

Chapter 4

Macro-Trend Study Under Service System: Preliminary Research in Service Innovation and Emerging Technology



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Introduction

In our daily life and work, we are immersed in many types of services, most of which are invisible experiences around us (Vink & Koskela-Huotari, 2021). Services can be viewed as an accumulation of a series of interactions between people and objects under predetermined sequences and frequencies that occur over time (Penin, 2017).

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For example, we might take public transportation to work to utilize mobility service; we might go to restaurants to enjoy the dining service with friends and family; we might study at school to use education service (Wolfe, 2020) or government service; we might want to go to movies, theater, concerts, and sports events to utilize entertainment service. These life-relevant services not only continue to evolve but also shape our lives, describe and influence our perceptions, and adapt to and potentially enact culture (Duan et al., 2021).

Most of the time, we take it for granted. When things do not go well or the way we expect them to be, it can turn out to be a bad or at least unsatisfactory user experience. And in recalling our memory of the experience, we might want to articulate our pain points and make suggestions to service providers. Ideally, users hope the services they purchase/receive can be improved or even innovated with their feedback.

Prior to discussing the concept of service design, we understand that the term design simply is about establishing preferable ways of being in the world by materializing stages that are associated with change (Wizinsky, 2022). Design is synonymous with the transformation and adaptation processes.

Service design seamlessly penetrates people's life and work in multiple ways and contexts with different levels of influence, for example, hospitality services, hospital services, financial planning services, autonomous delivery services, tour guide services, house rental services, airport self-check-in services, museum audio guide system service, and even organizational services, namely, leadership and culture building (Almossawi, 2022; Gheerawo, 2022; Bethune, 2022). Typically, when we define the concept of service design, we understand it from an outside-in perspective during the process of service design and development (Mager, 2004).

Inevitably, what we purchase is not only physical products but also invisible services around physical products that generate service value for us (Telalbasic, 2021). Consumers essentially purchase beyond owning a brand-new iPhone from Apple. Instead, they use the physical product as a tangible "medium" to allow them to subscribe to Apple cloud services, for example, iMessage, FaceTime, iTunes, and Apple TV. Therefore, in order to improve people's quality of life through service innovation, it is critical to understand the history of service design, its comprehensive definition, and creative application.

Thus the first part of the research is to offer an overview of the history and concept of service design and its application by selecting 30 leading academic research papers and articles as a main resource to study, analyze, and reframe the connection between service design, service innovation, and social-technological challenges. The second part of the research is to discuss the benefits and weaknesses of the selected service design framework applied to three macro-trend models: (1) the people-centered model (PM), (2) the technology-centered model (TM), and (3) the hybrid model (HM), a mix of PM and TM, to help us better understand, reframe, and analyze social-technological challenges through a service design lens (Amatullo et al., 2022).

Some well-known service innovation examples, like Airbnb and Uber, inspire us to push the boundary of traditional industries by conducting design experiments

from the angles of product development, service innovation, and experience design covering both tangible and intangible service design touchpoints. In addition, we mention the topic of service design in terms of measuring its quality of outcome, the adaptability to scale, and the effectiveness of its social impact to complete this experimental research.

Literature Review

We studied this research topic using the literature on (1) the history of service design; (2) the definition of service design; (3) the measurement and effectiveness of service design quality, (4) macro-trend models: PM, TM, and HM; and (5) service systems: product, service, and experience design.

The History of Service Design

Lynn Shostack coined the term “service design” in 1982 in his article “How to Design a Service” published in the *European Journal of Marketing* Vol. 16. Instead of applying service design in the creative and design field, Shostack used the term to discuss the task description and market planning (Catalanotto, 2018).

The concept of service design began in the 1990s, which was almost the same time as the development of interaction design (Holmlid & Evenson, 2008). Service design was defined as a discipline, which was positioned close to industrial design in the very beginning (Mager, 2008). At the beginning of the 1990s, service design was still a relatively new concept and methodology for academia and industry. Especially when first introduced to the University of Applied Science in Cologne as academic design research, people misunderstood and confused the concept of service design with other design disciplines (Mager, 2009).

At that moment, people’s impression of design/industrial design focused on making products aesthetically appealing and ergonomic to increase the sales price of the business. Service design thus has a different emphasis in terms of its purpose, values, thinking process, and research approaches.

Service design, like other design disciplines in general, is an applied science. It is the application of design thinking and design methodologies (Mager, 2013). Service blueprint (Kuang & Chou, 2017; Chuang, 2007; Shostack, 1984) and service concept (Goldstein et al., 2002) can be useful tools and frameworks when service designers or service providers want to design and plan new services or improve the current service models.

Part of service design, in essence, is a human-centered design process with an amplifying participatory section, which naturally infuses new design methods and perspectives to innovate the field of service design (Holmlid & Evenson, 2008). We

can recognize that service design starts with the desirability of service recipients (Kuang & Chou, 2017).

Interestingly, service design, as a design profession, lives and learns through design applications, which give more weight to using a human-centered design process (Brown, 2008), co-creation approaches, and participatory methodologies to have a more holistic perspective in service design projects (FJORD, 2017). Meanwhile, the service design domain also has significantly expanded its scope of studies and evolved by integrating other fields of knowledge and applications, for example, big data (Sun & Park, 2017), machine learning, power distribution (Goodwill & Bendor, 2021), public service (Trischler et al., 2019), psychology (Kim, 2021; Kim et al., 2019), and other emerging technologies (Lee, 2022a).

The Definition of Service Design

Everyone has experienced or consumed the outcome of service and might also offer service to others. What is service design by definition from academic and industry perspectives? Services, in general, are purchased and consumed simultaneously, and normally require people, including service recipients (e.g., users), service providers, and employees to connect with each key stakeholder during services (Bitner, 1992).

“Service design gives shape to experiences that have no form,” said Jamin Hegeman, VP, Experience Strategy at Capital One (Hegeman, 2017). According to *The Economist*, a British weekly newspaper, it wrote “service design can be understood as the design of products of economic activity that you can’t drop on your foot, ranging from hairdressing to websites.”

