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Designing Life: A Socio-cultural Analysis of IKEA *Kitchen Planner* and UX

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Introduction

In the past two decades, we have witnessed and engaged in discourse on “globalization” as a phenomenon, a social trend, and sometimes a research topic. With regards to our everyday life, the impacts brought by globalization are particularly visible from the food we consume, the manufactured products we purchase, and the news we share.

The kitchen is a special place in home renovation because it requires the most sophisticated design and complex implementation. Freeman (2004) calls kitchen “the heart of the home” and argues that kitchen decoration reflects aesthetic preference as well as concerns about career aspirations and views on parenthood, family, decency, and respectability. She further elaborates that the construction of a new kitchen “inevitably takes place within a historically shaped context” (2004, p.3).

The design process of a kitchen, like design tasks in other areas, requires specific domain knowledge and skills. However, kitchen design has its unique requirements and constraints due to the limited flexibility in appliance selection and work layout. While planning and designing a kitchen, users face complicated situations where they need to consider many technical factors such as the structure and floor plan of the house, lighting and heating system, interfering traffic in the kitchen, geographic locations of the house, temperature and humidity, and clean technology to name a few. The kitchen is also highly sensitive to local culture. For example, the demand for utensils, furniture, and appliances closely depends on cooking styles that vary drastically across the globe.

IKEA’s *Kitchen Planner* aims to better daily life by bringing users’ knowledge and creativity into the design process. This software is accessible on the IKEA website with multilingual versions. *IKEA Kitchen Planner* can assist customers with many tasks such as planning the layout of the kitchen and choosing the furniture that fits the space and user’s personal preferences. It also allows users to preview their kitchen design on the computer screen before they ever spending a fortune on electronic appliances or cabinetry. IKEA has developed a series

of home planning software with localized versions in different countries and regions. *Kitchen Planner* is one of the earliest versions to be launched in this series and is available in more than 20 countries in over 10 different languages.

IKEA has long been an advocate of Swedish design and a naturalistic lifestyle that features simplicity, modernity, and functionality. As a global retailer and a producer of furniture and interior decoration, IKEA has opened more than 300 stores internationally, selling a broad range of 9,500 products in 52 countries. IKEA's vision is to create "a better everyday life" for the people (IKEA) by offering well-designed, functional home furnishing products at affordable prices.

Literature review

In this part, I review current scholarship of genre theory in the field of technology design, focusing on the two key concepts in this study: technology *affordance* and local *uptake*.

Genre: technology as a genre and genre at different levels

Genre theory, taking socio-cultural account into consideration, gives us a tangible and feasible framework to analyze technology design. The notion of "genre" could be traced back to Mikhail Bakhtin's work such as *The Dialogic Imagination* (1981) and *Speech Genres and Other Late Essays* (1986). Bakhtin and Medvedev (1978, p. 134) argue that literary genres are more than texts; genres are ways of "seeing and conceptualizing reality" and are deeply shaped by cultural and historical contexts. Morson and Emerson (1990) further argue that genres also convey a worldview through concrete examples "[that] allow the reader to view the world in a specific way" (Morson and Emerson, 1990, p.282) For example, recommendation reports conceive of the world "in terms of problems" that need to be solved by using clearly defined criteria, and maps are representing the world in ways that "collapse space and ideology" (Spinuzzi, 2003). A *genre* could situate in communication contexts where it serves certain function, and genre is also shaped by the situation. Erickson (1999) defines genre as "created by a combination of the individual (cognitive), social, and technical forces implicit in a recurring communicative situation." As this view suggests, genre and genre theory deal with the interaction between elements in communication, such as function, texts, and agents. An examination of genre could reveal various aspects of the contexts, such as "the institutional and social setting, the activities being proposed, the roles available to writer and reader, the motives, ideas, ideology, and expected content of the document, and where this all might fit in our life" (Bazerman, 2000, p.16).

In rhetoric studies, *genre* is firstly defined as a type of rhetorical response to a recurring social action, and learning a genre may help us learn "what ends we may have" (Miller, 1984, p.165). Russell (1997) further proposes that the definition of genre could go beyond text features, treating genre as an activity system through which groups can routinely use tools in certain contexts. In the Human-Computer Interaction (HCI) field, the definition of *genre* can go beyond the text; many artifacts with design elements and communicative features can be broadly interpreted as genres too (Brown & Duguid, 1994; Sun, 2012). Sun further argues that technology as a genre is socially and culturally founded, and generic features of a technology "carry meaning and enhance culturally situated actions and local practice" (Sun, 2012, p.68).

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Genre theory can study different aspects of a technology genre at multiple levels. Spinuzzi (2003) systematically synthesizes genre studies and proposes a three-level scope for analyzing genre. As he suggests, technology as a genre could be placed at three levels: the macroscopic level reflecting activity, the mesoscopic level reflecting action, and the microscopic level reflecting operation.

On a macroscopic level, genre is activity that deals with cultural and historical contexts, which involves the ways that “the entire communities understand, structure, collaborate on, and execute their evolving cooperative enterprises” (Spinuzzi, 2002). Genre could be regarded as social memory (Bakhtin, 1984), social action (Miller, 1984), or shaping and shaped by sustained disciplinary activity (Bazerman, 1988). On a mesoscopic level, genre is action that is goal-directed. Genre deals with “the specific tasks in which people are consciously engaged at a given point” (Spinuzzi, 2002, p.9) so genre could be viewed as strategies or tactics. On a microscopic level, genre mainly focuses on the operations responding to a specific condition. Spinuzzi (2003) points out that a drawback of the single-scope approach to study human-computer interaction is overlooking the work and process at different levels. The integrated scope with multiple levels will yield a more comprehensive view of user-centered design.

