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## Service innovation quality in healthcare: service innovativeness and organisational renewal as driving forces

Yu Mu <sup>a,b\*</sup>, Bart Bossink<sup>b</sup> and Tsvi Vinig<sup>c</sup>

<sup>a</sup>*Glorious Sun School of Business and Management, Donghua University, Shanghai, People's Republic of China;* <sup>b</sup>*Section Science, Business and Innovation, Vrije Universiteit Amsterdam, Amsterdam, Netherlands;* <sup>c</sup>*Section Entrepreneurship and Innovation, University of Amsterdam Business School, Amsterdam, Netherlands*

Drawing on an integration of service-dominant (S-D) logic and the dynamic capabilities approach, this study focuses on the relatively under-researched issue of service innovation quality in healthcare services. We propose a conceptual framework for the relationships between user-induced and organisation-based renewal, and service innovation quality in the healthcare sector. By putting service innovativeness and organisational renewal at the input side of the healthcare organisations' value creation process, and treating service innovation quality as an output, this study hypothesises direct relationships between these two ends. We conducted an empirical study in the Dutch healthcare sector. Based on data from 168 service innovation projects in Dutch healthcare organisations, the empirical study verifies these hypothesised relationships. The results reveal that both service innovativeness and organisational renewal are significant antecedents of quality improvement of the healthcare service innovations in these projects. This study provides theoretical and managerial implications for improving the quality of healthcare service innovations. The key managerial insight is that healthcare organisations are implicated to pay more attention to continuous renewal of value propositions to their users/patients, as well as to continuous renewal of their organisations' functioning.

**Keywords:** service innovation; innovation quality; service innovativeness; organisational renewal; healthcare

### 1. Introduction

Healthcare significantly affects quality of life and well-being of individuals and collectives (Berry & Bendapudi, 2007; Ostrom, Parasuraman, Bowen, Patrício, & Voss, 2015). Coping with quality pressures and aiming to capture future clinical and technological opportunities, the healthcare sector is active in *service innovation*, and introducing new healthcare services and procedures (Srivastava & Shainesh, 2015). This study views *service innovation* as any change that affects one or more terms of one or more service characteristics (Gallouj & Weinstein, 1997).

Numerous matters, however, challenge service management, quality control and quality improvement for healthcare service providers (Berry & Bendapudi, 2007). The complexity of the healthcare context may distinguish the innovation management concept in healthcare from that in other service sectors (Braa, Hanseth, Heywood, Mohammed, & Shaw, 2007). *Service innovation quality*, as the intersection of service innovation and quality management, has been paid scant attention to, both in theory and

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\*Corresponding author. Email: [muyu@mail.dhu.edu.cn](mailto:muyu@mail.dhu.edu.cn); [y.mu@vu.nl](mailto:y.mu@vu.nl)

practice. We define *service innovation quality* as the conformance of a service innovation's operational outcomes to the desired specifications.

Some studies on a prevailing issue of value creation in service innovation have emerged in other service sectors (e.g. Chen, Kerr, Tsang, & Sung, 2015; O'Cass & Sok, 2013; Skålén, Gummerus, von Koskull, & Magnusson, 2015). However, with some exception (e.g. Srivastava & Shainesh, 2015), it is still underexplored how value is created in healthcare organisations' service innovation processes, where this value comes from, and what kinds of value can be assessed. This study responds to calls from service researchers for (1) a better understanding of both service innovation and its value creation aspect, and (2) scientific research on healthcare services and matters of well-being (Berry & Bendapudi, 2007; Ostrom et al., 2015).

Taking a look at two ends of the value creation process in healthcare service innovation, i.e. input and output, this study aims to answer the question underlying this research: What are the antecedents of service innovation quality in healthcare? We attempt to address this question from the perspective of how healthcare organisations provide increased value by means of service innovations. The unit of analysis in this study is healthcare service innovation, achieved by means of a project. We propose that at the input side of a healthcare service innovation project, value is increased by renewing the organisation's internal functioning as well as renewing its user/patient approaches. At the output end, we use the quality of the service innovation that is developed by means of the project as an indicator of increased value in the healthcare service innovations.

