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## MANAGEMENT OF SERVICE INNOVATION QUALITY

Mu, Y.

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## Chapter 5 Development of a four-dimensional categorization of service innovation<sup>4</sup>

Innovation research has resulted in various service innovation categorizations and numerous related classification schemes. The majority of extant categorizations features either the degree of change or type of change in service innovation. The classification schemes of these categorizations in the literature suggest a need for more appropriate ones in theory and practice. This study conceptualizes service innovativeness by four dimensions with a series of items, and then accordingly frames four categories of service innovation based on the compositions of items: environment-, technology-, market- and organization-dominant service innovation. We conduct a multiple-case study in the settings of theme parks and airlines, with 11 service innovation projects situated in Walt Disney World, Singapore Airlines or China Eastern Airlines. Adopting the proposed classification scheme, the 11 cases are analyzed and described in terms of changes in innovations, and then classified into the four categories. This study adds to the research stream of service innovation categorization through simultaneously concerning both the degree and type of change and providing a novel classification scheme. This categorization is applicable for practitioners to focus on the selection, assessment and improvement of various categories of service innovations in projects.

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## 5.1 Introduction

The topic of service innovation categorization has received extensive attention. Existing literature has classified service innovations into different categories primarily by means of identifying their *degree of change* or *type of change* (Snyder et al., 2016). Categorizations concentrating on the degree of change (e.g., radical versus incremental innovation) reveal the impact level of a specific service innovation category (Gallouj and Weinstein, 1997; de Vries, 2006). Others emphasizing the type of change (e.g., product versus process innovation) identify which changed part qualifies as a service innovation (Hjalager, 1997; Sirilli and Evangelista, 1998). In the literature there is a dearth of categorizations that simultaneously consider both facets, to combine their strengths and deliver more information from the categories.

Previous classification schemes for service innovation categories involve four primary approaches: single- and multiple-item conceptualizations, matrix categorizations and cluster analyses. However, according to the literature, flaws exist in the four streams. Single-item conceptualizations are seen to be oversimplified and can have unavoidable bias in the accuracy of classification results (e.g., Amara et al., 2009; Corrocher and Zirulia, 2010; Dotzel et al., 2013). Extant multiple-item conceptualizations are based on the distinctive aspects of changes in service innovations to label categories, and thus can create rigid isolations between these aspects (e.g., Hsieh et al., 2013; Salunke et al., 2013). Matrix categorizations with two/three dimensions may fail to depict and distinguish the multifaceted and complicated characteristics of service innovations (e.g., Chan et al., 1998; Berry et al., 2006; Paswan et al., 2009). Finally, cluster analyses are empirically derived and have the risk to lose the conceptual meanings of the resulting clusters (e.g., Avlonitis et al., 2001).

Given the suggested weaknesses of these methods, there is a need for an optimized classification scheme of service innovation categorization, which constructs a series of items of changes that happen in entire innovation categories as a whole, and then formulates distinctive compositions of items for these categories. In doing so, this conceptually-anchored scheme benefits the practice in selecting, assessing and improving various categories of service innovations in projects.

From the perspective of service innovativeness, this study concerns both the *degree of change* and *type of change* in service innovations, frames a model for diverse service innovation categories, and constructs a classification scheme of the categorization. This study attempts to address the following research question: *How can service innovations be classified into categories that address the degree and type of change?* With this question as a starting point and by using a four-dimensional model of innovativeness (Salomo et al., 2007; Kock et al., 2011; Schultz et al., 2013b), this study conceptualizes service

innovativeness with a series of items, and on this basis develops a categorization with four categories: environment-, technology-, market- and organization-dominant service innovation.

A multiple-case study approach is deployed to confirm the appropriateness of this categorization. Two empirical settings in the tourism industry are targeted: theme parks and airlines. A total of 11 service innovation cases situated in Walt Disney World (Disney), Singapore Airlines (SIA) or China Eastern Airlines (CEA) are analyzed in terms of changes in innovations, and then classified into the four proposed categories, by adopting the classification scheme outlined in this study.

This article is structured as follows. In the next section, extant service innovation categorizations and classification schemes in the literature are summarized. The need for a new categorization is then discussed. Section three frames the proposed categorization and related classification scheme as the research instrument, and then presents the methods of case selection as well as data collection and analysis. In section four, the results of data analysis and the detailed process of identifying categories are narrated. This article is ended with a discussion, including the findings, implications, limitations and suggestions for future research.

## **5.2 Literature review**

This study views *service innovation* as any change that affects one or more terms of one or more service characteristics (Gallouj and Weinstein, 1997). Service innovation literature has resulted in the development of numerous categorizations (Section 5.2.1) and classification schemes (Section 5.2.2).

### **5.2.1 Categorizations in three approaches**

Extant studies on service innovation are considered to span three approaches: assimilation, demarcation and synthesis (Coombs and Miles, 2000). These three approaches are frequently recognized by service innovation researchers (e.g., Drejer, 2004; de Vries, 2006; Ordanini and Parasuraman, 2011; Anning-Dorson, 2018).

Table 5.1 summarizes the relevant conceptual or empirical research articles which follow the criteria: (1) mainly focusing on service innovation categories, and (2) specifically utilizing one approach from the three streams.

**Table 5.1 Service innovation categorizations in three approaches**

Approach	Study	Content of categories	Type of study	Context
Assimilation	Hjalager (1997)	Product, classical process, process innovations in information handling, management, institutional	Conceptual	Tourism
	Sirilli and Evangelista (1998)	Product, process	Empirical: survey	Manufacturing and services
Demarcation	den Hertog (2000)	Supplier-dominated, innovations in services, client-led, innovations through services, paradigmatic	Conceptual	Knowledge-intensive business services (KIBS)
	Avlonitis et al. (2001) * Alam (2006)	New-to-the-market service, new-to-the-firm service, new delivery process, service modification, service line extension, service repositioning	Empirical: survey	Financial services
	Berry et al. (2006) *	Flexible solutions, controllable convenience, comfortable gains, respectful access	Conceptual	Market-creating services
	Oke (2007)	Service product, service	Empirical: interviews, survey	Services
Synthesis	Gallouj and Weinstein (1997)	Radical, improvement, incremental, ad hoc, recombinative, formalization	Conceptual	Services
	de Vries (2006)	Radical, incremental, ad hoc, recombinative/architectural	Empirical: case study	Services
	Paswan et al. (2009) *	8 cells: high/low environmental uncertainty × high/low market orientation × cost leadership/differentiation	Conceptual	Services
	Hsieh et al. (2013) *	New service concept, process, business model	Empirical: interviews	Services

Note: \*Study listed both in Table 5.1 and 5.2.