Affordance

To analyze whether a technology genre makes sense to its users in varied contexts, we need to introduce the concept of *affordance*. Discussing affordance from a physical perspective, Norman (2013, p.11) refers to this term as “a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used,” in which both “the quality of the object” and “the abilities of the agent” jointly determine the presence of an affordance. For example, the shape and material of a handle on the door afford the action of “opening the door.” Moreover, affordance could also be situated in a social context. For example, many Korean refrigerators have multi-functions that are quite foreign to American customers: UV lights, odor-eliminating filter, and compartments for preserving and accelerating the ripening process (Barry, 2015). These functions and equipment are designed for kimchee—a fermented vegetable dish in Korea. Being regarded as the national dish, kimchee reflects the local tradition of preparing fermented vegetables through the long and cold winter and local people’s need for technology to store the dish properly. We can claim that the special design features on the refrigerators bear social affordance in the local Korean context.

In addition to the technical features, technology also embodies values and politics (Friedman, 1997). A common problem in technology design and research is that we focus too much on tasks at lower-levels (such as unconscious *operations* on the microlevel and goal-directed *actions* on the mesoscopic level) rather than processes of higher-order (such as culturally sensitive *activities* on the macrolevel) (Sun, 2012). Consequently, we have developed technologies that sustain *operational affordance* and *instrumental affordance*—the properties that afford automatic functions and goal-directed actions (Sun, 2006), but neglects *social affordance*—the meaning arises from certain activity in an extended socio-cultural context. Due to this neglect, the cultural context is often “omitted from design,” and this problem becomes much worse in cross-cultural

design because “[while] meaning is the central issue, users and designers do not share the same cultural contexts” (Sun 2012, p.71).

Acknowledging the complexity of *affordance*, Sun (2006, 2012) outlines a three-level structure of affordance that consists of *operational*, *instrumental*, and *social affordance*. The structured affordance comes from the dialogic interaction between the users, the technology, and the context. The *operational level* refers to the property of the technology that involved physical actions such as touch and feel of a keyboard on a cell phone; the *instructional level* refers to the traits and property that support “goal -directed actions in the material context” such as “communicating unobtrusively” through text messaging (Sun 2006, p. 460); the *social affordance* refers to the properties that may support activities in a social and cultural contexts, such as staying in contact with friends. In this hierarchy, the social aspects of affordance could be interactions on various levels in the contexts, which include individual, community, and society and cultural levels. As affordance arises from different levels of *activities*, Sun further points out that affordances of different levels could interact and develop through technology enactment. Social affordance may arise out of operational and instrumental affordance; therefore, the same instrumental affordance might bring about different social affordance when it is realized in different contexts (Sun 2012, Sun & Hart-Davidson 2014). In the case of IKEA *Kitchen Planner*, for example, users have access to multiple kitchen templates with fixed placement of major elements like kitchen walls, counters, doors, and sink. While this feature generates operational and instrumental affordance by reducing the complexity of design tasks, its incapacity of sustaining a cooking culture should also be noted. I will elaborate on the analysis of this feature in the Discussion section.

Uptake

Uptake provides another lens to examine user experience and technology design in local contexts. Uptake is a term originated from *Speech Act Theory* which could be traced to language philosopher J. L. Austin’s book *How to Do Things With Words* (1962). In this series of lectures, Austin uses *uptake* in the term *secure uptake* to refer to the understanding of a certain action that must be taken in response to an illocutionary speech act. For example, the sentence “The table is messy” is more than a sentence. It could be read as an illocutionary speech act that is asking someone to clean the table. Anne Freadman (1994) introduces *uptake* to genre studies through the metaphor of playing tennis: like the “enabling and constraining” shots deriving from “the formal-material determinants” (p.44-45), an *uptake* in discourse or genre is the outcome of an interaction between utterances which are constrained or enabled in the context.

Assimilating the concept of *uptake* helps us generate insights into technology genre because it dynamizes social actions in which user experience takes place. Miller (1984) describes how genres could be used for actions in concrete situations and outlines principles on a general level. Freadman (1994) describes *uptake* in a dynamic perspective, demonstrating how genres interact or even interlock in actual communication. In Culturally Localized User Experience (CLUE) framework, Sun (2012) defines uptake as a way of user localization as they are “responding to, taking up, and making use of an original design” (p.242) in various contexts. Being the outcome of interactions between users, designer, and social contexts, a local *uptake* represents the effort that reaffirm user agency against the imposed globalizing trends toward homogeneity (Sun,

2012). Later she expands the concept of local uptake to include “the local variations of a technology across the globe” (Sun 2013, p. 33). For example, Twitter from U.S. and Weibo from China are local variations of the microblogging technology as part of “a global technology assemblage” (ibid).

This study will focus on how users utilize *Kitchen Planner* in local contexts as responses to the dynamic local conditions. To be more specific, I will pay close attention to uptakes as localized means of using the software to fit users’ everyday life. User experience will be analyzed through concrete activities in complex situations where material factors, social-cultural contexts, and technological features play a role.