The stream of research on service-dominant (S-D) logic views users/patients as value co-creators in the healthcare service production and delivery processes (Srivastava & Shainesh, 2015; Vargo & Lusch, 2016). Organisations' contribution in the value creation process is to offer new/improved value propositions to satisfy their customers/users/patients. The dynamic capabilities approach conceptualises organisations as entities that integrate, build and reconfigure internal and external resources and competences into new market/user/patient propositions to respond to rapidly changing environments (Teece, 2007). Such internal and external renewal can contribute to service innovation quality. One aspect of potential improvement of service innovation quality – based on S-D logic – is to renew the organisation's value propositions to markets/users/patients, i.e. *service innovativeness* (Calantone, Chan, & Cui, 2006; Gatignon & Xuereb, 1997); the other – based on a dynamic capabilities approach – is to opt for the renewal of organisation's internal functioning, i.e. *organisational renewal* (Danneels, 2002; Floyd & Lane, 2000).

The objective of this study is to identify and then substantiate these two pathways in healthcare. Based on an integration of S-D logic and the dynamic capabilities approach, this study puts forward a theoretical conceptual framework and its related hypotheses, and then empirically tests these hypotheses. We conducted an empirical study in the Dutch healthcare sector to test our hypotheses. The sample consists of 168 respondents who are active in healthcare service innovation projects. A main outcome is that Dutch healthcare organisations in their projects complete high-quality service innovations through renewing their value propositions to users/patients, and/or renewing their organisational functioning.

The remainder of this paper is organised as follows. In the next section, we develop and formulate the theoretical background of the proposed conceptual framework and hypotheses. The method is crafted to formally test the hypotheses in the third section. Finally, we present the empirical results and a detailed discussion with main findings, implications and opportunities for further research, respectively, in the fourth and fifth section.

## 2. Theoretical background

### 2.1. Basic approach

In terms of value creation in the service innovation process, few studies have concentrated on it in general, or particularly in the healthcare sector. Among them, O’Cass and Sok (2013), Chen, Kerr, et al. (2015) and Srivastava and Shainesh (2015) focused on business-to-business services, knowledge-intensive business services and healthcare services, respectively. Studies on service innovation widely applied either S-D logic (e.g. Skålén et al., 2015; Srivastava & Shainesh, 2015) or the dynamic capabilities approach (e.g. Chen, Kerr, et al., 2015; Kindstrom, Kowalkowski, & Sandberg, 2013). We adopt an integrated approach in the emerging field of value creation in healthcare service innovation, by combining S-D logic and the dynamic capabilities approach.

*Service-dominant (S-D) logic* views customers/users/patients as co-creators of value, and organisations as providers of related value propositions (Vargo & Lusch, 2016). In a healthcare context, users/patients and healthcare organisations co-create value in their interactions with each other. The *dynamic capabilities approach* suggests that the renewal of resources and competences offers service organisations sustainable competitive advantages (Teece, 2007). It deals with capabilities of sensing, seizing and reconfiguring, and provides a perspective from which to undertake service innovation and strategic renewal (Chen, Kerr, et al., 2015; Kindstrom et al., 2013).

By integrating and emphasising S-D logic and the dynamic capabilities approach, healthcare organisations can gain sustainable strategic benefits from their service innovations. A focus on S-D logic leads healthcare organisations to value co-creation efforts. And by means of sensing, seizing and reconfiguring activities, healthcare organisations can implement renewal to serve users/patients in a changing healthcare context. We propose that innovating healthcare organisations need to invest in searching for and finding opportunities of service innovation (sensing). Next, they develop service innovations through exploring or exploiting these innovation opportunities (seizing). And then healthcare organisations work on accordingly transforming and recombining their resources and competences to serve the focal users/patients with these service innovations (reconfiguring).

### 2.2. Service innovativeness

*Service innovativeness* refers to the uniqueness or novelty of a service to the market or user groups, which we adapt from the concept of product innovativeness (Ali, Krapfel, & Labahn, 1995). Organisations strive for service innovativeness to keep in close touch with customers/users and their needs (Gatignon & Xuereb, 1997).

To a certain degree, customers/patients of healthcare organisations differ from customers in other service sectors. For instance, they are usually sick and under stress, and reluctant for ‘unwanted’ or ‘annoying’ healthcare services (Berry & Bendapudi, 2007). Serving them and meeting their specific demands and preferences present unique challenges to healthcare service providers. It is especially crucial for healthcare organisations to capture users’/patients’ needs and wants, and understand and handle the conflicts between their needs and wants.

