
ORV3 → ORV	3.409	0.001	0.868	Y
PRE1 → PRE	3.866	0.000	0.950	Y
PRE2 → PRE	1.096	0.273	0.883	Y
PRE3 → PRE	3.432	0.001	0.913	Y
PRR1 → PRR	2.755	0.006	0.917	Y
PRR2 → PRR	5.003	0.000	0.972	Y
TRA1 → TRA	4.206	0.000	0.947	Y
TRA2 → TRA	2.361	0.018	0.880	Y
TRA3 → TRA	1.850	0.064	0.914	Y
TRT1 → TRT	2.087	0.037	0.939	Y
TRT2 → TRT	2.713	0.007	0.953	Y
TRT3 → TRT	0.699	0.484	0.769	Y
TRT4 → TRT	1.371	0.170	0.680	Y

of 0.7 (Hair et al., 2019). Next, after running the PLS algorithm,⁵ we found that the VIF value was below 5 for all formative indicators, proving no critical issue with multicollinearity. Next, we checked the outer weights for their significance and relevance by conducting bootstrapping. As recommended by Hair et al. (2022), we used the complete complexity settings and a sample size of 10,000.⁶ Looking at the outer weights' *p*-values, we find that most formative indicators are significant at a 5% level, except ARM1, ARO3, IRK1, ORC1, ORC3, ORV1, PRE2, TRA3, TRT3, and TRT4. If an indicator weight

is not significant, it is not always assumed to be a symptom of a poor measuring model. Rather, the indicator's absolute contribution to the construct, measured by the outer loading, is examined (Hair et al., 2019). Thus, formative indicators can be kept despite an insignificant weight if the outer loading is above 0.5, which is the case for each formative indicator. Therefore, we retain all indicators of the first-order formative constructs and continue with the second-order formative measurement model (Table 1).

Assessment of second-order measurement model

In the second stage of the disjoint two-stage approach, we used the LV scores of the first-order constructs (extracted from SmartPLS) to create the model with the second-order constructs (OR, AR, TR, IR, PR). We repeated the validity criteria from the "Assessment of first-order measurement model" section for the second-order constructs. The redundancy analysis of each construct was above the threshold

⁵ PLS-SEM parameters: weighting scheme, path; result type, standardized; initial weight, default.

⁶ Remaining settings were default: percentile bootstrap, no results per sample, fixed seed, significance level 0.05, and two-tailed test. Those settings were used for all bootstraps in the "Assessment of first-order measurement model," "Assessment of second-order measurement model," "Assessment of third-order measurement model," and "Assessment of the structural model" sections.

Table 2 Results of the second step of the disjoint two-staged approach

	<i>Outer weight, T-statistics (IO/STDEVI)</i>	<i>Outer weight, p-values</i>	<i>Outer loadings, original sample (O)</i>	<i>Significant and kept</i>
ARM → AR	4.701	0.000	0.865	Y
ARO → AR	5.898	0.000	0.911	Y
IRK → IR	8.384	0.000	0.991	Y
IRS → IR	1.710	0.087	0.826	Y
ORC → OR	6.520	0.000	0.928	Y
ORV → OR	4.347	0.000	0.862	Y
PRE → PR	5.836	0.000	0.974	Y
PRR → PR	2.627	0.009	0.889	Y
TRA → TR	6.751	0.000	0.987	Y
TRT → TR	1.988	0.047	0.876	Y

Table 3 Results of the third step of the disjoint two-staged approach

	<i>Outer weight, T-statistics (IO/STDEVI)</i>	<i>Outer weight, p-values</i>	<i>Outer loadings, original sample (O)</i>	<i>Significant and kept</i>
AR → ESM	2.540	0.011	0.834	Y
IR → ESM	2.515	0.012	0.899	Y
OR → ESM	2.152	0.031	0.847	Y
PR → ESM	2.649	0.008	0.935	Y
TR → ESM	0.333	0.739	0.861	Y

of 0.7. The VIF values were all below 5, proving no critical issue with multicollinearity. Looking at the outer weights' p -values, we find that all formative indicators are significant at a 5% level, except IRS. However, all outer loadings are above 0.5; thus, we retain all indicators of the second-order formative constructs and continue with the third-order formative measurement model (Table 2).