The *assimilation* approach treats service innovation as similar to manufacturing innovation

(Barras, 1986, 1990; Atuahene-Gima, 1996b; Miozzo and Soete, 2001). Studies in this stream reflect an impetus from a technologist perspective (de Vries, 2006). Therefore, this stream frequently classifies service innovations into product and process innovation (Sirilli and Evangelista, 1998), or some other categories (e.g., management, marketing or institutional innovation) added in this product-process innovation dichotomy (Hjalager, 1997, 2010). Previous research has widely discussed the applicability of the classic product-process innovation framework in service context, as well as the relationship of these two categories (Damanpour and Gopalakrishnan, 2001; Snyder et al., 2016). It is difficult (or even impossible) to identify the blurring boundary between product and process elements in services (Gallouj and Weinstein, 1997; Snyder et al., 2016). Service product innovations also frequently bring changes in the service delivery process, which in turn may result in the generation of a new service product. Changes in both facets even occur simultaneously in some cases (Damanpour and Gopalakrishnan, 2001).

Categorizations in the *demarcation* approach focus on the specific characteristics of services (e.g., den Hertog, 2000; Avlonitis et al., 2001; Alam, 2006; Oke, 2007). This approach, by contrast, argues that service innovation is prominently distinct from manufacturing innovation, and thus calls for new theories and instruments (Gadrey et al., 1995; Sundbo, 1997). Not limited to the traditional product-process innovation dichotomy, categorizations in this approach implement various theories and models to examine innovations in general services (e.g., Oke, 2007) or in specific service(s) (e.g., Gadrey et al., 1995), as well as certain subset(s) of service innovation (e.g., Berry et al., 2006). Although acknowledging the distinctions between intangible services and manufacturing goods, some attempts in this stream are still strongly influenced by categorizations of manufacturing innovation (e.g., Avlonitis et al., 2001; Alam, 2006).

The *synthesis* approach pays attention to the neglected innovation elements that are relevant for services as well as manufacturing (Drejer, 2004; Paswan et al., 2009; Ordanini and Parasuraman, 2011; Chang et al., 2012). Gallouj and Weinstein (1997) pioneered the studies in this approach, and classified innovations into six categories, two of which are radical and incremental innovation. As a crucial basis for integrating studies on innovation in manufacturing and services, their categorization and framework have been widely adopted and further developed (Windrum and García-Goñi, 2008; Martínez-Ros and Orfila-Sintes, 2009; Corrocher and Zirulia, 2010). For instance, de Vries (2006) decreased the six categories into four and examined them, in which radical and incremental innovation are retained. Among other categorizations in this stream (e.g., Paswan et al., 2009), notably, business model innovation is recently inserted into the product-process innovation dichotomy to facilitate research in the synthesis approach (Hsieh et al., 2013; Ostrom et al., 2015).

### **5.2.2 Classification schemes along with categorizations**

Alternative classification methods can lead to different labeling of the same service innovation (Garcia and Calantone, 2002). However, not all studies on service innovation categorization report their associated classification schemes. In Table 5.2 we summarize the relevant conceptual or empirical studies which (1) mainly focus on service innovation categories, and (2) specifically utilize a classification scheme. Generally, four groups of classification methods are shown in these studies.

Table 5.2 Service innovation categorizations with a classification scheme

Classification method	Potential weakness of the method	Study	Content of categories	Type of study	Context
Single-item conceptualization	Unavoidable bias in the accuracy of classification results caused by its oversimplification	Amara et al. (2009) Corrocher and Zirulia (2010) Doitzel et al. (2013)	Product, process, delivery, strategic, managerial, marketing Incremental, recombinative, improvement Internet enabled innovation (e-innovation), people enabled innovation (p-innovation)	Empirical: survey Empirical: analysis of documents Empirical: panel data	KIBS Mobile communications Services
Matrix categorizations	Unable to depict and distinguish the multifaceted and complicated innovativeness characteristics	Chan et al. (1998) Berry et al. (2006) * Paswan et al. (2009) *	Incremental, distinctive, breakthrough Flexible solutions, controllable convenience, comfortable gains, respectful access 8 cells: high/low environmental uncertainty × high/low market orientation × cost leadership/differentiation	Empirical: survey Conceptual Conceptual	Services Market-creating services Services
Multiple-item conceptualization	Creating rigid isolations between aspects of change for labeling innovations	Hsieh et al. (2013) * Salmke et al. (2013)	New service concept, process, business model Interactive, supportive	Empirical: interviews Empirical: interviews, survey	Services Services
Cluster analysis	Empirically derived and potential to lose the conceptual meanings	Avlonitis et al. (2001) *	New-to-the-market service, new-to-the-firm service, new delivery process, service modification, service line extension, service repositioning	Empirical: survey	Financial services

Note: \*Study listed both in Table 5.1 and 5.2.

*Single-item conceptualizations.* Some studies conceptualize each category of service innovation with a single item. Amara et al. (2009) classified service innovations in knowledge-intensive business service firms (KIBS) into six categories by means of one-item measures. Alternatively, Corrocher and Zirulia (2010) and Dotzel et al. (2013) both performed a content analysis and labeled service innovation categories based on their definitions. Depending on one single-item measure or definition, the oversimplification of these two approaches can cause unavoidable bias in the accuracy of classification results.

*Matrix categorizations.* Widely found in both manufacturing and service innovation categorizations, the methods with a matrix focus use several (frequently two or three) dimensions and lead to numerous innovation categories. Chan et al. (1998) delineated three service innovation categories in a two-dimensional matrix. In the conceptual studies of Berry et al. (2006) and Paswan et al. (2009), four and eight cells were divided respectively based on two and three dimensions. Similar to single-item conceptualizations, matrix categorizations of service innovation solely refer to two or three items/dimensions. Likewise, this method can fail to depict and distinguish the multifaceted and complicated characteristics of innovations in different categories.