In S-D logic, value is not just simply added to services by the service providers, but also determined by the customers/users as the beneficiaries (Vargo & Lusch, 2016). A central criterion of service innovativeness is whether a significant increase in customer/user value is proposed in comparison to prior offerings (Schultz, Salomo, & Talke,

2013). Service innovativeness introduces a new way to satisfy customers'/users' requirements, and opens up a new possibility to them (Ali et al., 1995). Services that are designed to be unique, reliable and of high quality, are often considered successful (Cooper & de Brentani, 1991).

For incremental service innovations, focusing on new ways to fulfil customers'/users' previously unsatisfied needs, and providing them with a more satisfying experience or solution to their problem, can be an important basis for the differentiation of offerings (Berry, 1995; de Brentani, 2001). For radical service innovations, one-of-its-kind services establish a new service category or create a totally new market (Kock, Gemünden, Salomo, & Schultz, 2011; Schultz et al., 2013).

### 2.3. *Service innovation quality*

In the literature, service innovation performance is assessed as a multidimensional construct that reflects both operational and marketplace facets (Carbonell, Rodriguez-Escudero, & Pujari, 2009; Menor, Tatikonda, & Sampson, 2002). The majority of research on service innovation has focused on its performance from a market/outcome perspective, with comparably fewer attempts to empirically address its operational/process performance (e.g. Atuahene-Gima, 2003; Froehle, Roth, Chase, & Voss, 2000). As the demand for exploring the wider performance benefits of service innovation is growing (Menor et al., 2002), we concentrate on value creation in the service innovation process to investigate the performance in terms of *service innovation quality*.

Adapted from Carbonell et al. (2009), *service innovation quality* in this study describes the conformance of service innovation outcomes to the pre-set performance specifications. The concept of service innovation quality is similar to what others have labelled as *conformance quality* (Wu, 2010) and *innovation process quality* (Dervitsiotis, 2011). Due to the intangible characteristics of service and various categories of service innovation, we do not limit service innovation quality to the quality of a finally offered service. It also incorporates the conformance of other parts that are associated with the whole innovation process (e.g. changes of the service delivery approach, or the introduction of a new technology).

In the setting of healthcare, through renewing the service value proposition by means of a service innovation project, healthcare organisations improve their service innovativeness, resulting in a totally new or an improved service. This new/improved service aims to better satisfy users'/patients' needs, and induce renewal and value in a user/patient context. Unique and differentiated products or services tend to have product advantages, with relative higher quality than other similar offerings (Calantone et al., 2006; Gatignon & Xuereb, 1997; Montoya-Weiss & Calantone, 1994).

Based on the above theoretical points of departure, we put forward the first hypothesis as follows.

*Hypothesis 1.* Service innovativeness positively affects service innovation quality in healthcare organisations.

### 2.4. *Organisational renewal*

*Organisational renewal* in this study involves the building of new or changes of existing organisational resources and capabilities (Danneels, 2002). *Organisational renewal* is different from the broad concept of *strategy renewal*, but similar to *competence modification*, as one sub-process of strategy renewal (Floyd & Lane, 2000). Many approaches

help to enhance an organisation's operational competencies and resource integration, such as a new established innovation-oriented culture, and optimised structure, processes and practices (Kock et al., 2011; Schultz et al., 2013).

By developing internal resources and capabilities, service organisations are better able to recognise, shape and exploit (sense, seize and reconfigure) opportunities to co-create value in service innovation (Kowalkowski, 2011). Either a new operational method, service delivery system or marketing approach, helps to solve customers'/users' problems and provide new/improved service value. The healthcare context is characterised by multiple stakeholders and strong networks (Braa et al., 2007). The rapid changes in this context largely impact healthcare organisations. Organisational renewal is relevant to create the flexibility to respond to these changes in the organisations' external environment (Floyd & Lane, 2000), also for healthcare service providers.

Organisational renewal deals with organisations' resources and competencies from a dynamic perspective, and not opposing to organisational synergy. The concept of *organisational synergy* suggests that developing a service innovation by closely relying on the service organisations' current internal resources and competences seems to enhance performance or achieve success (Cooper & de Brentani, 1991; Song & Parry, 1997). Organisations with a wide range of technological, marketing and/or managerial synergy are confronted with the importance of sticking to their core capabilities (Danneels & Kleinschmidt, 2001). Also, they encounter obstacles to organisations' internal renewal. These obstacles include employees' resistance to changes (Amabile, Conti, Coon, Lazenby, & Herron, 1996) and organisations' self-reinforcement of historical paths (Schreyögg & Kliesch-Eberl, 2007).