Assessment of third-order measurement model

In the third iteration of the disjoint two-stage approach, we used the LV scores of the second-order constructs (extracted from SmartPLS) to create the model with the third-order construct (ESM). We repeated the validity criteria from the "Assessment of first-order measurement model" and "Assessment of second-order measurement model" sections for the third-order construct. The redundancy analysis for the ESM construct was above the threshold of 0.7. The VIF values were all below 5 for all formative indicators, proving no critical issue with multicollinearity. Looking at the outer weights' p -values, we find that all formative indicators are significant at a 5% level, except TR. However, all outer loadings are above 0.5; thus, we retain all indicators of the third-order formative constructs and continue with the structural model assessment (Table 3).

Assessment of the structural model

As the assessment of the measurement model was satisfactory, we can now proceed to the structural model assessment. As we have one predictor variable (ESM) for the two outcome variables (NVI, NVF),⁷ there is no collinearity issue (inner VIF value = 1). Similar to the formative measurement check, we conducted the bootstrapping with the same setup as above. The path coefficient of ESM capability towards the outcome variables NVI and NVF is below the threshold (p -value < 0.5); therefore, the ESM capability has an influence on both. It means that when the ESM capability increases by one standard deviation unit, the endogenous constructs increase by 0.632 (ESM → NVF) and 0.701 (ESM → NVI) respectively.

The R^2 indicates the variance explained in an endogenous construct, and with levels of 0.400 for NVF and 0.492 for

⁷ The parameters for the outcome variables NVI and NVF in the structural model meet the reliability and validity criteria. For NVI, the R^2 is 0.492, composite reliability (ρ_a) is 0.952, AVE is 0.838, and Cronbach's alpha is 0.952. The loadings of the five items NVI1–NVI5 are between 0.882 and 0.929. For NVF, the R^2 is 0.400, composite reliability (ρ_a) is 0.953, AVE is 0.838, and Cronbach's alpha is 0.951. The loadings of the five items NVF1–NVF5 are between 0.856 and 0.937.

Table 4 Results of the structural model assessment

	<i>T-statistics</i> (<i>IO/</i> <i>STDEV</i>)	<i>p-values</i>	<i>Original</i> <i>sample</i> (<i>O</i>)	<i>R</i> ²	<i>Relationship</i> <i>validated</i>
ESM → NVF	15.960	0.000	0.632	0.492	Y
ESM → NVI	18.013	0.000	0.701	0.400	Y

NVI, the R^2 shows a moderate explanatory power. Typically, the f^2 effect size is only reported upon request, as it is similar to the R^2 value in terms of the order of relevance of the predictor construct explaining the dependent construct (Hair et al. 2022). However, since our interest lies with the (sub-) constructs of ESM as well, we calculated the f^2 size with regard to deleting the second-order constructs of ESM capability (OR, AR, TR, IR, PR respectively). The results show that the resources of ESM capability have a small effect on the outcome variables (f^2 varying between -0.006 and 0.049). For the Q^2 out-of-sample predictive relevance of the structural model, we used PLSpredict.⁸ For this, SmartPLS estimates the model on a training sample (Hair et al. 2022). The results range from the lowest 0.285 (NVF1, NVF2) to the highest 0.409 (NVI1), indicating an above-medium model ability to predict future observations. The CVPAT results⁹ suggest that our structural model has significantly better predictions than the naïve indicator-average prediction benchmark (average loss difference, NVF = -0.811 and NVI = -0.922 , both with a significant p -value). The linear model prediction benchmark has a non-significant and low difference in average loss, which does not meet the criteria for strong predictive validity (Sharma et al., 2023). Based on those values, we conclude that the nomological validity assessed with the two nomological relations towards NVI and NVF is provided. With the predictive assessment, we completed the structural model analysis (Table 4).

Further analysis and validation

We include several further assessments in order to deep dive into the model validation. First, we assessed the CMV with the MLMV approach by executing the PLS algorithm with and without the marker variable. The effect of the marker variable on the path coefficients ESM → NVI and ESM → NVF as well as the R^2 value of the outcome variables is neglectable (0.005 and 0.002 respectively). The correlation between any LV and the marker variable is significantly below the threshold of 0.3 (Table 5). Therefore,

we conclude that CMV is not an issue with our model and analysis.