*Multiple-item conceptualizations.* Some studies measure service innovation categories with diverse scales (e.g., Hsieh et al., 2013; Salunke et al., 2013). Multiple-item conceptualizations of service innovation categorization can provide considerably more sophistication and flexibility than single-item conceptualizations and matrix categorizations. However, the existing multiple-item conceptualizations construct different service innovation categories by separate items of change. Actually, a service innovation frequently induces changes in more than one aspect. Separating these aspects and accordingly labeling service innovation categories are problematic. Product-process innovation dichotomy is an example of this, as its applicability is limited by the blurring boundary between product and process elements in services (Gallouj and Weinstein, 1997; Snyder et al., 2016). Through creating rigid isolations between aspects of change to classify service innovations, the previous multiple-item conceptualizations conflict with the fact that one innovation may result in changes in various aspects.

*Cluster analyses.* On the basis of a multiple-item conceptualization, cluster analysis is further implemented in some studies on service innovation categorization (e.g., Avlonitis et al., 2001). Not designating and distributing items for different categories, cluster analysis operates a set of items for the whole, with each category related to distinctive factor loadings of items. However, the classification results of this statistical approach are empirically derived and somehow sensitive to the data. In some cases, the cluster solution fails to reveal the conceptual meanings of the resulting clusters, as confined to demonstration of the empirical presence (Bailey, 1994).

### 5.2.3 Need for a new categorization

A recent review of Snyder et al. (2016) concludes four classification themes of service innovation categorizations: degree of change, type of change, scope of newness and means of provision. Among various categorizations, the majority features either *degree of change* or *type of change* (Snyder et al., 2016). For example, the radical-incremental innovation dichotomy reveals the degree of change, and is frequently used in the *synthesis* approach (Gallouj and Weinstein, 1997; de Vries, 2006); the product-process innovation dichotomy concerns the type of change, and primarily appears in the *assimilation* approach (Hjalager, 1997; Sirilli and Evangelista, 1998) as well as the *synthesis* approach (Hsieh et al., 2013).

A new categorization that catches the degree and type of change in service innovation can simultaneously specify (1) to what extent the changes have an impact and (2) which aspect makes the primary changes. The detailed information about such a classification scheme for the operationalization of a categorization provides academics and practitioners with a common understanding of identifying specific service innovation categories. Considering the aforementioned weaknesses of existing classification schemes, a new optimized one advances the research of service innovation categorization threefold. Firstly, the scheme can conceptualize multiple items of change to portray the multifaceted and complicated innovativeness characteristics, and can yield more accurate classification results. Secondly, the scheme can construct a set of items applicable for varying innovation categories as a whole, and then separate categories based on the compositions of items. Thirdly, the scheme can be conceptually anchored, and attach conceptual meanings to each category.

In the literature, innovations in manufacturing and services can be classified by means of identifying their innovative nature (Garcia and Calantone, 2002). Innovativeness is frequently measured by many dimensions (e.g., Schultz et al., 2013b). Likewise, service innovations are more or less innovative in various dimensions. *Service innovativeness* in this study refers to the newness of a service innovation (Garcia and Calantone, 2002; Schultz et al., 2013b).

A four-dimensional model that encompasses environment, technology, market and organization facets has been well accepted in the area of product innovativeness (Salomo et al., 2007; Kock et al., 2011) as well as new product portfolio innovativeness (Schultz et al., 2013b). These four aspects are most frequently used in previous research, and accordingly summarize four *types of change* in innovations. Besides, this four-dimensional model differentiates *degrees of change* between various innovation categories (Schultz et al., 2013b). Therefore, a categorization based on this model enables the identification of both type and degree of change. In this study the model serves as a foundation of constructing a service innovation categorization as well as the associated classification scheme.

## 5.3 Method

### 5.3.1 Basic approach

#### 5.3.1.1 Research instrument

Following a multifaceted view of innovativeness, in the domain of service innovativeness this present study adopts the product innovation-based four-dimensional model (Salomo et al., 2007; Kock et al., 2011; Schultz et al., 2013b). We suggest that four dimensions of service innovativeness reflect different degrees of change, successively from a higher to a lower level of change: from environmental newness (highest level), to technological newness, to market newness, to organizational newness (lowest level).

*Environmental newness* is accompanied by shift(s) in industry norms, regulations and infrastructure, and/or general social values and norms (Salomo et al., 2007; Kock et al., 2011; Schultz et al., 2013a, b). *Technological newness* is yielded by introducing new technological principle(s), using new technological component(s), and/or enhancing the technology-induced performance (Salomo et al., 2007; Schultz et al., 2013a, b). *Market newness* proposes increase(s) in customer value, creation(s) of a new market, and/or change(s) in the way a market functions (Garcia and Calantone, 2002; Kock et al., 2011; Schultz et al., 2013a, b). *Organizational newness* requires change(s) in organizational culture, structure, service operation and delivery system, and/or R&D practices (Avlonitis et al., 2001; Salomo et al., 2007; Schultz et al., 2013a, b).

We frame the four dimensions of service innovativeness as well as their items (i.e., elements of change) in Table 5.3.

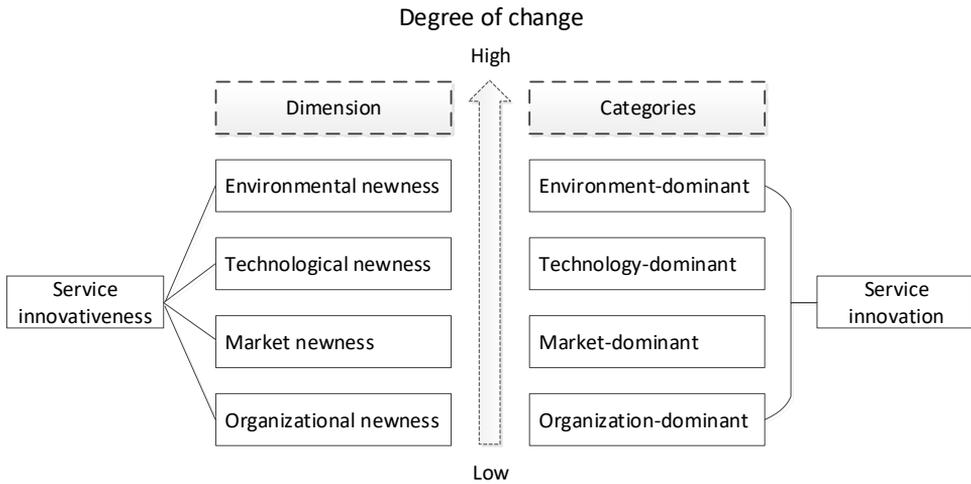
**Table 5.3 Dimensions and items of service innovativeness**