Tomiyama et al. gave a more formal academic definition of service: “a service is an activity that a service provider offers to a service receiver in a service environment and generates values for the service receiver,” which can better inform us about the concept of service design (Tomiyama et al., 2004).

The people-oriented design concept is the key characteristic of service design (Sung, 2014). Holmlid and Evenson concluded in their research that by nature service design is human-centered and participatory that can provide meaningful perspectives to service information (Holmlid & Evenson, 2008). Therefore, service design typically starts from the needs of users, and service recipients (Kuang & Chou, 2017), and can be applied to address the form and functionality of services through the lens of service recipients. To service recipients, the purpose of service design is to ensure the service interfaces and interactions are useful, usable, and desirable, whereas for service providers, service offerings are effective, efficient, and distinctive (Mager, 2008).

To improve and innovate services, we also need to consider not only service recipients but also other key stakeholders, and service providers as well as their profit, because they want their service to be unique to sell on the market to form their special selling proposition while competing with other types of service offerings (Mager, 2013).

Anderson et al. argued that service design is an essential innovation tool and can also work as a mindset, solving transformative service design challenges, for example, redesigning healthcare service systems (Anderson et al., 2018). Wolfe also proposed that service designs are critical and impactful approaches with the purpose to enable cutting-edge social-technological innovations by serving both public services and private enterprises (Wolfe, 2020).

We also need to think about what is good service design in general. To put it simply, good service can maintain consistent service quality, and its processes and results are more precise and predictable from service providers' perspectives, whereas bad service is relatively inconsistent and contradictory across the entire customer experience, which is difficult to predict, scale, and even replicate its service (Penin, 2017).

Good service design can be decomposed into design aesthetics, the meaning of the design process for potential users, and people's emotional attachment on their journey (Simonse et al., 2019). Good service design is also used with an integrated service design model to be more inclusive to support various perspectives of service providers and service recipients across critical service touchpoints in their journeys to enable more innovations and make improvements.

The Measurement and Effectiveness of Service Design Quality

Understanding the history of service design and its definitions, we are curious about exploring how to measure the effectiveness and quality of the service design process and outcome (Sun, 2020). Do we have universal standards to follow or evaluation criteria for the measurement in the service design domain? What is an evidence-based framework for evaluating a service design? What is a scientific framework for judging whether a service design is innovative and a good solution? (Furrer et al., 2016)

One example in Table 4.1 is the framework of understanding environment-user relationships in service organizations that show the structure and flow of how to measure people's responses as a guide to measuring cognitive, emotional, and physiological responses to environments (Bitner, 1992).

In 2004, Hevner et al. proposed seven useful principles (design as an artifact, problem relevance, design evaluation, research contributions, research rigor, design as a search process, communications of research) to conduct service design research focusing on information systems and academia. Furrer et al. discussed the service measurement from a marketing and business perspective by proposing four angles (activities, marketing role, customer role, and design science concepts) from the innovative service design framework in 2016. Simonse et al. proposed four key criteria (analyze, experience, co-design, and evaluate) for their integrated service design framework in 2019 to experiment in care service and patient journey.

While designing new types of services, we recognize that service is a process and do not only consider one touchpoint, single task, or situation across the process

Table 4.1 The service design frameworks to measure the service quality and effectiveness

Framework	Measure criteria or evaluation approach	Research context	Material source
Environment-user relationship service framework	<i>Cognitive</i> response to environments <i>Emotional</i> response to environments <i>Physiological</i> response to environments	Marketing Organization structure	Bitner (1992)
Integrated service design	<i>Analyze</i> the care service system <i>Experience</i> the journey yourself, observe, and sketch it <i>Co-design</i> the patient journey: craft the journey toolkit, interview, and synthesize <i>Evaluate</i> the patient journey for integrated service design	Patient journey Care service	Simonse et al. (2019)
Seven guidelines for conducting research on service design	Guideline 1: design as an artifact Guideline 2: problem relevance Guideline 3: design evaluation Guideline 4: research contributions Guideline 5: research rigor Guideline 6: design as a search process Guideline 7: communications of research	Information systems research Academic research on service design	Hevner et al. (2004)
Innovative service design	<i>Activities</i> (e.g., problem surfacing, problem structuring, solution imagining, innovation creating, innovation creating, innovation optimizing, value proposition developing, and value delivering) <i>Marketing role</i> (e.g., coach, analyst, experimenter, role play customer, customer engineer, value optimizer, deliver point provider) <i>Customer role</i> (e.g., client, usage subject matter expert, sounding board, role player, co-designer/validator, value validator, value co-creator, and benefiter) <i>Design science concepts</i> (e.g., psychometric measurement and analysis, invention axiom, information or comprehensiveness axiom, system optimization, feedback)	Marketing and business	Furrer et al. (2016)
SERVQUAL	Reliability Assurance Tangibles Empathy Responsiveness	Customer satisfaction measurement	Parasuraman et al. (1988, 1991)
Voice of customer (VOC)	Identify customer needs Structure customer needs Provide priorities for customer needs	Marketing research	Griffin and Hauser (1993)

(continued)

Table 4.1 (continued)

Framework	Measure criteria or evaluation approach	Research context	Material source
Lead user analysis (LUA)	Specify lead user indicators Identify lead user group Generate concept (product) with lead users Test lead user concept (product)	Understand the role of users in innovations	Urban and von Hippel (1988), von Hippel (1986)
Service-dominant logic	Service is the fundamental basis of exchange Indirect exchange masks the fundamental basis of exchange Goods are a distribution mechanism for service provision Operant resources are the fundamental source of strategic benefit All economies are service economies Value is co-created by multiple actors, always including the beneficiary Actors cannot deliver value but can participate in the creation and offering of value propositions A service-centered view is inherently customer-oriented and relational All social and economic actors are resource integrators Value is always uniquely and phenomenologically determined by the beneficiary Value co-creation is coordinated through actor-generated institutions and institutional arrangements	Help understand the new definition and concept of service to be measured and perceived in the domain of economics New paradigms shift for production and consumption under value systems	Vargo and Lusch (2004, 2008, 2016), Lusch and Vargo (2014)

(Vargo & Lusch, 2008). It is actually a multifaceted measuring process to review the effectiveness and quality of the service design outcome. Thus, it indicates that the critical role and responsibility of the service designers is to illustrate a bird’s-eye view of the entire service experience and its relevant elements merging with the details of each component within the service systems (Kankainen et al., 2012).