In order to validate the model relationships between the lower- and higher-order constructs, we ran the whole three-stage formative ESM capability instrument in SmartPLS. We connected the first-, second-, and third-order constructs together, by using the formative lower-level indicators for the first-order constructs and the LV scores as single items for the second- and third-order constructs.

Before the relationship assessment, we validated the measurement model by checking the collinearity, significance, and relevance of the indicators.¹⁰ The VIF were all below 5. The significance of the weights as assessed by the outer weights' p -values was positive except ORC1, ORC3, and TRT3. However, based on Hair et al.'s (2021) recommendations, we kept all formative indicators due to their outer loading above 0.5 and their outer loading significance. For the path coefficients, all first- to second-order constructs have significant paths (p -value at 0.000), with the magnitude of relevance varying from weak (IRS → IR 0.202 or TRT → TR 0.256) to high (IRK → IR 0.839 or TRA → TR 0.784). We can conclude that the relationships between first- and second-order ESM constructs are validated (Table 6). For the path coefficients, all second- to third-order constructs also have significant paths (p -value at 0.000), with the magnitude of relevance varying from weakest (TR → ESM 0.036) to highest (PR → ESM 0.367). We can conclude that the relationships between second- and third-order ESM constructs are validated (Table 6).

Control variables

A final post hoc assessment was the evaluation of the significance and effect of our control variables on the endogenous variables. We conducted the bootstrapping calculations¹¹ for our structural model. We found that none of the control variables has a significant impact on ESM capability. For the outcome variables NVF and NVI, the results show that organization size, industry sector, business type, and headquarter country have no significant impact. Regarding individual controls, neither the ownership of an SM certification, the organizational work level, nor the belonging to the data sourcing pool has an impact on the outcome variables. However, years of SM experience and tenure influence the perception of IT performance significantly with a negative path. In detail, staff with less SM experience has a higher perception of NVI than staff with 7+ years (path coefficient 0.235). This could suggest that more experienced

⁸ The settings on PLSpredict were as recommended by Hair et al. (2022): no of folds, 10; no of repetitions, 10; fixed seed.

⁹ The settings on PLSpredict were similar as for the Q^2 calculation.

¹⁰ A redundancy analysis was already conducted in the "Assessment of first-order measurement model" section.

¹¹ For the control variable test, we used the faster results and 5000 subsample setting.

Table 5 Results of the MLMV test

<i>CMV</i>	<i>Path coefficient with-out marker</i>	<i>Path coefficient with marker</i>	<i>R² without marker</i>	<i>R² with marker</i>
ESM → NVI	0.701	0.696	0.492	0.492
ESM → NVF	0.632	0.634	0.400	0.401
<i>Marker to LV path coefficient</i>				
To ESM	0.152			
To NVI	0.030			
To NVF	−0.008			

professionals are either more critical about the organization or possess better know-how to assess the intra-organizational phenomena. Also, tenure changes the perception of IT and firm performance. Personnel with shorter tenure (less than 1 up to 5 years) has a higher perception of IT performance (NVI) than staff with 20+ years belonging (path coefficients 0.522, 0.526, 0.468).¹² This could suggest that newer employees are more optimistic about the company than long-term employees.

Discussion

This study is rooted in the SM research and is motivated by the question of *how we can parsimoniously and reliably measure an ESM capability through a validated scale-based instrument*. Based on the service system lens and existent literature, the ESM capability model comprises *organizational, architectural, technological, shared information, and people resources*. With data collected from German and Austrian IT consultants and international survey participants, we validated the ESM capability instrument using the PLS-SEM method.

To answer the research question, an ESM capability can be measured parsimoniously and reliably through the validated OATIP-based instrument (Fig. 2). The validity and adequacy of this instrument are supported by the PLS-SEM results. The measurement models of the first- and second-order constructs are confirmed to be significant and relevant. The structural model evaluation further confirmed that ESM capability is nomologically linked to IT performance and firm performance, as the R^2 indicates a moderate explanatory power. Moreover, the predictive relevance of the structural model (Q^2) suggests an above-medium model prediction ability. Further, we were able to validate the relationships between higher- and lower-order constructs of the ESM capability. Lastly, we accounted for various individual and organization-related control variables, which have no significant impact on the ESM capability, but partially on the

outcome variables. In sum, by validating the measurement and structural model, we have confirmed that the lower-level indicators have an impact on the sub-resources of ESM, and those in turn positively influence the OATIP resources of the ESM capability.