In a healthcare setting, through renewing their internal functioning by means of a service innovation project, healthcare organisations acquire totally new or enhance existing operational capabilities (Calantone et al., 2006). These new/enhanced capabilities induce the renewal and value in an organisational context, and ensure the quality of the outcome of this service innovation project. Therefore, we expect that this healthcare service innovation has relatively higher innovation quality outcomes than its pre-set performance specifications and other similar innovations. Considering a similar reasoning for service innovativeness, we hypothesise the following linear and positive relationship between organisational renewal and service innovation quality.

*Hypothesis 2.* Organisational renewal positively affects service innovation quality in healthcare organisations.

The relationships that we put forward in these two hypotheses are shown in the research framework (depicted in Figure 1).

Project complexity (PC), user context turbulence (UCT) and technological turbulence (TT) are included as control variables for service innovation quality. These three covariates are related to broad uncertainties in service innovation projects. PC indicates uncertainties within the innovating organisation. UCT and TT are controlled for environmental uncertainties and complexity (Calantone, Garcia, & Droge, 2003).

### 3. Method

#### 3.1. Sample and response

With regard to the value-creating mechanisms of healthcare service innovation, Srivastava and Shainesh (2015) launch a representative study by means of a qualitative research design. We conduct a survey-based, quantitative study in this area, which to date



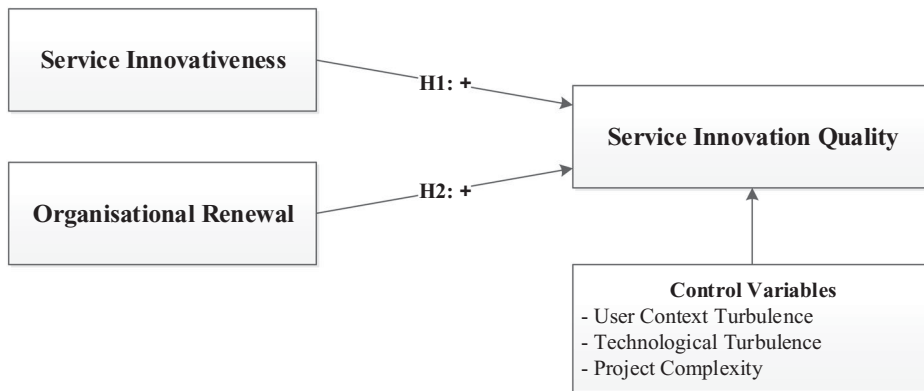


Figure 1. Proposed conceptual framework.

remains relatively scarce. The empirical setting for this study is the Dutch healthcare sector. The unit of analysis is a healthcare service innovation that is realised in a project. This study employs a key informant approach to collect empirical data, due to the precedent of its use in innovation research at the project level (e.g. Chen, Neubaum, Reilly, & Lynn, 2015).

We drew a list of organisations operating in the Dutch healthcare sector from the REACH (Review and Analysis of Companies in Holland) directory. These healthcare organisations include hospitals, medical centres, clinics, medical group practices and so on. Leaders who are in the position of managers (e.g. owner, chairman, director, head of department) or specialists who are involved in innovation or R&D activities (e.g. project leader, scientist) are targeted as potential respondents. Employees who meet these criteria for inclusion are likely to have responsibility for, and/or extensive knowledge of service innovation activities in their organisations.

We carried out an online questionnaire survey to 1598 key informants. A two-round pre-test and an online pilot test confirmed the appropriateness of the questionnaire. We sent out two reminders to the non-respondents. After three e-mailing rounds, we collected a total of 168 usable questionnaires, representing a response rate of 10.5%. The service innovation projects in which the respondents are active cover a broad spectrum of healthcare service innovations. Referring to the categorisation of Avlonitis, Papastathopoulou, and Gounaris (2001), we classify the innovations in the projects as new-to-the-market services (e.g. apps with medical instructions for patients), new or modified service lines (e.g. websites or long-time telephone services of medical consultation), new delivery processes (e.g. e-health platforms and modules), incremental service improvements (e.g. increased intensity of rehabilitation), repositioning of existing services (e.g. redesign of the mission and ambition), to cost-reducing innovations (e.g. introduction of lean management). Tables 1 and 2 show the projects' composition and respondents' demographic characteristics, respectively.