Dimension	Items (Elements of change)	Sources
1. Environmental newness	Industry norm	Salomo et al. (2007)
	Industry regulation	Kock et al. (2011)
	Industry infrastructure	Schultz et al. (2013a, b)
	General social value and norm	
2. Technological newness	Technological principle	Salomo et al. (2007)
	Technological component	Schultz et al. (2013a, b)
	Technology-induced performance enhancement	
3. Market newness	Customer value	Garcia and Calantone (2002)
	Market	Kock et al. (2011)
	Way of market functioning	Schultz et al. (2013a, b)
4. Organizational newness	Organizational structure	Avlonitis et al. (2001)
	Service delivery system	Salomo et al. (2007)
	Organizational culture	Schultz et al. (2013a, b)

The innovativeness of a specific service innovation is often characterized by a combination of several items among one, two, three or all of the four dimensions. In this study we propose that a service innovation can be labeled with its highest innovativeness dimension (as a dominating dimension) that covers items from this dimension as well as one or more of the items from the lower dimension(s). For example, a service innovation that scores on items that belong to the lower dimension ‘organizational newness’ as well as the higher dimension ‘market newness’, is labeled as a market-dominant service innovation. The basic idea is that a service innovation with a higher innovativeness dimension can also comprise various items of the lower dimension(s) (Schultz et al., 2013b). Therefore, four categories of service innovation are named in terms of the dominating aspects (see Figure 5.1).

*Environment-dominant service innovation* significantly influences industry norms, regulations and infrastructure, and/or general social values and norms. *Technology-dominant service innovation* embeds new technological principles/components

and/or technology-induced performance enhancement, but is not accompanied by environmental newness. *Market-dominant service innovation* increases customer value, creates a new market, and/or changes the way a market functions, but does not incorporate any technological or environmental impacts. *Organization-dominant service innovation* makes changes in organizational culture, structure, service delivery system and/or R&D practices, rather than in any market, technological or environmental facets.



**Figure 5.1 Four-dimensional service innovation categorization**

### 5.3.1.2 Empirical settings

This study employs a qualitative empirical research design to explore and analyze the appropriateness and applicability of this categorization. A multiple-case study approach is used to gain an insightful understanding of a complex situation (Yin, 2014). A set of service innovation projects from three companies is identified and investigated.

The selection of the case companies is guided by the need to study sufficient service innovation projects in an innovative environment. Three case companies are targeted in two active sectors of tourism: theme parks and airlines. In the sampling process companies that gain a reputation for service excellence and innovation are identified. The focus is on successful pioneers that have developed considerable experience and knowledge in the field of service innovation. Extensive secondary materials about these companies are accessible in the public sources.

Walt Disney World (Disney), Singapore Airlines (SIA) and China Eastern Airlines (CEA) are chosen as the target companies in the two sectors. Disney and SIA are one of the most

internationally successful service providers in sectors of theme parks and airlines respectively. CEA is one of the leading airlines in China. Three case companies can offer rich empirical data on various service innovations (i.e., the studied phenomenon) (Siggelkow, 2007).

This multiple-case study enables both evaluation (within-case analysis) and comparison (cross-case analysis) of collected data, through following a pattern-matching logic (Yin, 2014). Within-case evaluation is to classify each service innovation case to a specific category; cross-case comparison is to portray every category to compose an entire categorization. The insights flowing from this carry analytical validity, which means that these insights can be generalized to theory about service innovation categorization (Yin, 2014).

### **5.3.2 Data collection**

The used materials of the Disney cases are partly summarized from one author's work experience as a guest-contact cast member during a six-month period in a Disney theme park. Being in the middle of everyday work enables the author to recognize the cases of service innovation in the studied context, by engaging in service offerings, group meetings and informal discussions with colleagues. Visiting Disney theme parks as a 'mystery visitor' is another relevant approach of collecting fresh case study material of Disney, as a cast member owns the privilege to visit Disney theme parks freely in off-work time. Besides, secondary materials are picked from an extensive search. The triangulation of data from multiple information sources, as well as the combination of observation- and archival data, enables a thorough understanding of the research phenomenon, and mitigates potential retrospective bias in the author's summary.

First-hand data of the SIA and CEA cases were gathered via a questionnaire. A four-hour workshop was devoted to give a common background to CEA managers about the concept of service innovation. Audiences were asked to describe relevant service innovations completed respectively by SIA and CEA in the questionnaire. Respondents include 18 managers from CEA. Supplementary materials for data analysis are collected from the two airlines' websites and other public sources, including news-items and publications. Regarding the SIA and CEA cases, the triangulation of data is also ensured by multiple information sources. The sources and compositions of primary and secondary data of all cases are shown in Table 5.4.

**Table 5.4 Data sources**

Data category	Data sources	Disney cases	SIA and CEA cases
Primary data	Working experiences	Summary (23 pages)	n.a.
	Site visit	Field notes (25 pages)	n.a.
	Workshop-based questionnaire	n.a.	18 responses
Secondary data	Company's website	7 news-items	15 news-items
	Public sources	6 publications	8 publications

Note: n.a.=not applicable.

The resulting set of 11 service innovation projects as the studied cases consists of five cases situated in Disney, three in SIA and three in CEA (see Table 5.5).