We observe a variance in path strengths, suggesting that some constructs have a stronger influence on ESM capability than others. In the measurement model, we observe weaker outer weights for indicators ARM1 (loose coupling of modules), ORC1 (customer needs satisfaction), and IRK1 (know-how transfer on SM) (Table 1). These results are particularly surprising for the customer needs satisfaction (item ORC1) and know-how transfer on SM (item IRK1), which according to literature and theory are prominent features. With the strong emphasis on increased value provision for the customer in SD-L theory and the focus on improved service value for the customer in ITSM (MacLean & Titah, 2023) as well as the ESM benefit of improved customer satisfaction (O'Connell & Drogseth, 2019), we would have assumed a strong indicator weight for ORC1. Similarly, with the emphasis on learning processes and knowledge transfer in theory (Maglio et al. 2009; Mele & Polese, 2011) as well as

Table 6 Results of the ESM construct validation

<i>Relationship</i>	<i>Estimate</i>	<i>p-value</i>	<i>Path coefficient</i>	<i>Outcome</i>
ORC → OR	+	0.000	0.643	Validated
ORV → OR	+	0.000	0.461	Validated
ARO → AR	+	0.000	0.606	Validated
ARM → AR	+	0.000	0.501	Validated
TRT → TR	+	0.000	0.256	Validated
TRA → TR	+	0.000	0.784	Validated
IRK → IR	+	0.000	0.839	Validated
IRS → IR	+	0.000	0.202	Validated
PRR → PR	+	0.000	0.344	Validated
PRE → PR	+	0.000	0.709	Validated
OR → ESM	+	0.000	0.202	Validated
AR → ESM	+	0.000	0.231	Validated
TR → ESM	+	0.000	0.036	Validated
IR → ESM	+	0.000	0.290	Validated
PR → ESM	+	0.000	0.367	Validated

¹² Three categories were significant with path coefficients for tenure: less than a year; 1–2 years; and 3–5 years.

the evident internal knowledge on ITSM transferrable to the business organization (ESM) (Hennhöfer 2017a), we would have assumed a strong indicator weight for IKR1. However, one has to consider the sum of formative indicators included in the ESM capability model and acknowledge that the number of significant indicator weights is limited, the greater the number of formative indicators (Hair et al., 2019).

In the structural model evaluation, we see that the technological resource (TR) has the least influence on ESM capability. This could feel striking, particularly as ESM has been criticized as serving to the benefits of SM platform vendors (Kahlout 2017). However, the finding is supported by broader IS literature. Gorla et al. (2010) find no direct significant association between system quality (i.e., software and data components) and organizational performance. Instead, they find evidence for an indirect relationship between system quality and organizational performance through information quality (i.e., outputs of the information systems). They argue that technical features of system quality are only remotely related to the impact they have on the organization. The use of modern technology or user-friendly features improves the information received (Gorla et al., 2010). Particularly from a user perspective, the used software or platform might indeed be viewed only as a means to the (information) end, and is, as long as no errors occur, quite invisible.

On the other hand, we see that the people resource (PR) has the strongest relationship with ESM capability. Although the strength of the relationship might surprise, the result is supported by literature. Any organizational transition requires proper change management and, with this, the inclusion of all aspects of the organization, particularly people. The research found that about 70% of change initiatives fail to achieve their goals due to employee resistance, lack of clear objectives, poor communication, and weak management support (Bellantuono et al., 2021).

Next, we found support for both nomological relations and concluded that ESM capability has a positive influence on an organization's IT (NVI) and overall firm (NVF) performance. The significant outcome constructs increase the confidence in the indicator validity of the ESM capability model (MacKenzie et al., 2011). The explanatory power (R^2) of ESM towards the outcome variables is satisfactory and in accordance with the literature findings that a portion of firm or IT performance is attributable to ESM. The positive impact on those outcomes underlines that ESM capability is a valuable concept to aspire to when aiming for organizational improvements. The stronger influence of ESM on IT rather than firm performance would be in accordance with our anticipation based on its IT architecture and ITSM origins as well as the complex nature of a firm's overall performance. The results are congruent with the findings from previous ITSM-related studies. Studies

from a literature review reported improved service quality and customer satisfaction, as well as improved functioning and coordination of the organization's IT functions (Iden & Eikebrokk, 2013). Some studies found support for financial gains like improved return on investments or IT resource utilization (Iden & Eikebrokk, 2013).