On a five-point scale, the mean of the key informants' knowledgeability is 4.48, and the mean of their involvement degree is 4.42. Considering the respondent's role in the innovation project, 44% is project leader, 33% is supervisor and 19% is member of the project team. Only 4% (7 respondents) is not involved in the project, and has a relatively low average knowledgeability of 2.71, which is still above the middle value of 2.5. The composition of the projects and characteristics of the respondents verify the appropriateness of these samples and key informants.



Table 1. Projects' composition.

Project category			Project duration			Project team size <sup>a</sup>		
Category of the innovation	<i>n</i>	%	Month	<i>n</i>	%	Range	<i>n</i>	%
New-to-the-market service	47	28.0	≤1	6	3.6	≤1–4	70	41.7
New service line	16	9.5	2–6	21	12.5	5–9	60	35.7
Addition to existing service line	18	10.7	7–12	37	22.0	10–14	16	9.5
New delivery process	6	3.6	13–18	30	17.9	15–19	5	3.0
Improvements/Revisions to existing service	48	28.6	19–24	31	18.5	20–24	2	1.2
Service repositioning	7	4.2	≥25	43	25.6	≥25	15	8.9
Cost reduction	7	4.2						
Other	19	11.3						
Total	168	100	Total	168	100	Total	168	100

<sup>a</sup>Number of employees in the project team.

We conducted two post hoc tests to assess common method bias. Harman's single-factor test and a common method variable approach suggest no serious problems with common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To test for non-response bias, we compared the answers from the early and late respondents (Armstrong & Overton, 1977). A series of Mann–Whitney *U* tests reveal no significant differences between two subgroups ( $p < .05$ ).

### 3.2. Measures

We employed reflective measurement models for all the latent variables. Measurement items of the constructs are mostly based on existing scales that have shown reliability and validity in previous studies. Unless noted otherwise, five-point Likert-style scales were used (1 = 'strongly disagree' to 5 = 'strongly agree'). Table 3 gives a measurement summary with all items, and their sources and loadings.

We used a relative measure of three items for *service innovation quality*, which is adopted from Kessler and Bierly (2002) and Lin, Huang, and Chiang (2012).

A three-item scale for market innovativeness from Schultz et al. (2013) is adapted to measure *service innovativeness*.

We combined three items measuring organisational innovativeness from Schultz et al. (2013) with one additional item from Avlonitis et al. (2001), to measure *organisational renewal*.

For these control variables, we measured UCT and TT by a four-item scale for each (Candi, van den Ende, & Gemser, 2013; Danneels & Sethi, 2011; Dayan & Di Benedetto, 2011). Three indicators are included for PC.

## 4. Analysis and results

### 4.1. Measurement properties: measurement model assessment

We applied SmartPLS 3 to obtain partial least squares structural equation models (PLS-SEMs) for both the measurement and the structural model. PLS-SEM is employed, as it is based on a distribution-free assumption, and exhibits higher statistical power than covariance-based structural equation modelling for models with relatively small samples (Sarstedt, Hair, Ringle, Thiele, & Gudergan, 2016). Two items (TT4 and PC3)

Table 2. Respondents' demographic characteristics.

Gender			Age			Education			Work experience		
Category	<i>n</i>	%	Year	<i>n</i>	%	Category	<i>n</i>	%	Year	<i>n</i>	%
Male	100	59.5	26–35	26	15.5	High school or less	2	1.2	1–2	10	6.0
Female	68	40.5	36–45	38	22.6	Some college	4	2.4	3–5	41	24.4
			46–55	58	34.5	Bachelor's degree	30	17.9	6–10	37	22.0
			≥56	46	27.4	Master's degree	71	42.3	11–15	28	16.7
						Doctoral degree	57	33.9	16–20	15	8.9
Total	168	100	Total	168	100	Other	4	2.4	≥21	37	22.0
						Total	168	100	Total	168	100

Table 3. Items for construct measurement<sup>a</sup>.