Methodology

In this study, I explore and analyze a design software named *Kitchen Planner* launched by IKEA, a leading multinational home decoration and furniture company originally from Sweden. *Kitchen Planner* is designed to assist IKEA customers in reviewing, selecting, and purchasing kitchen appliances and furniture. This software is available in several languages to meet local customers’ linguistic needs. As the world’s largest furniture retailer (Loeb 2012), IKEA’s effort in launching multiple local versions demonstrate its ambition to approach overseas customers, which also echoes the ongoing trend of localization taken by many multinational corporations in the global markets. Despite the support it provides to local users, *Kitchen Planner* poses many questions and concerns about user experience. Is *Kitchen Planner* usable and useful? Does *Kitchen Planner* make users’ everyday life better? How do *Kitchen Planner*’s function and menu assist users in completing design tasks? Does it succeed in making user experience meaningful in local cultural context? Does it show any deficiencies that may hinder user experience? To provide answers to these questions, I carefully analyze the design, functions, and user experience, hoping to generate insights into technology design for everyday life and provide useful suggestions for design practice in the future.

Here, I list my research questions:

What affordance does IKEA Kitchen Planner provide? How does Kitchen Planner connect action and cultural meaning in local contexts?

Research design and data collection

The research method reflects an attempt of “etic-then-emic” approach, which is first articulated by Thatcher (2010, 2011) in intercultural professional communication study. The *etic-then-emic* approach requires the researchers to apply structured frames—such as cultural dimensions (Hofstede, Hofstede, & Minkov, 2010)—to study cross-cultural differences and then to “qualify it with emic details” (Thatcher, 2010). The terms of *etic* and *emic* derive from linguistic studies, where the emic approach being originally associated with the study of phonemics which are the smallest sound unit carrying meaning to speakers of a certain language or culture, and etic approach focusing on sound unit generated by specific physical distinctions such as the shape of mouth, the position of tongues, and throat and air. Thatcher (2010) points out that emics are culturally specific while etics are not; the study of the physical etics, however, can explore how the languages use physical features to generate culturally specific sound units, “exemplifying the

etic-then-emic approach” (Thatcher, 2011). This approach provides a new perspective to cope with two long-standing competing paradigms in professional communication: the global, neutral framework and the local, cultural sensitive one. The etic-then-emic approach can be applied to study technology design. We can use usability testing to evaluate the technical and physical side and use user experience study to reveal the socio-cultural factors. Employing etic-then-emic approach in HCI study can improve “the logistics, fairness, and validity of the research” (Thatcher, 2001).

In this study, the etic-then-emic approach features a usability approach of expert walkthrough combining with an autoethnography. Autoethnography is “an approach to research and writing that seeks to describe and systematically analyze (graphy) personal experience (auto) in order to understand cultural experience (ethno)” (Ellis, Adams, & Bochner, 2011). Autoethnography has been used in a wide spectrum of disciplines such as design research, communication studies, education, anthropology, sociology, and marketing. In our field, we have seen some attempts of introducing this method to better understand user experience (Blandford, Furniss, & Makri, 2016). For example, Höök (2010) discusses how bodily experience such as body movement and emotion could be transferred to digital technology design. To gain first-hand understanding, she participates in horse riding and then uses her own experience as data to reflect on the research topic. O’Kane, Rogers, and Blandford (2014) adopt autoethnography to study the usage of a wrist blood pressure monitor. Belinsky and Gogan (2016) employ autoethnography to study business pitch development.

The term autoethnography bears multiple variations with regards to form, approaches, data interpretation, and writing (Hayano, 1979; Ellis 2004, Holman Jones 2005, Ellis, Adams, & Bochner, 2011). However, many scholars have reached a consensus that a researcher’s role should be an engaging “participant observer” (Ellis, Adams, & Bochner, 2011) and the researcher’s own experience and reflection is a valid source of data. Research practice grounded on these two principles is also regularly conducted in various usability tests, especially in heuristic evaluation that relies on a researcher’s expertise and experience. Although autoethnography could only represent a single person’s account thus its findings could not be generalized to a broader population (Blandford et al., 2016), it does provide a fresh perspective and in-depth data. This method is often used as an exploratory step earlier in user experience research and further help with the research design and planning of subsequent studies that involved other participants (O’Kane et al., 2014).

My approach to conduct this study is anchored by the engaging role of the researcher found in both an autoethnographical study and a heuristic evaluation. I interweave two approaches in one study, aiming to bring together a broader view of technology design as each approach covers a different perspective: A heuristic evaluation can reveal the technical, operational, and instrumental characteristics, and the autoethnography will bring an interpretive account in connecting with cultural and social contexts.

To examine technology design for everyday life, I chose three localized versions of *IKEA Kitchen Planner*: the Swedish version, the U.S. version, and the Chinese version. Although a multinational corporation, IKEA has always been known for its advocacy of Nordic design and

aesthetics. IKEA was founded in Sweden and its current products are deeply shaped by Swedish design, thus I consider the Swedish version as its original version, thereby recognizing the U.S. version and the Chinese version as attempts of localization. I am a frequent IKEA customer and have been very familiar with its style and products, and I have a good understanding of the requirements for a kitchen as I spend a considerable amount of time in my kitchen on a daily basis. In addition, I lived in China for over 20 years and have been living in the U.S. for more than five years. I have also visited Sweden and read extensively about its culture and history.