Since service design is a complicated process interconnecting service providers, service recipients, and other key stakeholders within service systems, service design can involve many stakeholders with different needs and incentives (van der Bijl-Brouwer, 2022; Seravalli & Witmer, 2021). Therefore, it is critical to understand the key stakeholders’ expectations and goals upfront in the user journey to help us validate the outcome and value of service innovation (Simonse et al., 2019).

Macro-Trend Models: People-Centered, Technology-Centered, and Hybrid

Complicated social-technological and systemic challenges have transformed the service design conditions under the different macro-trends models (Amatullo et al., 2022; Vink & Koskela-Huotari, 2021). Advanced technological developments and global social issues have made people sophisticated in various aspects: desirability, purchasing behavior, lifestyle, education, and expectations of work and family, which enable the emergence of new types of services and business models beyond dyadic interactions between service providers and service recipients (Patrício et al., 2018a).

For example, three different typologies of servicescapes have been proposed from the academic research (Bitner, 1992): self-service (requires customers only), interpersonal service (requires both customers and employees), and remote service (requires employees only).

While Bitner mentioned the above three types of services designed for service recipients (e.g., users and customers), in this study, we reinterpret and categorize them into three models to discuss the macro-trends of service design: (1) People-centered model: Service providers use labor or people services to have customers served by people, for example, waiters, guides, and nurses, and make them feel a sense of privilege naturally (Patrício et al., 2018b). (2) Technology-centered model: Service providers use technologies to replace the majority of labor costs and services, for example, autonomous vehicle or autonomous delivery services. (3) Hybrid model: Service providers use self-service to empower the customers to make their own decisions. Some of the service design touchpoints might have staff or machines to help customers finish their tasks, for example, airport self-check-in kiosks supported by ground staff.

We mention the three macro-trend models under the influence of technological developments and global social impacts to give a clear explanation of the ideas of service design in the social-technological context (see sections “**People-Centered Model**”, “**Technology-Centered Model**”, and “**Hybrid Model**”). In Table 4.4, we provide a brief explanation of each model and relevant examples and compare their advantages and weakness through the lens of service.

We also introduce the term “service currency” in this section, which stands for the cost of the objects (e.g., physical and informational) or resources (e.g., labor and financial) exchanged between service providers and service recipients (e.g., users and consumers).

In addition, we define two key types of stakeholders in the study:

1. Service providers: companies/enterprises which offer service and experience to customers across user journey touchpoints through visible and invisible artifacts. Some researchers have suggested that service providers might act as creative secretaries to facilitate the conversation between customers and companies (Kankainen et al., 2012).

2. Service recipients: people in general who consume or experience the services provided by service providers. We often called them users or customers in the service system.

Service Systems: Product, Service, and Experience Design

Design and the design process can be considered a social systemic practice with impacts (Jones & Van Ael, 2022), whereas services can be viewed as the soft infrastructure of society which is composed of many different layers of complex systems and subsystems (Penin, 2017). In this study, we can think about a system as a set of technical artifacts under well-established behaviors and constraints with the purpose to interact with other elements/artifacts (De Weck et al., 2012).

If we zoom out a bit to look at a concept of system in a relatively bigger context, we can consider a system as a combination of various types of elements/artifacts that can generate greater value and outcomes which cannot be produced by a single element/artifact (Engel, 2018; Rehtin, 1991).

Other features of systems can also help us decompose service systems, including system boundary/environment, system structure, the concept of system of system (SoS), system hierarchy, and many other different system types (Haberfellner et al., 2019; Crawley et al., 2016).

While we reconsider service design at a system level (e.g., social innovation service systems, technological ecosystem systems, healthcare service systems, financial planning service systems, and public transportation service systems), we will have a more holistic view to explore and renavigate the relationship between service systems with three macro-trend models—PM, TM, and HM—which purposefully enables us to reconnect and reframe the social-technological types of service design challenges (Rodrigues et al., 2021).

Anderson et al. mentioned the above concept as a product-service system, which can also be viewed as part of the transformative service research, TSR (Anderson et al., 2018). Others talked about service systems, which are defined from an organizational angle by considering people, communication, context, and technology and linked to other service systems by organizational or social value propositions (Maglio et al., 2009; Spohrer et al., 2007).

However, in the study, we separated the concept of service systems into three categories: (1) product design, (2) service design, and (3) experience design (Table 4.2). Product design can broadly represent the visible part of the service systems (Bitner, 1992), for example, autonomous vehicles, airport self-check-in kiosks, or architectural spaces like libraries and hospitals, whereas experience design is the non-visible part of the service systems, including people's feelings, perceptions, vibe of the environment, or activities hosted in the public space.

Service design is a series of predefined interactions between service providers and service recipients (e.g., users and customers). In addition, service design can act as a medium to connect, activate, and communicate between the other two service

Table 4.2 The three service systems: product, service, and experience

Service system	Product design	Service design	Experience design
Explanation	Product design can broadly represent the visible assets within the service systems, and we hypothesize that most visible assets can give people a tangible experience	Service design is a series of predefined interactions between service providers and service recipients. Service design can act as a medium to connect, activate, and communicate between the other two service systems to generate the benefit and create value out of the services	Experience design is to describe the non-visible part of the service systems. We can leverage the multiple physical and digital service touchpoints to curate the experience
Examples	Autonomous vehicles, airport self-check-in kiosks, or architectural space like libraries and hospitals	The self-check-in service, interface, apps, websites, and the airline staff can be all accounted for as part of the service design	People's feelings, feedback, ideas, perceptions, vibe of the environment, or activities hosted in the public space

systems, product design and experience design, to generate the benefit and create value out of the services or to cause negative effects.