We believe that a large benefit of the validated ESM capability model is its holistic view and cross-field perspective. The ESM origins in ITSM and IT architecture fields allow to depict the ESM capability as a comprehensive enterprise instrument. Although both fields are service-oriented, the ITSM perspective provides stronger customer-centric and process-centric ESM indicators, while the IT architecture view includes system-centric indicators (Goscinska & Winkler 2022). The holistic, cross-field ESM view is supported by IS literature as well. While Hennhöfer (2017a) focuses on organizational service aspects of ESM, he describes ESM as an operative architecture model. On the other hand, while Härting et al. (2020) emphasize the enterprise architecture management aspect in a modern organization, they acknowledge the entanglement between IT architecture and other organizational dimensions. They state that the success of enterprise architecture is influenced by indicators like a defined framework, organizational culture, optimized business processes, or an improved IT-business connectivity (Härting et al., 2020). Therefore, we recommend the validated OATIP-based instrument as a comprehensive and well-structured ESM capability model for organizations.

Implications for research

This paper adds conceptually and empirically to the ESM literature, which is yet embryonic in the IS and IT management fields. The benefit for the IT and business communities lies in a proposition for a parsimonious, reliable, and validated scale-based instrument of ESM capability. One research-related implication that can be drawn from our analytical results is that each of the five OATIP resources and its ten sub-resources has its own unique validity and therefore should be considered in further theory building or construct development. By validating the ESM model, we ensured academic rigor, elevated the confidence in the scientific construct, and increased the credibility of the research (Straub et al., 2004). We acknowledge a need for further investigation, particularly when looking at the strength of outer weights for some formative indicators or the path coefficient of some sub-resources of ESM (exemplary of the weaker technological resources (TR) dimension). As our interest lies in initiating an academic debate around ESM and optimizing the validated ESM capability model, we welcome further research in this area.

Next, we see support for the assumption that organizational adaptation (towards ESM capability) is a service

innovation which generates new or more business value (reflected as IT and firm performance). A recent study on reference frameworks such as ITSM confirms that frameworks act as an organizational capability and orchestrate service innovation (Iden et al., 2020). The service- and customer-oriented nature of such reference frameworks, like ESM, increases the service climate and co-creation practices within a service system and thus facilitates service innovation, which is in turn a source of business value and advantage (Iden et al., 2020). Moreover, we can re-confirm the usefulness of the service system lens applied by Goscinska and Winkler (2023), since the theory-derived OATIP resources organization, architecture, technology, shared information, and people indeed represent a value co-creation configuration for the ESM capability. Each indicator in the resource configuration is able to re-compose during an organizational transformation journey. Through such a service innovation process, the ESM capability is generated in a service system.

ESM should therefore gain more attention from researchers interested in service-related topics. Our work fits well in the recent service research priorities which address issues such as restructuring resource configurations in organizations in uncertain environments, the role of technology and artificial intelligence in service provisioning, or the tracking and improvement of service performance as well as customer experience in service provisioning (Ostrom et al., 2021).

Lastly, we showcase how to evaluate a third-order formative construct with the PLS-SEM method. This is particularly valuable because the formative, hierarchical nature of the ESM capability model is so far quite underrepresented in literature, yet in a strong need for application guidelines (Hair et al., 2017; Becker et al. 2012). We support studies with a focus on formative higher-order constructs, as they are particularly beneficial for deriving practical implications, allowing managers to identify actionable drivers (items) beyond the overall construct (Becker et al. 2012). Future research may build upon our methodological application, which we strived to present in a transparent, comprehensible, and reproducible manner.

Implications for practice

Our research benefits the practice community in several ways. Primarily, managers and decision-makers are offered a scientifically grounded and validated ESM capability instrument, which can help to initiate or continue with the company's transformation journey. The ESM capability model could be applied as a blueprint to identify improvement areas, conduct cost calculations, or even establish an implementation plan (Goscinska & Winkler 2023). With the conducted validation of a scale-based ESM instrument, we can offer managers a more tangible and credible instrument

for decision-making. Applying a range of analytical assessments, including predictive benchmarking, strengthens the generalizability and increases the confidence in the presented model (Sharma et al., 2023). The scale-based instrument is helpful in structuring the company's capabilities, but also as a useful tool for a maturity assessment of each (sub-) resource of ESM capability. With the help of the validated ESM capability model, enterprises can initiate a holistic status quo analysis of their organization-wide ESM transformation, while at the same time being able to dive deeper into particular indicators of the sub-resources.