In this study, I take an autoethnographic approach to record, analyze, and reflect on my own experience as a *Kitchen Planner* user. My exploration of *Kitchen Planner* is structured as a heuristic usability evaluation, a process in which I use five heuristics to assess the interface. I downloaded and installed each version (Swedish, U.S., and Chinese) respectively, and then I built a virtual kitchen on each platform through a few procedures: browsing items available in IKEA and laying out items on the interface to form a kitchen that fits local customers' expectations. In the process of building up a virtual kitchen, I took notes to record my actions, feelings, responses, and evaluations of the interface, which served as **preliminary data**.

The analysis is conducted in two phases: 1) an evaluation of critical operational features using categories synthesized from current literature on usability and a general analysis of instrumental affordance; 2) an in-depth analysis of social *affordance* and local *uptakes*.

In **phase one**, in order to generate a comprehensive description of the operational features and instrumental affordance of each version, I apply categories listed in ISO standards (ISO, 1998) and Nielsen's definition of usability (Nielsen, 1994) as evaluation criteria:

- *Learnability*: is the software easy to learn so that users can quickly start to work on the system and finish some tasks? Does the operation of the software require specific domain knowledge?
- *Efficiency*: is the software able to help users complete tasks with a high level of productivity? What agencies/agents are collaborating with the users?
- *Memorability*: are the software and its functions easy to remember so that returning users do not need to learn everything all over again?
- *Accessibility*: How can the users access the software? What functions and parts of the software can the users have access to?
- *Satisfaction*: is the software pleasant to use so that users will subjectively like it?

In **phase two**, I focus on the examination of how *Kitchen Planner* yields *social affordance* in local contexts and further analyze how this software could be used as a local *uptake*.

Discussion

In this part, I will discuss IKEA *Kitchen Planner*'s operational features and operational affordance using a usability approach. Its social affordance in local context is also discussed from a linguistic perspective and a domestic space perspective.

Operational features

The detailed analysis of operational features of each version is presented in Appendix A, B, and C. From a technical perspective, the Swedish version (See Appendix A) is low in technical requirements in terms of CPU processor, graphics card, screen display, Internet bandwidth, and browser. This characteristic makes the software highly accessible to general users. The interface is effectively designed regarding symbol function and cursor control so users will be able to navigate the software easily. As Fischer, Lemke, Mastaglio, and Morch (1990) suggest, the complete mastery of a design system that requires high-functionality will very likely exceed most individual's cognitive capabilities. Consequently, complex systems exhibit a low task completion rate. IKEA *Kitchen Planner* has carefully avoided such incompetence. Immersed in designing, even an ordinary customer need to concentrate on accomplishing tasks rather than mastering the computational languages and operational skills (Fischer et al., 1990). The low technical requirement and minimalist interface reduce operational and instrumental load imposed on users.

The Swedish version has other noticeable features. A total of ten ready-made kitchen templates are available so users can manage elements in each template to suit their own needs as well as to increase productivity. Located in the footer of the page, the link to the software interface is relatively unnoticeable, which might cause some concerns over accessibility (See Fig. 1). Another major drawback of accessibility is the software being unable to operate on mobile devices. The Swedish version also provides its users with offline assistance from specialists and hotline consulting. As a computer-aided design system tool, IKEA *Kitchen Planner* needs to assist users in turning their conceptual kitchen in their heads into a detailed visual representation on the screen. One strategy it uses is presenting images and measurements of furniture pieces on the interface so users can easily choose the piece they like, but it also comes with a deliberate limitation: the software only works with IKEA products that are listed in IKEA catalogs. In other words, users cannot electronically install new cabinets or place a stove from other manufacturers.