For example, people head to the airport to finish the self-check-in through the kiosk or with the help of ground staff from the airline. The self-check-in kiosk belongs to the category of product design; the overall self-check-in user journey is part of the experience design, including other key moments: prepare the travel plan, get to the airport, arrive at the airport, board, in-flight, arrive at the destination (Lai et al., 2022), and finally, the self-check-in service. Interface, apps, websites, and the airline staff can be all accounted for as part of the service design category.

In addition to discussing three types of service systems, we also want to understand how to improve the overall service experience within its systems through service design approaches. Service co-creation can be one great option, since there are many different types of service design methodologies. For example, service design for value networks (SD4VN) can be applied to the target subjects by enabling other interactive elements within networks to create more beneficial value through service system co-creation (Patrício et al., 2018a). Part of the SD4VN approach also follows a three-step design thinking process, including inspiration, ideation, and implementation (Brown, 2008).

However, when improving the service experience both for service providers and service recipients or designing new service offerings, we should consider widely about the service system. How can we reframe, solve, and refine the service design challenges through the lens of ecosystems of services, since service can be viewed as the projection of part of networks and a series of experience touchpoints from people's behaviors, which might inform and inspire to have better human-centered service design solutions (Kankainen et al., 2012)?

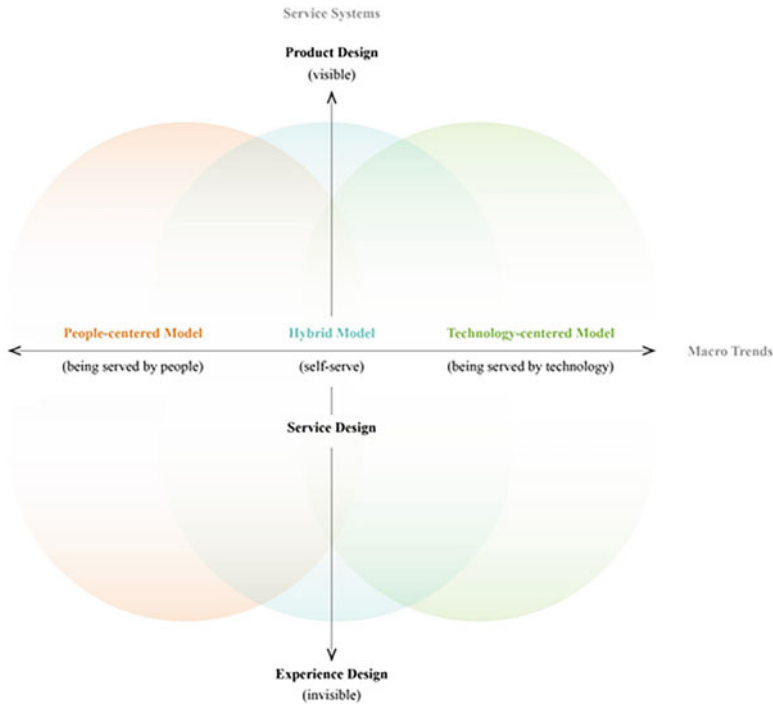


Fig. 4.1 The map of macro-trend models with service systems

Table 4.3 Service design opportunity areas according to service systems and macro-trends

Macro-trend	People-centered model	Technology-centered model	Hybrid model
Product design	Opportunity area 1	Opportunity area 2	Opportunity area 3
Service design	Opportunity area 4	Opportunity area 5	Opportunity area 6
Experience design	Opportunity area 7	Opportunity area 8	Opportunity area 9

We applied two categories: (1) service systems and (2) macro-trends as the hypothetical axes to experimentally build a 2X2 diagram shown in Fig. 4.1 and to map out nine service design opportunity areas in Table 4.3 to discuss different emerging service economics in Fig. 4.3.

Different types of service economics have emerged at various paces based on three service systems under three macro-trends. Service economics also influences most aspects of people’s lives including our working and living environment, complicated social structures, education systems, governmental power, and culture. The intention of creating the map of macro-trend models with service systems is to better help us explore, discuss, and even shape these invisible socioeconomic structures with service design components as well as considering visible service touchpoints.

In Fig. 4.1, we do not put much emphasis on the dimension of time connecting to service models and the design process. We recognize that normally the service will gradually evolve over time because of the changes in environment, the growth of people, the culture of organizations, and many other factors. For example, a customer going to a bar for his/her first time will have a different experience compared with people going to a bar multiple times. An experienced customer might know a bartender, and the preferred food and drink he or she wants to order. The dimension of time will impact not only the service design and its process but also the service quality and customers' expectations.

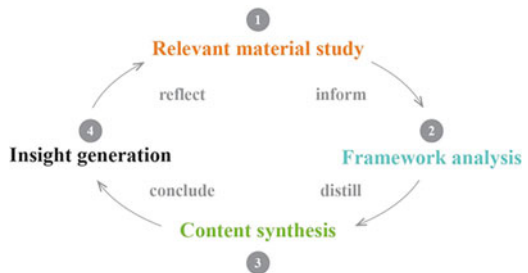
For further research inspired by Fig. 4.1, we can also consider when we apply service design for the public sector versus the private sector, what are the different problems that we need to think of and address? Do we need to create extra service design criteria to complete Fig. 4.1?

Research Methods

We conducted the research flow through a rigorous and direct systemic approach in four steps: (1) relevant material selection, (2) framework analysis, (3) content synthesis, and (4) insight generation. Unlike linear study processes, the above four steps are dynamic interconnected stages that help us understand the service design research topic in a more comprehensive and flexible way, including analyzing the data and material, synthesizing the content from multiple angles, concluding the research result with evidence-based perspectives, reflecting on the learnings, and suggesting future research areas. Figure 4.2 shows the overview of the research flow.