**Table 5.5 Cases of data analysis**

No.	Name of service innovation case	Source company
1	FASTPASS™	Disney
2	High Tech FASTPASS	
3	Storytelling attractions	
4	Drama metaphor	
5	Disney Point	
6	A380 flights	SIA
7	KrisWorld	
8	Value-added inflight services	
9	Air Travel of Eastern Culture Experience	CEA
10	Eastern Sky Chef Gourmet	
11	Personalized VIP services	

The Disney cases include five service innovations (Case 1 to 5). *FASTPASS™*, as a Disney trademark, is a virtual-queue reservation system for attractions in Disney theme parks. Despite a similar name, *High Tech FASTPASS* is a different system that provides Disney's

guests with easy identifications for entries or payments. *Storytelling attractions* in Disney theme parks are those designed to be connected with Disney elements such as movies, cartoons or TV series. Disney's well-known *drama metaphor* is to rename a set of terms in Disney's own language (such as 'cast members' to be employees and 'costumes' to be uniforms). *Disney Point* is a more welcoming gesture used by cast members, to point with two fingers or an open hand.

The SIA cases include three service innovations (Case 6 to 8). *A380 flights* are quality inflight experiences on an A380 offered by SIA (including cabin suites and the then-widest seats). *KrisWorld* is a SIA's award-winning inflight entertainment system. *Value-added inflight services* were numerous new services firstly provided by SIA in the 1970s, e.g., free alcoholic drinks and headphones.

The CEA cases include three service innovations (Case 9 to 11). *Air Travel of Eastern Culture Experience* was launched by CEA in 2007, as a series of services that integrated China's cultural elements like food, entertainment and events. *Eastern Sky Chef Gourmet* was a CEA's inflight catering service that arranged a chef along with the cabin crew to serve first- and business-class passengers. *Personalized VIP services*, such as birthday blessings and gifts, are offered by CEA to its VIP passengers.

### 5.3.3 Data analysis

Labeled by its highest-level innovativeness dimension, the four categories of service innovation are further interpreted through the following Boolean algebra algorithms:

$$EN \Rightarrow EDSI \quad (1)$$

$$\neg EN \cdot TN \Rightarrow TDSI \quad (2)$$

$$\neg EN \cdot \neg TN \cdot MN \Rightarrow MDSI \quad (3)$$

$$\neg EN \cdot \neg TN \cdot \neg MN \cdot ON \Rightarrow ODSI \quad (4)$$

where ' $\neg$ ' means the absence of a condition, and ' $\cdot$ ' represents the logical 'and'. EN is environmental newness, EDSI is environment-dominant service innovation, TN is technological newness, TDSI is technology-dominant service innovation, MN is market newness, MDSI is market-dominant service innovation, ON is organizational newness and ODSI is organization-dominant service innovation.

The formulas read as follows: (1) Presence of environmental newness can lead to environment-dominant service innovation; (2) Absence of environmental newness and presence of technological newness can lead to technology-dominant service innovation; (3) Absence of environmental newness as well as technological newness, and presence of

market newness can lead to market-dominant service innovation; (4) Absence of environmental newness, technological newness as well as market newness, and presence of organizational newness can lead to organization-dominant service innovation.

By ‘aspect-dominant’ we refer to the aspect that plays the leading role with a biggest impact and that connects the highest-level innovativeness dimension. As the primary *type of change* in a specific service innovation, this dominating aspect also decides and illuminates the *degree of change*. With regard to three less innovative categories (except environment-dominant service innovation), we are able to clarify some unchanged higher-level facet(s). But for three more innovative categories (except organization-dominant service innovation), the presence/absence of the lower-level dimension(s) is not given.

In the procedure of data analysis, we code the materials using a predefined item list based on the literature (in Table 5.3). Each service innovation case of the three companies is analyzed focusing on each of the four dimensions and the detailed items, to indicate the presence/absence of each item. Along with the formulas, this procedure presents the operationalization of our classification scheme.

## **5.4 Results**

11 service innovation cases are classified into four categories in our framework. Table 5.6 reveals the procedure of classification and identifies the changed/unchanged items in detail. Regarding both environment- and technology-dominant service innovation, one case of each Disney and SIA is classified into the two categories. One case of each Disney and SIA and two CEA cases are labeled as market-dominant service innovation. Two Disney cases and one CEA case are identified as organization-dominant service innovation. In the four subsections, all cases are presented in the same structure: a short general description of the service innovation followed by a discussion of the presence of changed items.

Table 5.6 Results of data analysis on 11 service innovation cases

Service innovativeness		Disney cases			SIA cases			CEA cases				
Dimension	Items (Elements of change)	1	2	3	4	5	6	7	8	9	10	11
Environmental newness (EN)	Industry norm (EN1)	√	x	x	x	x	√	x	x	x	x	x
	Industry regulation (EN2)	√					x					
	Industry infrastructure (EN3)	√					√					
	General social value and norm (EN4)	√					x					
Technological newness (TN)	Technological principle (TN1)	√	x	x	x	x	√	√	x	x	x	x
	Technological component (TN2)	√	√				√	√				
	Technology-induced performance enhancement (TN3)	√	√				√	x				
Market newness (MN)	Customer value (MN1)	√	√	√	x	x	√	√	√	√	√	x
	Market (MN2)	x	x	√			√	x	x	x	x	
Organizational newness (ON)	Way of market functioning (MN3)	√	√	x			x	x	x	x	x	
	Organizational structure (ON1)	x	x	√	x	x	√	x	x	x	x	x
	Service delivery system (ON2)	√	√	√	x	√	√	√	x	√	√	√
	Organizational culture (ON3)	√	x	x	√	√	x	x	√	√	x	x
R&D practice (ON4)	√	√	x	x	x	x	√	√	x	√	x	
	Category	EDSI	TDSI	MDSI	ODSI	ODSI	EDSI	TDSI	MDSI	MDSI	MDSI	ODSI

Note: '√' indicates the presence of a condition, and 'x' indicates the absence.

ODSI=organization-dominant service innovation; MDSI=market-dominant service innovation; TDSI=technology-dominant service innovation;

EDSI=environment-dominant service innovation.

### 5.4.1 Environment-dominant service innovation

Disney's *FASTPASS<sup>TM</sup>* (Case 1) and SIA's *A380 flights* (Case 6) are labeled as environment-dominant service innovations. Both cases make significant changes in environmental newness.