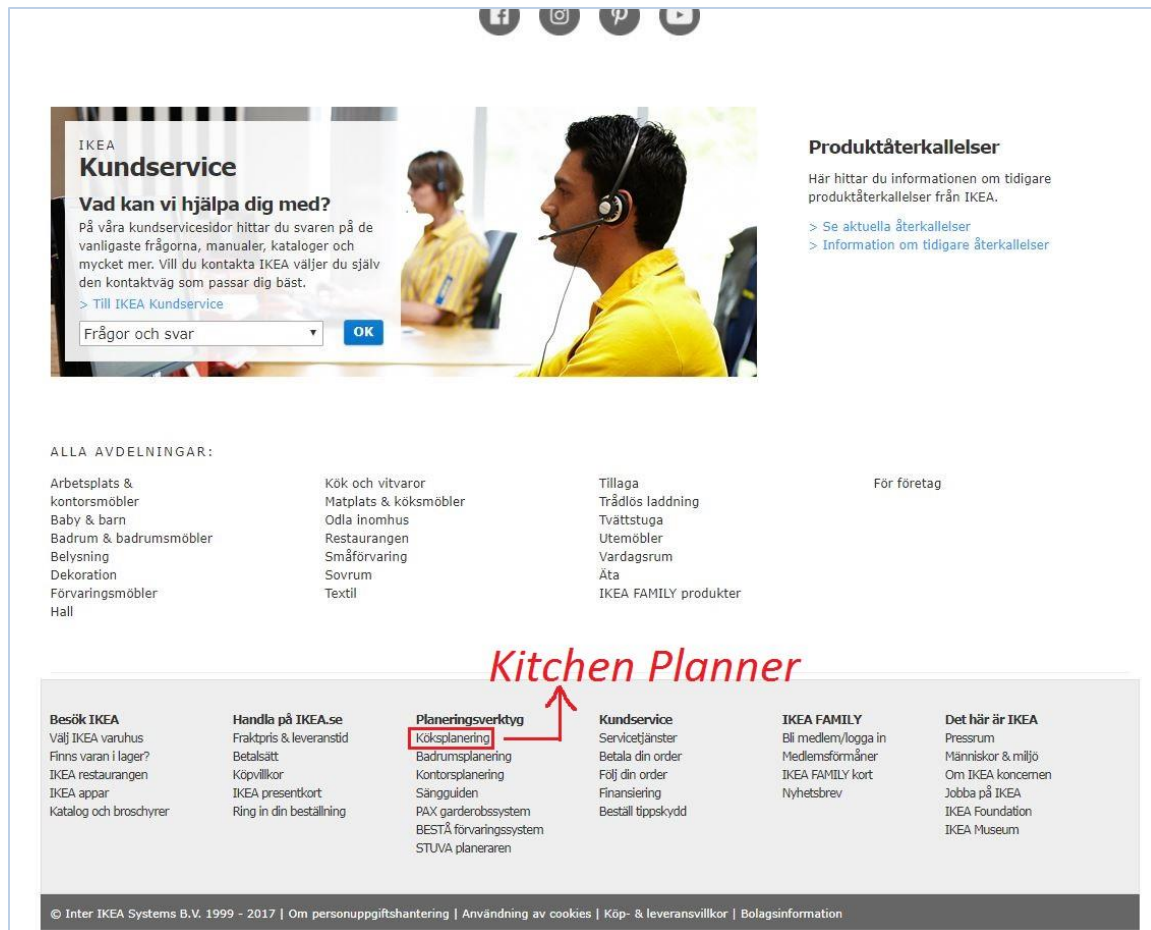


Figure 1. A screen shot of the Kitchen Planner's entry (the Swedish version)

As is shown in Appendix B, the U.S. version inherits the structure of the Swedish version. The U.S. version resembles the original design in terms of technical requirements and interface functions (See Fig. 2). Like the Swedish version, the U.S. version also provides multiple templates, but the number of templates is reduced to seven. A link and an illustrative picture are located at a noticeable place on the homepage, which adds to the software's accessibility. The collaborating service from the U.S. side is limited to on-site support from its staff and seven guidebooks in PDF format. Instant assistance such as hotline or online service is listed on the website. A major defect is the lack of multilingual versions, which limits its ability to serve a large population of Spanish speakers in this country. Another major drawback resides in the cursor control area where metric conversion is missing (See Fig.3). The U.S. is one of only three countries that have not adopted the metric system. In the U.S. version, measurement units like *inch* and *square inch* are provided, but no units from the metric system such as *meter* and *centimeter* are available. This design lacks user friendliness to international customers in the U.S. because this group will have to rely on external sources of conversion as they are more used to the metric system.

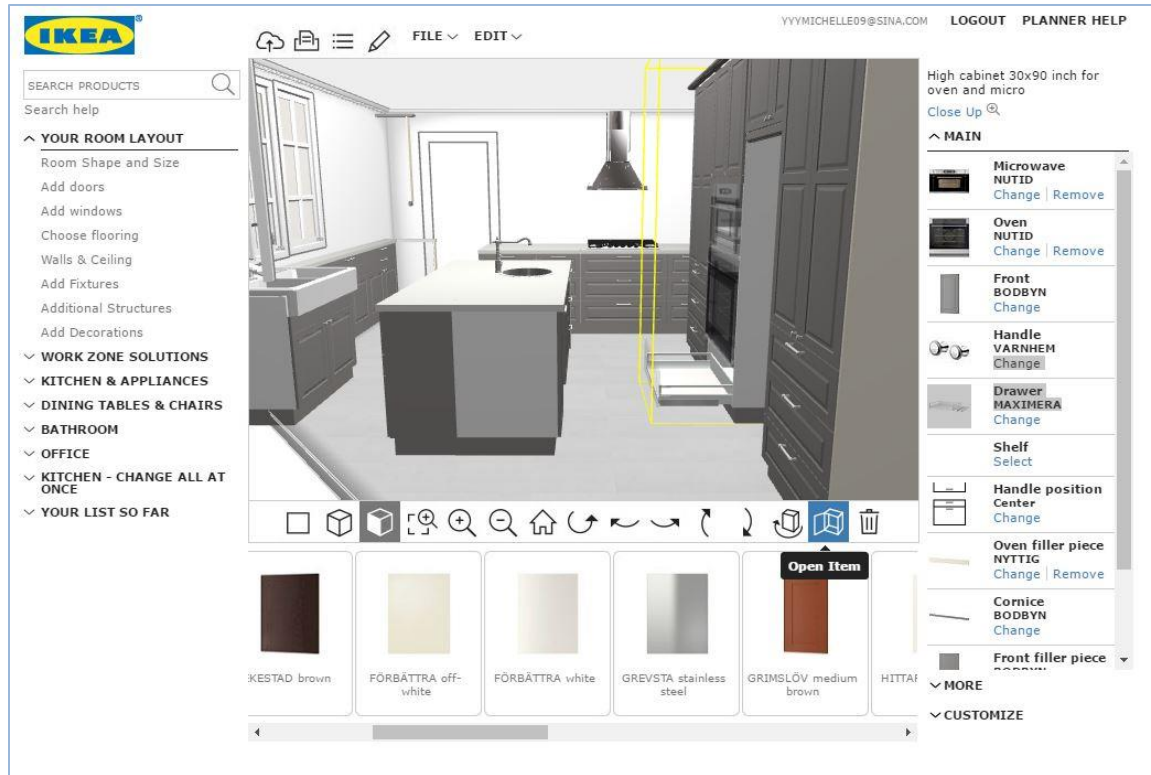


Figure 2. A screen shot of the *Kitchen Planner*'s interface (the U.S. version)