Even though each step is connected through four arrows in Fig. 4.2, that does not mean it is a linear approach. In fact, the overall research flow and study process are interconnected, organic, interactive, and naturally blended with four actions: inform, distill, conclude, and reflect to complete this study.

Fig. 4.2 Research method overview



Step 1: Relevant Material Study

We searched for relevant materials in response to our two research questions: (1) What is service design? (2) How do we use the service design lens to analyze three macro-trend models—PM, TM, and HM—to help us better understand the social-technological challenges? We applied the three selection criteria: (1) abstract, (2) keywords, and (3) conclusion from books, journal papers, and conference papers to filter out the critical sources for this study. Due to the three-month scope of this study, we ended up with ten journal papers, 20 conference papers, and eight books as our reference study materials.

Step 2: The Framework Analysis

Framework analysis includes different types of service design frameworks (Sangiorgi, 2009), methodologies, and evaluation criteria of service design quality, for example, service blueprint, service concept, integrated service design, SERVQUAL, voice of customer (VOC), lead user analysis (LUA), and service-dominant logic. Thus, in this step, we emphasize the service designs by analyzing and comparing their design intention, process, and modeling to help us better explore the potential integrated service design framework suitable for reframing, ideating, or even solving some of the social-technological challenges in the near future.

Step 3: Content Synthesis

In addition to exploring the service design frameworks, methodologies, and evaluation criteria analysis, we also care about the content and context of each selected service design approach and theory, including authors' perspectives on service design, their design intention, purpose, and motivation for creating or refining the service design methodologies and their decision-making process under some critical social-technological factors which might influence them and the service design result.

Step 4: Insight Generation

After gathering relevant resources, analyzing materials, and synthesizing the team discussion and data, we distilled four key insights inspired and generated by mapping three proposed macro-trends: PM, TM, and HM with three service design systems: product, service, and experience design (Figs. 4.1, 4.3, and 4.4). The

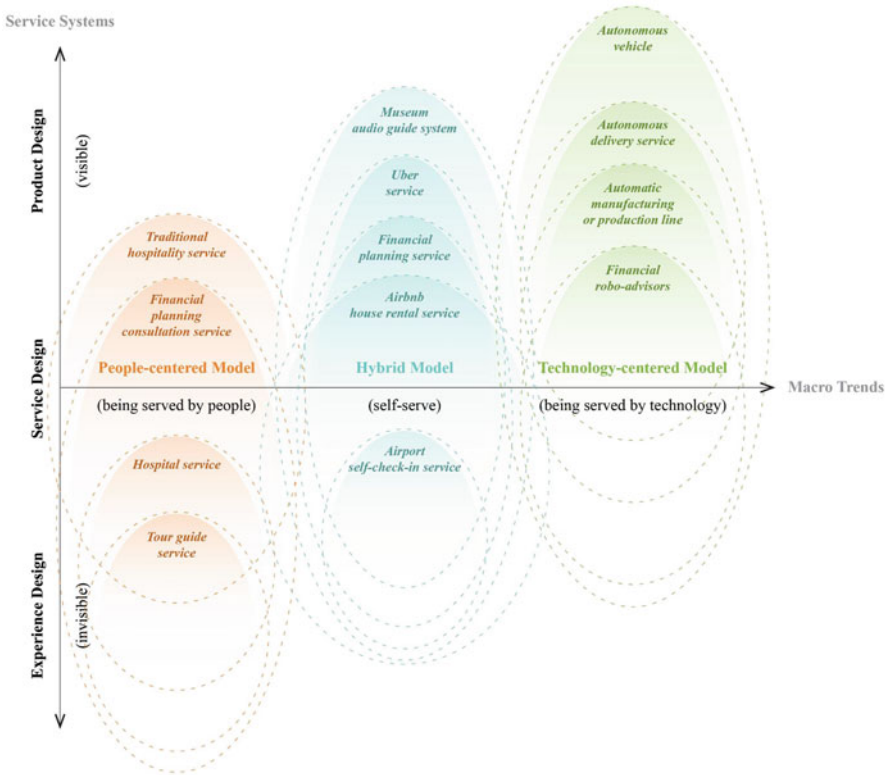


Fig. 4.3 The example of macro-trend models in service systems

suggested further research areas and research discussion are also associated with the four key insights covered in section “Conclusion”.

Research Result

After synthesizing the learnings from literature reviews and studies, we proposed the concepts by illustrating the diagram of the relationship between three service systems: product, service, and experience design and three trend models: PM, TM, and HM and ten relevant examples (Fig. 4.3).

We used financial service as one example to discuss across three macro-trends with three service systems. Under PM, let us imagine a typical financial planning service that is designed and provided by professional financial advisors. People possibly need to go to their office building located in the city center to book the consulting time for financial advice. The consultation services possibly happen through a series of intimate and in-person conversations with then financial advisors.



Fig. 4.4 The opportunity areas of macro-trends in service systems

People’s impression of the overall financial service experience is more based on their financial advisors, and it is a highly tailored customer service offered by a group of people with professional domain knowledge. Financial advisors might sell customers’ financial product potential, which is mainly service-based experience design and less physical product design solutions to advise and manage their investment and financial conditions.

In TM, with the emergent technologies, digital transformation, cultural- and social- structure change, and political and economic restructuring, people as consumers are actually empowered and even encouraged to pursue more options to select their financial services through multiple platforms: in-person, digital, or hybrid. Financial robo-advisor or robo-system is one of the results generated in the context of automation. By fully leveraging and understanding machine learning and artificial intelligence, financial planning services might be replaced by these smart systems and tools. Ideally, financial service providers can provide more accessible financial calculation tools and tailor-made services to cater to the various needs of customers.

Besides financial planning consultation services under PM and financial robo-advisors under TM, HM sits in the middle of the spectrum offering people another

type of financial services with more flexible possibilities. People can better consider their financial situations by having more flexibility to choose the financial tools including visible products to invisible service models and experience that they want to curate from in-person consultation services to digital financial planning assistance tools.