*FASTPASS<sup>TM</sup>*. To reduce guests' waiting time and improve their satisfaction, *FASTPASS<sup>TM</sup>* is applied to Disney's popular attractions frequently in the peak seasons, weekends and public holidays. Apart from the actual queue, the *FASTPASS<sup>TM</sup>* system creates another virtual one. When guests make a reservation for the virtual line, the *FASTPASS<sup>TM</sup>* system estimates a waiting and a return time for them. If guests take a *FASTPASS<sup>TM</sup>* ticket for a designated attraction in advance and return on time, they can directly enter into the attraction with little or no waiting time. *FASTPASS<sup>TM</sup>* created the concept of a virtual queue, which became a new norm for theme parks (EN1), as well as the associated industry regulation (EN2) and infrastructure (EN3). *FASTPASS<sup>TM</sup>* also revolutionized the general social values and norms with regard to the management of waiting time (EN4) (Ford and Dickson, 2008). The concept and system of a virtual queue, as well as services similar to *FASTPASS<sup>TM</sup>*, are widely applied by other theme parks and sectors around the world (Dickson et al., 2005).

Disney firstly tested the concept of the virtual queue in 1998 and established its technological principles (TN1). The key technological component (TN2) in the *FASTPASS<sup>TM</sup>* system is combining the number of guests in the virtual queue and the current processing capacity of the attraction to estimate how long it takes to get the newly arriving guest to the front of the line (Dickson et al., 2005). The technology-based *FASTPASS<sup>TM</sup>* reduces guests' waiting time so that they can engage more and longer in other valuable activities, such as dining and shopping, which in turn increase Disney's revenues (TN3).

Furthermore, spending less time in lines and enjoying more attractions increase customer satisfaction (MN1). Distinct from traditional reservation systems, *FASTPASS<sup>TM</sup>* changes the way theme parks function, through encouraging guests to participate in a virtual queue, and offering them additional advantages over an actual wait (MN3).

As a totally new service delivery system (ON2), *FASTPASS<sup>TM</sup>* changed Disney's culture (ON3) with a new approach of managing waiting time. Before the launch and via a series of new R&D practices such as computer simulations, tests and refinements (ON4), *FASTPASS<sup>TM</sup>* successfully overcame the tremendous amount of skepticism from management on its benefits (Dickson et al., 2005; Ford and Dickson, 2008).

*A380 flights*. As the first airline to fly A380 in 2007, SIA has been working on researching and developing inflight services on the superjumbo. These innovative services include the

so-called early ‘a class beyond first’ and recently ‘bedroom’ cabin suites, as well as the then-widest seats. A380 flights changed the airline industry’s norm (EN1) and infrastructure (EN3) for flight services on a giant aircraft.

SIA equipped the A380 with the then-widest seats which have fewer parts for a lower risk of malfunction (Heracleous and Wirtz, 2014). These new seats leveraged on related technological principles (TN1) and components (TN2), such as a carbon fiber composite shell structure. Introducing the technology-induced A380 flights strengthened SIA’s image of an innovation pioneer, and created the buzz that SIA had the capability and credibility to launch such a breakthrough cabin product and inflight experience. Load factors were high for A380 flights (TN3) even during the world economic crisis (Heracleous and Wirtz, 2014).

SIA’s A380 flights created totally new customer value (MN1), enhanced passengers’ flight experience, and significantly impacted the market (MN2). Particularly the luxurious cabins on SIA’s A380 stimulated the needs of first-class passengers. Numerous competitors were then attracted into the market of luxurious cabins in recent years.

The introduction of A380 flights created a new fleet to change SIA’s organizational structure (ON1). The commitment of new cabin products and services continuously revamped SIA’s service delivery systems (ON2). These innovative services such as new interiors are the outcomes of R&D activities in the past years, which involve extensive customer research and close partnerships with designers and suppliers (ON4).

#### **5.4.2 Technology-dominant service innovation**

Disney’s *High Tech FASTPASS* (Case 2) and SIA’s *KrisWorld* (Case 7) are labeled as technology-dominant service innovations. The two cases induce technological newness but make no changes in environmental newness.

*High Tech FASTPASS*. Based on radio frequency identification (RFID) technology, High Tech FASTPASS works with a wristband provided to Disney’s hotel guests. The wristband functions as a key, providing the guest an identification for entry or payment. Although not significantly changing Disney’s external environment, High Tech FASTPASS brought new technological components (RFID) (TN2) to the theme park industry, which in turn enhanced Disney’s performance (TN3).

In the market, some guests are accustomed to using tickets, keys and smart-phones to provide identifications. Having a wristband equipped with High Tech FASTPASS is a quite new experience for these guests, which offers them new customer value (MN1) and changes the way the market functions (MN3) to some degree.

With regard to Disney, all existing Disney systems required reprogramming to accommodate High Tech FASTPASS, and new systems had to be developed to ensure

these wristbands work wherever guests might provide an identification (Ford et al., 2012). High Tech FASTPASS brings new/improved service delivery systems (ON2) and new R&D practices (ON4) in Disney.

*KrisWorld*. Introduced in 1997, KrisWorld offers a wide range of entertainment options, including the first inflight 3D games. KrisWorld was powered by new technological principles (TN1) and components (TN2) from Panasonic such as eX3™. KrisWorld helps SIA to embrace technologies and flight services to define premium air travel, and also introduces personalization to allow a shift from in-seat to on-demand audio/video.

Customer value (MN1) was significantly increased by KrisWorld. Passengers can use SIA's award-winning app SIA Mobile or website to preview inflight entertainment audio and video contents that will be available on their flight, and to set up their pre-selected playlist. Once onboard, passengers can either synchronize their mobile devices or log in at their seats to access their pre-selected contents. KrisWorld allows passengers to customize their preferences and bookmark their viewing history between flights.

When firstly launched, KrisWorld was a totally new service delivery system (ON2) for SIA. Cooperating with Panasonic, SIA's extensive R&D practices (ON4) developed new technologies for KrisWorld.

### **5.4.3 Market-dominant service innovation**

Disney's *storytelling attractions* (Case 3), SIA's *value-added inflight services* (Case 8), CEA's *Air Travel of Eastern Culture Experience* (Case 9) as well as *Eastern Sky Chef Gourmet* (Case 10) are labeled as market-dominant service innovations. The four cases induce market newness but make no changes in environmental and technological newness.