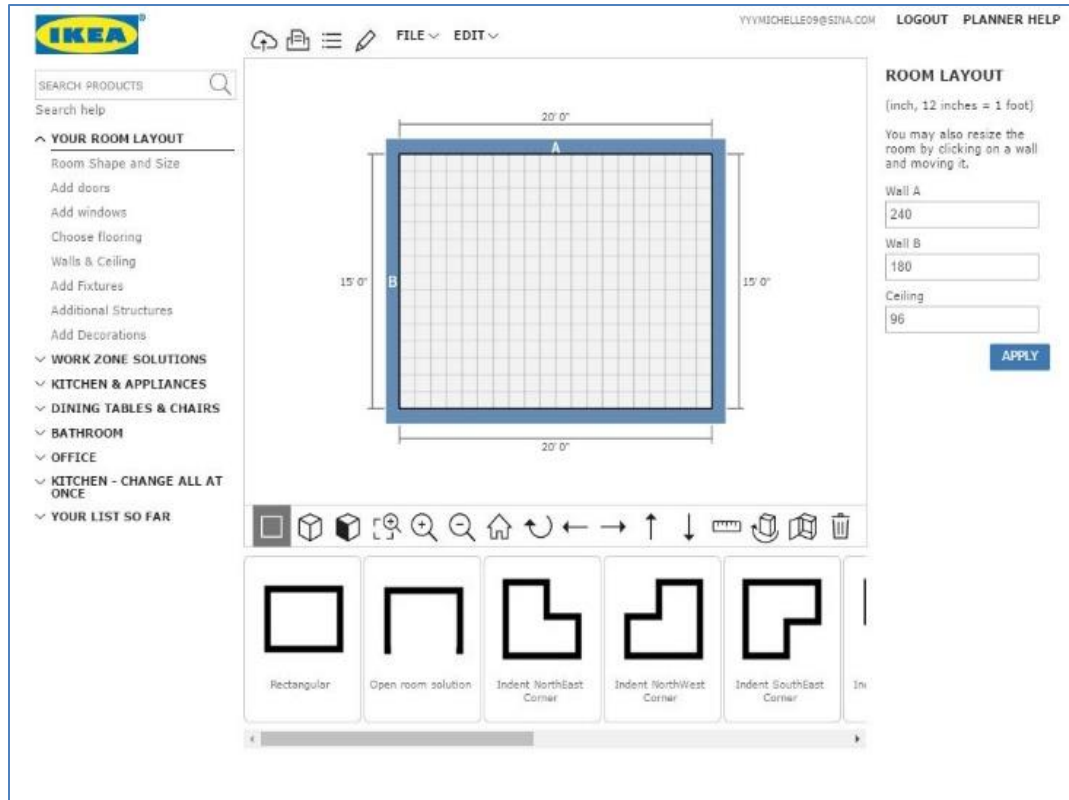


Figure 3. A second screen shot of the *Kitchen Planner*'s interface (the U.S. version)

I choose to include two screenshots of the U.S. version because it is more accessible to our journal readers as it is the only version using English language on its interface.

As presented in Appendix C, the overall design of the frame and functions in the Chinese version are very close to the Swedish one, but the Chinese version deviates from the original version with regards to system requirements and collaborating service. Compared to the Swedish version and the U.S. version, the Chinese version imposes a relatively low requirement on computer hardware, such as computer processor, graphics card, and screen resolution. In the guideline instructions, estimated downloading time on different bandwidth is also listed so users can anticipate the time without feeling too frustrated while waiting. Unlike the other two versions, however, the Chinese version is not compatible with the MAC system, a design defect that will cost a significant loss of users. IKEA also provides its Chinese users with seven kitchen templates and various collaborative service and assistance, such as a user's guide, a highly practical self-measurement form, and in-store consulting service. The Chinese version provides a *User's Guide* with a hyperlinked “浏览用户指南” (translation: *Browsing Users' Guide*) right next to the software entry. This guidebook combines explanation of design rationales with products, but surprisingly the guide is written in English. A *Customer Self Measurement Method Form* in PDF format is available for downloading, in which key measurement items in the kitchen are listed, such as the size of prep station, size of electronic appliances, size and direction of kitchen doors, position of pipes and outlets, etc.