However, the intention of mapping 13 potential service models from automobile industries, financial planning industries, hospitals, hospitality services, and others in Fig. 4.3 is to better help us think about where are the future service design and experiences that people desire that we cannot find on the market to identify potential business implications. The observation and research can effectively assist us to design accessible services with sound business models and qualities for our target audience and continue to explore future research opportunity areas for service design and social innovation.

People-Centered Model

The term “people-centered” was inspired by the term “human-centered design.” IDEO, an international design and innovation company, has promoted the concept of human-centered design (HCD) and design thinking since the 1990s, even though the HCD concept started in the 1960s (IDEO, 2022). It is one of the design processes that starts from users’ desirability and also considers the feasibility of technology and viability of the business to come up with innovative HCD solutions focusing on building empathy for users or potential consumers (IDEO, 2015).

In the study, we put emphasis on the service touchpoints provided by people, including staff, leadership teams, interns, and other service providers in the service system.

PM is constructed based on the customer-centered service guidance (Cook et al., 2002). The majority of service currency/cost that we assume in the study is the labor cost. The service providers deliver their service to users/customers through their staff, for example, waiters/guides/nurses. For example, in banks, financial planners/advisors or bank tellers can give customers consultation advice; in restaurants or hotels, waiters serve customers; in museums, tour guides give tours to visitors; in hospitals, doctors and nurses help patients.

The benefit of PM for customers is that they are entitled to the service packages that service providers designed for them because they can feel a sense of being served and enjoy the privilege, whereas service providers offer tailor-made premium services to cater to customers’ unmet needs and designers through providing labor-intensive services.

The downside of PM is that the high cost of labor service fees may not attract customers. From service providers’ perspectives, they will need to consider the cost of training their staff and also think about service updates to make the seasoned customers feel not only premium, but also fresh and inspired.

Technology-Centered Model

Prior to discussing the concept of TM, we want to introduce our definition of the term technology in the study. What is technology by definition? There are several explanations of this context-driven term. However, our definition is modified from de Weck's book: *Technology Roadmapping and Development: A Quantitative Approach to the Management of Technology*. We view technology as an enabler to assemble processes and objects in the different stages from conception, to design, execution, and operation to realize the functional aspect of technological artifacts that are also associated with knowledge to achieve goals that people set and that generate value for people (De Weck, 2022).

When technology is the center of service design, the control of service shifts from people to technology (De Weck, 2022). Service providers use the emerging technologies to replace the majority of labor costs. Thus, the service currency/cost that we assume in the study is the technology development and maintenance cost.

The service providers deliver their service to users/customers through technology, for example, financial planning toolkits, software, financial robo-advisors, autonomous vehicles, autonomous delivery services, and automatic manufacturing/production lines. The consumer-facing touchpoints are driven by technology. For example, customers can take autonomous vehicles to their destinations without driving themselves. They can have more flexible space and time to work or relax during transportation.

The benefit of TM for customers is that they can rely on systems driven by technologies, for example, AI and machine learning, to do the tasks for them. Therefore, people can focus on other more important things, whereas service providers do not need to pay much attention to people's side. Instead, they can focus on designing optimized mechanisms or trained algorithms to adapt to various situations.

For service providers, the downside of TM is the challenge of how to use the emerging technologies, for example, AI and machine learning, to develop tailor-made customer services without making people feel distant or cold due to automation. Service providers also need to consider the services and systems safety of the users when operating or controlling by machines or smart devices.

Hybrid Model

HM is a mix of PM and TM. Service providers use the idea of self-service to empower customers to make their own decisions, which enables more emphasis on experience-based design (Perrott, 2013). Some of the service touchpoints of customer journeys might have offered staff or machines to help customers finish their tasks. The estimated service currency/cost that we assume in the study is the learning time and effort for customers to understand the self-service model.

There are many self-models on the market and it has become very common. For example, customers order their preferred house through the Airbnb house rental service on digital devices. Amazon marketplace provides an interactive platform to make connections with communities (Patrício et al., 2018a). They probably do not necessarily need to meet the house owner, since they have already dropped the keys in the mailbox.

Many airports have set up lots of self-check-in kiosks to help travelers process their tickets and luggage check-in to save more time and labor costs. One analogous example is that many financial planning services, online banking or banking apps (e.g., personal capital), contain both in-person consultation services and financial toolkits or software that allow customers to understand the financial products better and maintain the transparency of the conversation and process.

Another example is a shared lab space on campus. We can also view it as a great HM case study, since lab scientists, staff, or students can work flexibly either in the actual physical lab space or digital space via Zoom or other online software to contribute their works (Lee, 2022b). The research works and services can be delivered in multiple channels, because either people or technology is one element within the service systems.

The benefit of HM for customers is that they will have a certain level of freedom to spend their time and control the frequency and approaches to using services. Service providers offer maximized flexibility and adaptability to satisfy customers' needs and might save the cost between labor/staff training and technological development and maintenance.

However, in HM, the self-service experience design will play a critical role for service providers, since customers can navigate themselves directly through the process and outcome of service design and they might participate in part of the creation of service design. Due to the complexity of the self-service, system design, and sophistication of customers, the design and development of HM might cost much more money than the other two models.

Discussion and Next Step

Based on Fig. 4.1 and Table 4.4, we divided Fig. 4.4 into nine opportunity areas marked by numbers from one to nine. We are especially interested in exploring circles three, five, and seven for further discussion. What will the scenarios look like if we consider a PM connecting with experience design (circle seven)? How do we envision applying a TM to reshape the product design process and frame of reference (circle three)? What if we use a HM by combining two models of PM and TM to create and explore future service design approaches, models, and applications (circle five)?