*Storytelling attractions*. The settings of storytelling attractions are decorated with some Disney elements. For instance, a ride at Disney's Magic Kingdom shows the living scene in a popular Disney movie *Pirates of the Caribbean*. Although inducing no technological or environmental changes, the storytelling attractions offer guests new customer value with more compelling and engaging experiences (MN1) (Zomerdiijk and Voss, 2011). These unique experiences create new markets (MN2) for Disney. An organizational structure called 'Imagineering' was formed by Disney in the early 1950s, in order to dream up new creative venues, and to design new attractions for both first-time and regular guests (Capodagli and Jackson, 2007). When a new attraction is constructed, a new organization unit (ON1) and associated service delivery systems (ON2) are accordingly added into Disney.

*Value-added inflight services*. In the 1970s, SIA started to provide various innovative inflight services, including free alcoholic drinks, multiple choices of meals and free headphones (Heracleous and Wirtz, 2014). These value-added services were unheard of

before and against the rigid rules of the International Air Transport Association, and significantly changed passengers' flight experience (MN1). These innovations in the early stage of SIA's history were simple but nurtured SIA's innovation culture (ON3) to constantly strive for totally new services (Heracleous and Wirtz, 2014).

*Air Travel of Eastern Culture Experience.* As an innovative and differentiated inflight service, Air Travel of Eastern Culture Experience was launched in form of various inflight cultural weeks in 2007. Integrating China's cultural elements like food, entertainment and events, this new-to-the-market service provides passengers with a value-added flight experience. In a certain week, all CEA's flights display a local culture by means of special activities and with a specific theme. Without changes in technological and environmental elements, Air Travel of Eastern Culture Experience offers new customer value (MN1) through new service delivery systems (ON2) to passengers, and cheers employees up with a more innovative organizational culture (ON3).

*Eastern Sky Chef Gourmet.* During Spring Festival holiday in 2011, CEA arranged Eastern Sky Chef Gourmet in some flights, as well as chefs to design a series of special inflight menus for first- and business-class passengers. Passengers in the two classes could select their inflight food 48 hours prior to the take-off. Along with cabin crew, chefs served the two-class passengers, and collected their comments on the food. Eastern Sky Chef Gourmet created new customer value (MN1) through arranging an inflight chef, and also changed CEA's internal service delivery system (ON2) for first- and business-class passengers. Ideal inflight food is not solely about taste, but also to ease the passengers' exhaustion and tension, and increase their appetite in the high-pressure cabin. Through analyzing the category, flavor and structure of inflight food, the chefs committed on new cuisine development, and accordingly renewed the inflight menu approximately every 15 days.

#### **5.4.4 Organization-dominant service innovation**

*Drama metaphor* (Case 4) and *Disney Point* (Case 5) as two Disney cases, as well as *personalized VIP services* (Case 11) as one CEA case, are labeled as organization-dominant service innovations. The three cases induce organizational newness, but make no changes in environmental, technological and market newness.

*Drama metaphor.* Disney's drama metaphor offers a useful way to conceive service performances. In Disney language, 'guests' refer to visitors at Disney theme parks, and 'cast members' represents Disney's employees; The selection of personnel is called 'auditions' for 'performances' (jobs); When serving in the park, cast members are regarded 'onstage' in 'costumes' (uniforms). The emergence of this drama metaphor as a service concept has changed Disney's organizational culture (ON3). This special language is introduced when training new cast members.

*Disney Point.* In some cultures, pointing with one index finger is considered impolite. As guests visiting Disney theme parks come from all over the world, cast members are instructed to point with two fingers (index and middle finger together) or an open hand on the first day of training. Cast members are required to always use the Disney Point when giving directions to guests. The introduction of Disney Point was a new change in Disney's service delivery system (ON2). In numerous photos of Walt Disney, the founder of Disney is 'doing Disney Point' in a park, by pointing with two fingers stretched out and a cigarette between two fingers. This folklore enhances Disney Point to be a traditional element of Disney's organizational culture (ON3).

*Personalized VIP services.* CEA personalizes the VIP passengers' experience by adopting information about their birthdays and preferences from the Enterprise Customer Information Facility (ECIF) system. Once the name of a VIP passenger appears in the ticket reservation system, personalized VIP services start to be arranged accordingly. Services range both on the ground and in the air, e.g., free airport limousine transport services, birthday blessings and gifts. Personalized VIP services changed CEA's service delivery system (ON2) for VIP passengers. As similar personalized services have been introduced to the market by SIA and other airlines, for CEA this innovation is a new-to-the-organization one with no changes in environmental, technological and market facets.

To sum up, in the empirical setting of theme parks, five Disney cases span the entire four categories. Six cases from airline sector as a whole also validate the existence of four categories. These results in both settings illustrate the appropriateness and applicability of this categorization. The classification results of the Disney cases reveal that services provided by a successful innovator are developed and accumulated historically from various categories of service innovation.

Moreover, three SIA cases are environment-, technology- and market-dominant service innovation for each, with no organization-dominant ones; three CEA cases involve two market-dominant and one organization-dominant service innovations. The classification results of the two airlines suggest that the categorization identifies the degrees of change in various service innovations for a comparison between the innovativeness of two companies. As a whole, three SIA cases show a higher degree of change than three CEA cases.

## **5.5 Discussion**

### **5.5.1 Comparison with other categorizations**

This study offers a categorization for labeling various service innovation categories based on four dimensions of service innovativeness, as well as a classification scheme of operationalizing this categorization. In the domain of service innovativeness this research

adopts a four-dimensional model of innovativeness (Salomo et al., 2007; Kock et al., 2011; Schultz et al., 2013b). This study suggests that a service innovation can be labeled as a specific category by its highest-level dimension of service innovativeness. Four proposed categories include environment-, technology-, market- and organization-dominant service innovations, with their level of change successively from higher to lower. The dominating highest-level aspect simultaneously indicates the holistic degree of change and the primary type of change in a specific service innovation category.

As acknowledged by a recent review of Snyder et al. (2016), the majority of existing categorizations in different approaches features either *degree of change* (e.g., radical-incremental innovation dichotomy) or *type of change* (e.g., product-process innovation dichotomy) in service innovation. Among the three basic approaches of service innovation research (i.e., assimilation, demarcation and synthesis), categorizations that concern the *degree of change* in service innovation primarily adopt the synthesis approach (e.g., Gallouj and Weinstein, 1997; de Vries, 2006); Categorizations that concern the *type of change* in service innovation largely implement the assimilation or synthesis approach (e.g., Hjalager, 1997; Sirilli and Evangelista, 1998; Hsieh et al., 2013). The four-dimensional categorization outlined in this study simultaneously considers both facets, to specify (1) to what extent the changes have an impact (following the ‘degree-of-change’ stream), and (2) which aspect makes the primary changes (following the ‘type-of-change’ stream).