Type of construct	Construct <sup>b</sup> (Source)	Measure of construct	OL	HCL
Dependent variable	Service innovation quality (SIQ) (Kessler & Bierly, 2002; Lin et al., 2012)	Quality of the innovation was better than that of ... SIQ1. ... the pre-set performance specifications SIQ2. ... our similar completed innovations SIQ3. ... similar innovations completed by other organisations	0.79 **** 0.87 **** 0.87 ****	0.31 0.25 0.29
Independent variables	Service innovativeness (SI) (Schultz et al., 2013)	SI1. The innovation offered new user value not offered before by any other services SI2. The innovation created a totally new service category SI3. The innovation changed the way our user context functions	0.77 **** 0.78 **** 0.74 ****	0.28 0.32 0.31
	Organisational renewal (OR) (Avlonitis et al., 2001; Schultz et al., 2013)	In order to develop and introduce the innovation, we had to significantly change our ... OR1. ... organisational structure OR2. ... service delivery system OR3. ... organisational culture OR4. ... R&D and/or marketing practices	0.73 **** 0.85 **** 0.82 **** 0.82 ****	0.20 0.24 0.21 0.31
Control variables	User context turbulence (UCT) (Danneels & Sethi, 2011; Dayan & Di Benedetto, 2011)	UCT1. Users' demands and preferences changed quite a bit over time UCT2. Users tended to look for new services all the time UCT3. We witnessed demands for our services from users who were never served by us before UCT4. New users tended to have service-related needs that were different from those of our existing users	0.70 **** 0.71 **** 0.77 **** 0.80 ****	0.22 0.15 0.42 0.36
	Technological turbulence (TT) (Candi et al., 2013; Danneels & Sethi, 2011)	TT1. The technology in our industry changed rapidly TT2. Technological changes provided big opportunities in our industry TT3. A large number of innovative ideas have been made possible through technological breakthroughs in our industry TT4. Technological developments in our industry were rather minor <sup>cR</sup>	0.93 **** 0.92 **** 0.88 ****	0.23 0.18 0.13

(Continued)

Table 3. Continued.

Type of construct	Construct <sup>b</sup> (Source)	Measure of construct	OL	HCL
	Project complexity (PC) (self-developed)	PC1. The innovation project is complex	0.91 ****	0.27
		PC2. Project duration <sup>d</sup>	0.69 ****	0.15
		PC3. Project team size <sup>ce</sup>		
n.a.	Respondent's knowledgeability	Your knowledge of the innovation project is extensive	n.a.	n.a.
n.a.	Respondent's degree of involvement	Your degree of involvement in the innovation project is high	n.a.	n.a.

Notes: All items were scored on a five-point Likert-style scale (1 = 'strongly disagree' to 5 = 'strongly agree') unless indicated otherwise.

\*\*\*\* $p < .001$ ; two-tailed.

<sup>a</sup>OL = Outer loading, HCL = Highest cross loading, n.a. = not applicable.

<sup>b</sup>Name of each construct matches with the name in the conceptual framework in Figure 1.

<sup>c</sup>Item deleted.

<sup>d</sup>Six-point rating scale: 1 =  $\leq 1$  month, 2 = 2–6 months, 3 = 7–12 months, 4 = 13–18 months, 5 = 19–24 months, and 6 =  $\geq 25$  months.

<sup>e</sup>Six-point rating scale: 1 = 1–4 employees, 2 = 5–9 employees, 3 = 10–14 employees, 4 = 15–19 employees, 5 = 20–24 employees, and 6 =  $\geq 25$  employees.

<sup>f</sup>Reverse coded.

were deleted after comprehensive consideration of their outer loading (OL), composite reliability (CR) and average variance extracted (AVE) (Hair, Ringle, & Sarstedt, 2011).

For all constructs, their CRs reach values above the required threshold of 0.7, suggesting a satisfactory internal consistency reliability (Hair, Hult, Ringle, & Sarstedt, 2017). OLs of most indicators are above the rigorous cut-off value of 0.708 for indicator reliability (Hair et al., 2011). All AVEs exceed the recommended threshold of 0.5 for convergent validity (Fornell & Larcker, 1981). We inspected discriminant validity in three ways: the Fornell-Larcker criterion, assessment of the cross-loadings and the Heterotrait–Monotrait (HTMT) approach (Fornell & Larcker, 1981; Hair et al., 2011; Henseler, Ringle, & Sarstedt, 2015). Overall, almost all measures meet or exceed the recommended values, indicating an adequate level of reliability and validity. These related indexes can be found in Tables 3 and 4.

#### 4.2. Hypotheses testing: structural model estimation and evaluation

We investigated the direct effects of the model for the hypothesised effects. All variance inflation factors (VIFs) are less than 1.24, which are well below the cut-off point of 5, so we perceive no severe collinearity problems (Hair et al., 2017).

The coefficient of determination ( $R^2$ ) and Stone-Geisser's  $Q^2$  are examined to assess the model's predictive accuracy and relevance. A blindfolding procedure is used to obtain the  $Q^2$  value. The  $R^2$  and  $Q^2$  value of service innovation quality is 0.213 and 0.125, respectively.