Table 4.4 Three types of macro-trend models through the lens of service systems

Macro-trend	People-centered model	Technology-centered model	Hybrid model
Explanation	Service providers use labor or people services to have customers served by people, for example, waiters/guides/nurses, and make them feel a sense of privilege	Service providers use technologies to replace the majority of labor costs and services through using autonomous systems or AI powered by big data	Service providers might use self-service to empower the customers to make their own decisions. Some of the service touchpoints might have staff or machines to help customers finish their tasks
Service currency/cost	Labor/staff training and mentoring cost	Technology development and maintenance cost	Customer service learning and education cost
Examples	Financial planning consultation service (e.g., financial planners/advisors and bank tellers) Traditional hospitality service Hospital service Tour guide service	Financial planning toolkits and software (e.g., financial robo-advisors) Autonomous vehicle Autonomous delivery service Automatic manufacturing/production line	Financial planning service with multiple touchpoints (e.g., online banking or banking apps) Airbnb house rental service Uber service Airport self-check-in service Museum audio guide system
Advantages	Customers can fully enjoy the service packages that service providers designed for them Service providers offer labor-intensive services to cater to customers’ unmet needs It is a “high-touch” service for both service recipients and service providers. It is also a model with a high potential to develop tailor-made services and systems with flexibility and adaptability	Customers can rely on the service system driven by technologies or smart devices, for example, AI and machine learning Service providers do not need to pay much attention to people’s side. Instead, they can focus on designing optimized mechanisms or trained algorithms to adapt to various situations Service providers can relatively easy to maintain service quality	Customers will have a certain level of freedom to spend their time and control the frequency and approaches of using services Service providers offer maximized flexibility and adaptability to satisfy customers’ needs Service providers might save the cost between labor/staff training and technology development and maintenance

(continued)

Table 4.4 (continued)

Macro-trend	People-centered model	Technology-centered model	Hybrid model
Weakness	<p>The high cost of service fee and other labor fees may not be suitable for customers</p> <p>The service providers, for example, a hotel, will need to consider service updates to make the seasoned customers still feel fresh and inspired</p> <p>It might be relatively hard to maintain the quality of services if the service providers do not control the quality of people’s training</p>	<p>The service providers might find it hard to offer tailor-made services due to the limitation of emerging technologies or smart devices</p> <p>The service might make customers feel distant due to automation and machine interfaces</p> <p>Service providers consider the services and systems safety of the users when operating or controlling by machines or smart devices</p>	<p>The self-service experience design will play a critical role for service providers, since customers will navigate directly through the outcome of service design</p> <p>Due to the complexity of the self-service, system design, and the sophistication of customers, the design and development of HM might cost much more money than the other two models</p>

People-Centered Model and Experience Design

Envision one design scenario that is about applying PM to experience design. Even though the majority of service is delivered by people and may heavily rely on people or labor-intensive tasks, how do we smartly leverage people’s talents and creativities or design a set of toolkits or platforms to empower them to curate better experiences and services in the future? When we celebrate the incredible outcome that originates from “high-tech” advances in our society seamlessly connecting to our lives and work, we also need to consider another layer: high-touch to improve the quality of life.

High-touch can be interpreted in many different ways based on contexts and purposes. The term was coined by John Naisbitt, the author of the book *Megatrends* in 1982 (Naisbitt, 1984). It helps us reflect on the roles and responsibilities of service providers (including individuals and companies) in the context of creating or curating human-centered experience.

One obvious example is to apply a human-centered approach to our design and research process. We need to put more emphasis on our users, customers, and key stakeholders’ perspectives to not only design for them but also design with them. While we enjoy the outcomes and use the convenient, efficient services and experiences provided by high-tech innovation, for example, autonomous vehicles, home social robots, and other high-tech products, we need to consider all these great design solutions, apart from providing more convenient services for people: what are other critical high-touch service touchpoints that can enable us, as well as service providers and designers to offer more human-centered experience.

Technology-Centered Model and Product Design

Consider the concept of TM connecting to product design. In this study, we define product designs as physical products with tangible interfaces and features. Obviously, most product designs in the early-stage design and development process naturally fall into TM, since users/customers tend to view technology as part of product features. How does this technology work on this type of product or what are the benefits that users/customers will gain by applying the technology? In addition, the outcome of using technology in product design is relatively obvious and foreseeable.

In further discussion, we might need to reconsider the effects in different stages of product design and development, and the position and value of applying TM. We might need to think about not to overemphasize the importance of TM across all stages of product design and development without thinking about other aspects of product design, for example, the voices of potential users, the cost of the manufacturing process, time and labor, the whole product life cycle within the systems, and the sustainability issues of the product design.

Especially, product design now has become more complicated and powerful than ever to satisfy the needs of sophisticated users/customers. Emerging technologies only serve as one component among the rest of the complex product design system, and its goal is to deliver great value and services to its users/customers. For further studies, we can start by asking one question: How do we find the balance between using TM and PM during the process of product design and development to integrate considerations from users, manufacture, business, cost, and other critical factors into the product-service design process within the dynamic system of business, social impact, and emerging technologies?

Hybrid Model and Service Design

Envision one of the future conditions by applying HM to the service design domain. When we think of operation in hybrids, it is a combination of multiple systems and potentially many subsystems. People as users of systems have options to switch between automated, manual, or in-between/hybrid mode of controlling systems. Thus, it naturally makes the hybrid process itself complicated. We need to consider it comprehensively with more angles prior to making critical decisions. The discussion of applying HM in the context of service design will generate even more complicated systemic challenges, even though, in general, the nature and the process of HM connecting to service design is relatively challenging. And the service outcome and value are still very impactful in terms of influencing people's behavior, business models, and social impact.

For example, innovative shared economic services like Airbnb and Uber have fundamentally transformed the way we view these services. The concept of "owner-

ship” has disrupted and shaped people’s perceptions from having automobiles to sharing their mobility services: from owning the house to providing extra room for rental services. These services use both PM and TM during the whole user journey including service providers, service recipients, and other service-relevant stakeholders in the system.

For further studies of HM and service design, we can explore how to identify the critical service touchpoints to make PM and TM smooth and seamless and how to evaluate the service design quality both through a qualitative and quantitative approach.