This study adopts an approach of multiple-item composition-based conceptualization to classify service innovations. We identify service innovation categories according to distinctive presence/absence compositions of a set of items as well as innovativeness dimensions. This classification scheme can be superior to four frequently-used methods in the literature (single- and multiple-item conceptualizations, matrix categorizations and cluster analyses) for the following reasons.

Both previous single-item conceptualizations (e.g., Amara et al., 2009; Corrocher and Zirulia, 2010; Dotzel et al., 2013) and matrix categorizations (e.g., Chan et al., 1998; Berry et al., 2006; Paswan et al., 2009) of service innovation depend on no more than three items. Compared with the two methods, the scheme proposed in this study depicts and distinguishes the multifaceted and complicated innovativeness characteristics of service innovation. This scheme covers four aspects of change in service innovations (i.e., dimensions of service innovativeness), which increases the validity of its conceptualization. Additionally, this scheme involves no less than three items for each aspect of change, which enhances the reliability of its conceptualization.

Moreover, extant multiple-item conceptualizations in the literature measure each category with different and separate items of change. As a result, aspects of change are isolated

within these innovation categories (e.g., Alam, 2006; Hsieh et al., 2013; Salunke et al., 2013). Compared with them, this proposed approach assumes that an aspect of change is not exclusive for a specific innovation category, and thus adopts a same set of items to frame all potential changes in service innovations as a whole. Varying innovation categories are further classified according to the presence/absence of items as well as the composition of changes.

As a statistical approach, cluster analyses advance the method of previous multiple-item conceptualizations, through avoiding to designate and distribute items for different categories. Various service innovation categories are identified following items' factor loadings resulted from a cluster analysis (e.g., Avlonitis et al., 2001). This method, however, is empirically derived and confined to demonstration of the empirical presence. The resulting clusters can potentially lack conceptual interpretation. Comparatively, our proposed method is anchored in a theory (i.e., four-dimensional model of innovativeness), and thus each category inherently contains conceptual meanings.

### **5.5.2 Theoretical and managerial implications**

This research sheds new light on the concept of service innovation categorization twofold. This study develops a four-dimensional categorization in light of comprehensive, yet parsimonious, nature of service innovativeness. This categorization provides an alternative perspective that simultaneously investigates the degree and type of change. Furthermore, distinguished from the extant classification schemes of service innovation categorizations, this study frames a conceptually-anchored scheme of operating the proposed categorization. Based on the multiple-item composition-based conceptualization, the classification scheme may display more validity and reliability in capturing the multifaceted characteristics of changes in service innovations.

From a managerial perspective, this categorization has several important implications for practitioners. The detailed classification scheme enables a more systematic selection and an effective approach of potential service innovation projects for organizations. Instead of rushing into a service innovation in an ad hoc manner, practitioners are prompted to first thoroughly assess its service innovativeness. By deliberately examining the four innovativeness dimensions as well as the organization's capabilities and resources, practitioners can identify and then select the most suitable service innovation categories. Additionally, this classification scheme could be also implemented to evaluate the service innovation categories when projects are completed. According to a comprehensive assessment of their service innovation portfolios, organizations could make some improvements to adjust the composition of their innovation categories.

### 5.5.3 Limitations and directions for future research

The present research has several limitations that also must be considered. Firstly, this study suggests four distinct categories of service innovation for the purpose of identification. Yet the categorization does not provide mechanisms and practices that can be used to manage a service innovation in a specific category; it just classifies the innovation and leaves it up to managers to decide why, how and what to do with the classification information. Although a comprehensive discussion of all the pertinent managerial issues is beyond the scope of this study, future research could explore deeply the different innovation patterns, success factors and performance outcomes associated with these categories.

Secondly, an underlying assumption forms the foundation of this proposed categorization: four dimensions of innovativeness differ in levels of change which follow a successive order. This foundation is prominently new to the other theory-grounded categorizations of service innovation. Although literature has claimed the varying degrees of innovativeness dimensions, specifically the highest level of environmental newness (e.g., Schultz et al., 2013b), this study does not test and verify the precise level order of four dimensions. Future research could further study this aspect.

Moreover, despite carrying analytical validity, the qualitative approach applied in this study restricts the statistical generalizability of the findings. A next step could be to apply a large-scale quantitative study in a wider service context. The constructed items in this proposed classification scheme could be combined with standard survey techniques in further quantitative studies to gain an insight into the compositions of service innovation portfolios of organizations and/or industry sectors.

## 5.6 Summary and conclusion

Existing service innovation categorizations and classification schemes imply a need for a new conceptually-anchored categorization. The majority of extant categorizations features either the *degree of change* or *type of change* in service innovation. Besides, weaknesses go along with the four primary classification methods in the literature: single- and multiple-item conceptualizations, matrix categorizations and cluster analyses. This study aims to address the research question: *How can service innovations be classified into categories that address the degree and type of change?* Based on a four-dimensional innovativeness model (Salomo et al., 2007; Kock et al., 2011; Schultz et al., 2013b), this research develops a novel service innovation categorization as well as an associated classification scheme. This study labels four categories of service innovation with their highest-level innovativeness dimension: environment-, technology-, market- and organization-dominant service innovations. Conducting empirical studies in the setting of theme parks and airlines, and applying the classification scheme, this research validates the four proposed service innovation categories in practice. A total of 11 service innovation

cases situated in Walt Disney World, Singapore Airlines or China Eastern Airlines are analyzed in terms of changes in innovations and then classified into the four categories. This research is the first that anchors a categorization on both degree and type of change, taking into consideration the comprehensive innovative nature of service innovation. Through conceptualizing innovativeness with multiple dimensions as well as items and classifying categories with diverse compositions of items, the new categorization is more accurate to portray the multifaceted innovativeness characteristics of service innovations. Through a comprehensive examination of changes in service innovations, this categorization is helpful in practice, particularly for selecting target innovations, assessing completed ones and improving service innovation portfolios.