We used a bootstrapping procedure (5000 samples; 168 cases; no sign changes) to test the statistical significance of path coefficients. In support of both hypotheses, the results reveal that service innovativeness ( $H1$ ,  $\beta = 0.18$ ,  $f^2 = 0.033$ ,  $p < .01$ ) and organisational renewal ( $H2$ ,  $\beta = 0.14$ ,  $f^2 = 0.023$ ,  $p < .05$ ) positively affect service innovation quality. Both positive effects are verified with a significant path coefficient and small  $f^2$  effect size (see Table 5).

The effect of service innovativeness ( $\beta = 0.18$ ,  $f^2 = 0.033$ ,  $q^2 = 0.013$ ) on service innovation quality is higher than that of organisational renewal ( $\beta = 0.14$ ,  $f^2 = 0.023$ ,  $q^2 = 0.012$ ). Both path coefficient and effect sizes confirm this conclusion.

## 5. Discussion

### 5.1. Summary of findings

Some main findings can be summarised from our research. Firstly, this study empirically supports our hypothesis that service innovativeness positively affects healthcare service

Table 4. CR, AVE, square root of AVE, correlations and HTMT ratios of the constructs.

Construct	CR	AVE	1	2	3	4	5	6
1. Service innovation quality	0.88	0.71	(0.84)	0.44	0.32	0.35	0.22	0.40
2. Service innovativeness	0.81	0.58	0.32	(0.76)	0.33	0.50	0.22	0.31
3. Organisational renewal	0.88	0.65	0.28	0.24	(0.81)	0.26	0.14	0.33
4. User context turbulence	0.83	0.55	0.28	0.36	0.21	(0.74)	0.17	0.16
5. Technological turbulence	0.94	0.83	0.21	0.19	0.13	0.15	(0.91)	0.08
6. Project complexity	0.78	0.65	0.26	0.17	0.23	0.06	0.07	(0.80)

Notes: The square roots of AVE values are shown on the diagonal (between parentheses). Correlations and HTMT ratios are reported in the lower and upper half of the matrix, respectively.

CR = Composite reliability; AVE = Average variance extracted; HTMT = Heterotrait–Monotrait.

Table 5. Results of hypotheses testing.

Path	Path coefficient ( <i>t</i> -value)	$f^2$ effect size	$q^2$ effect size	Hypothesis supported?
Service innovativeness → SIQ	0.18 (2.69)***	0.033	0.013	H1 – Yes
Organisational renewal → SIQ	0.14 (2.18)**	0.023	0.012	H2 – Yes
User context turbulence → SIQ	0.16 (2.13)**	0.027	0.015	
Technological turbulence → SIQ	0.12 (1.79)*	0.017	0.007	
Project complexity → SIQ	0.18 (2.98)***	0.039	0.020	

Note: SIQ = Service innovation quality.

\*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .1$ ; two-tailed.

innovation quality. Previous research has found that the innovativeness of manufactured products is positively related to their product advantage, and product quality is an essential aspect of product advantage (Calantone et al., 2006; Gatignon & Xuereb, 1997; Montoya-Weiss & Calantone, 1994). Our revealed relationship of innovativeness and quality in healthcare service is in line with the link between innovativeness and product advantage in manufacturing sectors. Like organisations in manufacturing and other service contexts, healthcare organisations achieve service innovativeness in order to increase user/patient value and fulfil their unsatisfied needs, by providing users/patients with totally new ways of patient care, and more satisfying experiences or problem solutions (Ali et al., 1995; Berry, 1995; de Brentani, 2001). We find that healthcare organisations renew their service value propositions in service innovation projects, and accomplish good quality innovation outcomes. This can be illustrated by a great number of practical service innovation examples from our data. Examples in the Dutch healthcare organisations include: applying advanced technologies (e.g. image care, remote technology) in existing care processes; providing new online treatments via websites to specific patient groups (e.g. girls with an eating disorder); and developing new therapy modules.