On the other hand, if the organization is already in the implementation phase, the validated ESM capability model can be used as a progress measure instrument. The sum of the scale-based ESM indicators (characteristics) could also figure as a supportive transformation checklist. Exemplary, has the company considered employee adaptation (PRE) or internal knowledge buildup (IRK) next to the commonly regarded application of technological advances (TRA) or customer-centric setup (ORC)? If management is not sure where to start or which elements to prioritize, we recommend using the path strength of the (sub-)resources towards IT or firm performance to determine the implementation order. With a validated instrument, organizations can quantitatively and consistently measure their ESM capability progress against their target. We emphasize that ESM is an evolving type of organizational ability and could or even should be developed in a rather iterative, gradual approach (Goscinska & Winkler 2023).

Limitations and further research

The following limitations of our research merit consideration. When theoretical or methodological decisions are made during the research process, there is usually an alternative pathway. However, we have tried to provide transparent and literature-driven choices to our analysis. We acknowledge that, despite pre and post hoc countermeasures, there might be unconscious biases hidden in our survey sample. Our data acquisition focus on SM professionals could have led to specific conclusions; therefore, we suggest our findings to be generalized with caution. However, it is to be noted that we did not find a significant difference in the control variable on the ownership of an SM certification. Lastly, during our measurement model validation, we consciously opted for a lenient significance assessment of formative indicators, by following the decision tree of Hair et al. (2021). This was in favor of the models' full capture of the whole construct domain, as removing a formative indicator could reduce content validity (Hair et al., 2019).

Future research offers multiple opportunities to deep dive into the validated ESM capability model. As mentioned in the research implication section, we propose an open debate

on the optimization of the ESM capability, using the validated ESM capability model as a basis. With further quantitative analysis based on different samples, or different methods, new perspectives might be added. Exemplary, by applying configurational methods such as fuzzy set qualitative comparative analysis, one would be able to gain a more nuanced view on the conditions which lead to the successful outcome of ESM capability. Moreover, the ESM findings in PLS-SEM could benefit from a multigroup analysis, as it offers a more differentiated picture of the influence of moderators on a model (Hair et al. 2022). Analyzing particular interest groups, e.g., based on the industry sector or company size, allows for more tailored recommendations.

Furthermore, qualitative research in the form of case studies or interviews could offer detailed findings on the particularities of ESM capability, its implementation efforts, or organizational benefits. Lastly, what would be of further interest is the relationship of ESM with its genesis framework ITSM, to determine implementation dependencies and synergies. Exemplary, a recent study found that ITSM can be viewed as a set of different control systems influencing the IT function, and the impacts of ITSM on the IT function include transparency and productivity (MacLean et al. 2023). Applying the ITSM findings towards ESM examples could showcase the commonalities and differences between the application of SM in the IT versus business (non-IT) sphere of an organization.

Conclusion

In this research paper, we have recognized ESM as a beneficial approach towards organizational service workflows, yet also identified an analytical and methodological void for organizations in how to measure their ESM capability. The precursory conceptual OATIP-based model, based on the service systems lens and relevant literature, was operationalized into five resources: organizational, architectural, technological, information, and people resources. Through the measurement and structural model validity tests with the PLS-SEM method, we were able to validate the ESM capability model as well as find support for the positive nomological relations between ESM and IT and overall firm performance. The answer to our research question is, thus, that an ESM capability can be measured parsimoniously and reliably through the validated OATIP-based instrument.

Our contribution to this paper is empirical, as with a validated ESM capability model researchers can apply a measurable instrument to future studies. Conceptually, we strengthen the academic position of ESM in the IS and IT management literature. Practically, decision-makers are provided with a tangible set of characteristics across multiple enterprise resources to continue their organizational

transformation. Overall, the validated ESM capability model based on the OATIP resources offers a comprehensive and trustworthy ESM instrument.

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