Conclusion

We live in the world of experience economics (Lai et al., 2022), and our work and lives are full of services that are not only useful, usable, and desirable but also efficient and effective (Holmlid & Evenson, 2008). We consume various services to make our life more convenient and improve our quality of life; meanwhile, we might generate more consumers’ needs by asking for more new types of services. For example, when we travel abroad, we look for effective and efficient services to enjoy the trip. Regardless of other financial issues, if people can bike, they will not walk; if people can drive an automobile, they will not bike; if people can hire drivers, they probably will not drive themselves. People always tend to choose an option to achieve their goal in a most convenient way by instinct.

So it makes us reflect on the meaning of the term service design in today’s society. In the study, we want to provide a new perspective to understand service design in three macro-trends: people-centered model, technology-centered model, and hybrid model, with three service systems: product, service, and experience design, which can help us better understand, reframe, or even solve social-technological challenges (Amatullo et al., 2022; Vink & Koskela-Huotari, 2021). Thus, we identified and suggested three opportunity areas in Fig. 4.4.

High-Touch Is a Critical Catalyst in Service and Experience Design

In the people-centered model, service providers use labor or people services to have customers served by people and make them feel a sense of privilege. For example, in a five-star hotel, the servants or waiters should know your name, prepare check-in material in advance, and recognize your car before you enter the lobby. We want to leverage the “high-touch” of the people-centered model across the services to amplify the importance of the human-centered experience design.

We break down one general user experience by five critical touch points using the 5E experience design model: entice, enter, engage, exit, and extend (Sontag, 2018). Each key moment is created and curated not only through the lens of service functions and rational angles but also through the emotional and human-centered design aspects. People actually want to purchase neither products nor services; instead what consumers think about buying is the offerings that render services that bring value to them (Perrott, 2013).

Technology Is Viewed as a Vehicle to Deliver Value to People

In the technology-centered model, service providers use technologies to replace the majority of labor costs and services through using autonomous systems or AI powered by big data. How do we design products to provide a better user experience to people and with people? Sometimes, we overemphasize the term technology while introducing or learning about new products. Obviously, technology is one of the components of product design, and technology can be considered a vehicle to realize the functions of products. What we need to put more emphasis on is the services and experiences around the products to generate benefits for our users.

Apple is a great well-known example not only to launch a world-class product design but also to establish an accessible platform, subscription business models, and services, for example, Apple Pay and iTunes, to enhance the overall user experience and service.

Sophisticated Considerations for Users Are a Key to Creating Service Innovation

In the hybrid model, a mix of a people-centered model and a technology-centered model, service providers might use self-service to empower the customers to make their own decisions. Some of the service touchpoints might have staff or machines to help customers finish their tasks. This model is a relatively complex one, since we need to consider many components with multiple layers of considerations across the user journey. Do we have the right staff/experts to help users when the system goes wrong? Do we have adequate technologies to empower users to pursue their tasks? How do we connect people and technology in the service system by designing service models following rigorous and flexible protocols?

Tsutaya Books, an international bookstore established in 1983 in Osaka, Japan, has now opened over 1400 stores nationwide and is a convincing example to discuss the hybrid model with a service design focus (Yang, 2018; Culture Convenience Club Co., Ltd., 2010; Slywotzky & Wise, 2003). They offer a T-card membership service with collaborations with many brands across different industries, which

share similar visions and goals, to form a strong network to bring benefit to consumers with more competitive prices and more options.

Meanwhile, their omnichannel business strategy has seamlessly interconnected the physical (e.g., bookstore space, commercial items) and digital (e.g., membership, Tsutaya brand curation with the seasonal recommendation) service touchpoints (Sugiyama et al., 2015). Ultimately, Tsutaya Books positions itself as a lifestyle brand to bring more value to its customers.

Roadmapping of Macro-Trend Models and Service Systems

Service design is an integrated domain of knowledge to build, translate, and communicate the interaction, connections, and values between the product design and the experience design to meet the desirability of users, the sustainability of business, and the feasibility of emerging technologies to improve our society (van der Bijl-Brouwer, 2022).

The study uses a preliminary experimental research methodology to explore and understand the definition of service design in today's context and use three different service system lenses: product, service, and experience design to analyze three macro-trend models: the people-centered, technology-centered, and the hybrid to help us better envision the roles and value of service design attached to these complex systemic social-technological challenges. Therefore, we summarized critical questions around service innovation for future research shown in Table 4.5.

In the era of transformation of organizations and society, service design is also under a paradigm shift to adapt to new changes and build its capabilities to solve these complicated and systemic social-technological challenges (Wizinsky, 2022; Telalbasic, 2021; Patrício et al., 2018b). For example, how do we consider the transition phase of the creation of new service concepts from the stage of service prototyping and service implementation (Perrott, 2013)? How do we apply service engineering methodologies to reframe, ideate, solve, refine, and implement service-relevant issues in a more evidence-based engineering approach (Tomiyaama, 2000, 2001)?

In the foreseeable future, in the midst of a new global paradigm, we look forward to establishing and reshaping services and service designs as evolving dynamic platforms prepare for the next-generation challenges and create more contemporary service design innovations driven by emerging technologies, business models, and people's motivation to embrace the frontier possibilities, as well as build impactful ecosystems and culture.

Table 4.5 Macro-trend models and service systems

Macro-trend	People-centered model	Technology-centered model	Hybrid model
Product	How do we integrate people-side of services, policies, structures, and even culture into high-tech products?	How do we design products powered by emerging technology to provide better user experience for people and with people?	Do we have adequate technologies to empower users to pursue their tasks in the service system?
Service	How do we re-emphasize the human-centered culture and safe environment in a people-centered model to establish a sustainable service system?	When we launch a new product with new technologies, how do we design the service system accordingly in order to enhance the user experience?	Do we have the right staff/experts/professional team to help and support users when the service system goes wrong?
Experience	How do we amplify the human-side of the service model for users to create and curate a high-touch experience and address people's needs?	What will future scenarios influenced by emerging technologies look like that will transform service systems and people's behaviors dramatically?	How do we connect people and technology in the service system by designing service models following rigorous and flexible protocols?

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