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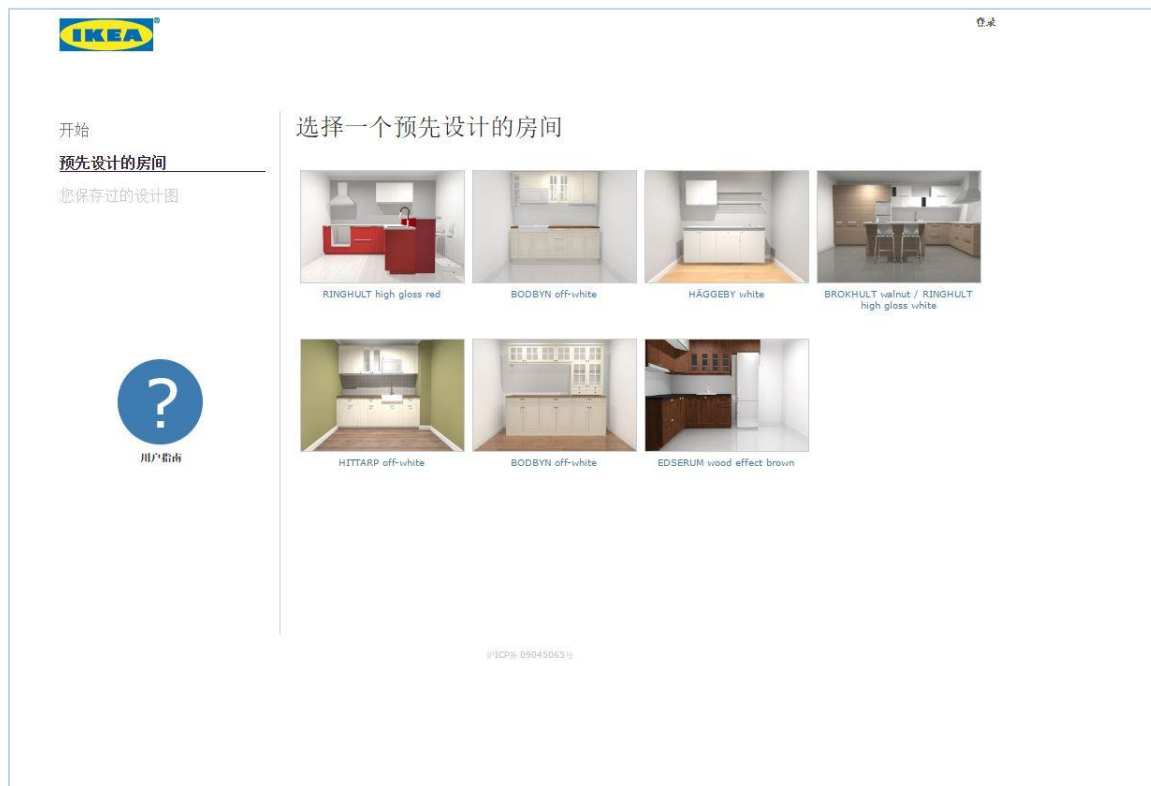


Figure 4. A screen shot of the *Kitchen Planner*'s Interface showing the templates (the Chinese version)

Essential to the software, the objects of the design process—various kitchen elements—determine user experience. The analysis shows that across three *IKEA Kitchen Planner* versions, working tasks can be classified into six areas: room layout, work zone solutions, kitchen and appliances, dining tables and chairs, and “your list so far.” As Figure 1 shows, thirteen room shapes are available in the “Room layout” section, with most of them being rectangular. Other designing units include choices of doors, floor materials, walls and ceilings, and so on. An intelligent function of the software is its ability to identify problems and offer suggestion accordingly. For example, if a user selects a cabinet and places it against the wall, a reminder will pop-up to ask the user to add a filler piece to fill the gap between the wall and the cabinet as to avoid possible scratch on the surface.

Affordance in local contexts

In this section, I will discuss how *IKEA Kitchen Planner* sustains or fails to sustain *affordance* at different levels. As is mentioned in the literature review, a great portion of design studies sees affordance at the operational level and instrumental level, neglecting the social affordance of a technology (Sun 2012). To address this gap, the discussion in this part will focus on social affordance.

Overall, *Kitchen Planner*'s U.S. and Chinese versions involve only basic localization work from the engineering perspective, and the language translation of the interface and menu do not fully meet local users' needs.

Linguistic affordance

Language difference is one of the primary concerns for technology localization, which is particularly exigent in a global context. *IKEA Kitchen Planner*'s linguistic affordance demonstrate its effort in localization with some successful and failing attempts. The original Swedish version is constructed in Swedish—the only official language in IKEA's native country, Sweden. When IKEA is localizing its software in foreign countries and regions, it adopts local languages to accommodate local users' linguistic needs. The U.S. version is available in English, the official and most spoken language in the country. The use of English as the delivery language makes the software accessible to 79.2% of its English-speaking residents (Central Intelligence Agency), but the absence of a Spanish version might frustrate a large population of Hispanophones in the U.S. According to the Instituto Cervantes research center (2016), an estimated 56 million people in the U.S. speak Spanish as of 2016, a large portion of whom are monolingual. Although the Spanish version of *Kitchen Planner* is available in a few Hispanophone countries like Spain and the Dominican Republic, they are not applicable in the U.S. because each local version is connected with storage data in the local country. In other words, Spanish-speaking customers in the U.S. will not get accurate information about the items they need through *Kitchen Planner* in Spanish language because what they choose in the software are items available either in Spain or the Dominican Republic, not their local stores. The lack of a Spanish version in the U.S. isolates a big group of customers from using and benefitting from the technology because of language barriers.