Secondly, the empirical results support our hypothesis that organisational renewal has a positive effect on healthcare service innovation quality. Although Kock et al. (2011) verified that organisations' internal changes had a negative impact on commercial success of new products (i.e. market performance), the scope of our study is different and encompasses innovation quality (i.e. operational or process performance). Also, prior findings have shown that organisational synergy increases innovation performance (Danneels & Kleinschmidt, 2001), and specifically the implementation quality (Song & Parry, 1997). As organisational renewal and organisational synergy are not two opposite concepts, there is no contradiction in these empirical findings between our study and the extant literature. Through renewing internal capabilities and resources, organisations enhance operational capabilities and resource integration (Calantone et al., 2006). It is also the case for healthcare organisations. Our empirical evidence indicates that numerous innovation practices in Dutch healthcare services produce quality outcomes. These practices involve optimised operational methods (e.g. development of a client administration system), improved service delivery systems (e.g. introduction of lean management for large patient groups) and new marketing approaches (e.g. 100% responsible e-consultation).

Furthermore, we empirically demonstrate that the effect of service innovativeness on healthcare service innovation quality is relatively higher than the effect of organisational renewal. Previous research has not estimated these distinct effects by simultaneously entering both antecedents in one procedure (i.e. simultaneous estimation), hence no comparable results have been found. Renewing value propositions and renewing internal

resources and capabilities both incorporate considerable uncertainties. But due to the barriers and resistance to organisation renewal from employees and the organisation itself (Amabile et al., 1996; Schreyögg & Kliesch-Eberl, 2007), renewing internal resources and capabilities is less effective for increasing healthcare service innovation quality. Besides, renewing the organisational structure and system also supports future innovation activities and projects (Danneels, 2002). Therefore, organisational renewal may have other positive effects on future innovation projects' outcomes apart from the focal one.

### **5.2. Theoretical and managerial implications**

Extant literature on the issue of value creation in service innovation mainly focuses on the economics-oriented service sector, e.g. business-to-business services and knowledge-intensive business service (Chen, Kerr, et al., 2015; O'Cass & Sok, 2013). Investigating the service-dominant (S-D) logic (Vargo & Lusch, 2016) and the dynamic capabilities approach (Teece, 2007), this study sheds new light on the innovation management of healthcare services. We identify a linkage between input and output of value creation in the healthcare service innovation process, by taking user-induced service innovativeness and organisation-based internal renewal as inputs, and service innovation quality as an output. Also, we empirically validate the two pathways in this linkage. To our knowledge, this is the first study that examines the distinct impacts of two fields of service innovativeness and organisational renewal simultaneously.

We derive some implications for innovation management practices of healthcare services from our findings. Healthcare organisations can benefit from the notion that service innovativeness results in new value propositions and quality innovation outcomes. Healthcare organisations can try to figure out user-induced opportunities and risks, as well as users'/patients' problems, in order to offer totally new or improved healthcare services.

The research results imply that healthcare organisations should also pay attention to the value of organisational renewal. To fit with the new requirements of healthcare service innovation projects and their outcomes, changes in the organisational structure, practices and service delivery system can contribute to the healthcare service innovation quality. However, organisational renewal encounters barriers from both managers and employees, which must be coped with.

Another practical implication is associated with the finding of the higher effect of service innovativeness on service innovation quality than that of organisational renewal. In management practice, there is an emphasis on the importance of organisational renewal as a pre-requisite for the successful implementation of innovations by means of a project. Our finding suggests that in the context of healthcare a focus on service innovativeness appears to have a stronger positive effect on service innovation quality.

### **5.3. Limitations and directions for future research**

There are several limitations to this study. The first one is related to the empirical sample and setting. The sample comprises healthcare organisations in the Netherlands. Statistical validity of our findings is limited to the Dutch healthcare context. The sample size is relatively small, although we find no serious problem with nonresponse bias in this study, and also PLS-SEM can deal with this smaller sample size. Future research could replicate this study with a complementary and larger sample, and/or broaden and test its statistical generalisability in other industries.



Moreover, we use a single key informant approach for data collection, which may result in the potential presence of common method bias (Podsakoff et al., 2003). Although we make considerable efforts (both procedural and statistical remedies) to alleviate this issue, there are inevitably limitations, of which a multi-informant, longitudinal empirical design is nearly free.

Finally, our proposed model is relatively simple, and just covers two direct effects on service innovation quality. Crucial insights can be gleaned from modelling more complex relationships into simple ones, by adding in mediators and/or moderators. Model extension can account for the variance not explained by the model in this study. Besides, our study does not explore the effectiveness and efficiency aspects of service innovation performance. Even though these themes are beyond the scope of our research approach, their relationships with(in) our model could be a fruitful direction for further research.

### Disclosure statement

No potential conflict of interest was reported by the authors.

### ORCID

Yu Mu  <http://orcid.org/0000-0002-2341-5802>

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