The Chinese version, on the contrary, sustains linguistic affordance more strongly than its U.S. counterpart. Mandarin Chinese is the dominant language spoken in China. Every individual with a basic literacy level is able to read or write Chinese. Therefore, the choice of Chinese language for the local version makes a lot more sense in China's sociocultural context. One drawback of the Chinese version lies in the *User's Guide*. Customers expect to find information regarding navigation of the software, so the language used in the *User's Guide* should be understandable to readers. Surprisingly, the *Users' Guide* is written in English without any form of Chinese translation accompanied. This inconsistency in languages leaves non-English-speaking users helpless when they are in urgent need of assistance.

Social affordance in domestic space

While languages afford some of the fundamental needs of users, the software's capacity to sustain domestic and socio-cultural affordance becomes another essential inquiry. According to the analysis conducted in phase one, all of the three versions provide their users a few kitchen templates to start the design process. These templates are finished design drafts with all the furniture, counters, workstations, appliances, and sinks in place. Interestingly, half of the templates adopt an open-kitchen layout that transforms the kitchen into an open space by connecting the kitchen to the rest area in the house or apartment. Some open-kitchen templates use a bar to function as the invisible wall to separate the cooking area from other areas.

Regardless of aesthetic preference, the open-kitchen design and the placement of bars sustain social affordance at distinctive levels in each country. Swedes have a tradition of socializing in the cooking and dining area (Sweden.se). In Sweden apartments and houses usually do not separate the kitchen from the dining area, and local people are very used to meet and talk in the kitchen. Moreover, the popular idea of “cohousing”, a collective form of living and sharing facilities, has been experimented and promoted in Sweden in recent decades (Vestbro, 2012). Among many of the innovative designs promoted in this movement, the notion of “central kitchen” is essential to the success of cohousing because its underlying goal—achieving “sense of community or neighborly collaboration” through shared space, facilities, and labor (Vestbro, 2012)—could be realized through a common workplace like the kitchen.

Growing and being nurtured in such a social context that highly values collaboration in domestic labor and communal activities, IKEA’s design and products are practicing the ideology that addresses how collective work and shared space can better our everyday life. Incorporated in *Kitchen Planner*, this ideology is practiced in the form of open kitchen and open space. Either in a private household or a shared house, a kitchen with vast open area gives people the flexibility to work and talk with each other. The option of adjusting the size of workstations and counters enables users to create a space with suitable size in accordance with the traffic and workload in the cooking area. Since the border between the cooking and dining area has been broken down, social interaction will be able to emerge. Therefore, *Kitchen Planner* as a technology genre sustains social affordance by providing options of creating space for social interactions.

The U.S. is a country that covers a vast land and fosters a highly diverse population, so the needs of each kitchen depend on regional culinary styles and local cultures. A major concern that comes with geographic feature is logistics. When a customer is planning to build or renovate the kitchen, he or she will need to take delivery and installation expense caused by geographic distance into account. As a result, customers will very likely favor a furniture store close to the house over a store that is far away. According to the IKEA USA website, IKEA has a total of 43 stores in the United States, most of which are located in the metropolitan areas like New York City, Los Angeles, Chicago, Dallas, Boston, and San Francisco. IKEA also strongly resonates with the Millennials. For urban residents, due to the high housing price, rental is a more economical and affordable choice. Tenants are less likely to spend time and energy in using or renovating the kitchen. In addition to the preference brought by house rental, city lifestyle is another factor affecting the use of kitchen. A fast-paced city life is always featured with dining out and vibrant social interactions, which makes urban home less demanding in terms of cooking functions compared to those in the suburban and rural areas. As a result of urban lifestyle, the operational functions—such as deboning a fish and roasting a turkey—are being replaced by social functions. For example, when you have a friend visiting you after work, you probably will grab some pre-made snacks from the kitchen and make a cocktail for the friend. As you are measuring liquor, mixing soda, and cutting lemon, your friend is sitting at the bar chatting with you freely. It is in this casual atmosphere that the kitchen manages to connect two individuals through social conversation and interaction. The bar, as an essential part of an open kitchen, subtly integrates informal socializing into the kitchen while ensuring that the efficiency of the kitchen as a workplace is not affected. By offering the choice to build up an open kitchen, *IKEA Kitchen Planner* sustains social-cultural affordance in its own way.

When the software comes to the China, it faces a social-cultural context that is quite different from the Scandinavian and North American society. As of kitchen design, the operational needs outweigh other needs. Unlike Swedish and American culture, the Chinese tradition never sees kitchen as a social place. A kitchen's ultimate function is to prepare and cook food for the family. Moreover, despite regional differences, cooking techniques like stir frying and steaming are among the most used ones, which apparently produce hazard in the air. Besides, given this cooking feature, a Chinese kitchen relies heavily on fire as its heat source, which creates a high demand for stoves (Chao, 1972). Therefore, in order to prevent the hazardous air from spreading out to other areas such as the dining room and living room, a typical Chinese kitchen is always equipped with a powerful fan and is constructed as a closed-up space. As a result of the hustle and bustle occurring in the kitchen, this place has never been used or perceived as a socializing area.

While Kitchen being a social space is highly impractical, it is also contradictory to the spatial hierarchy in traditional Chinese culture which is deeply shaped by Confucianism. Kitchen is subordinate to other space in domestic house architecture (Shin, 2013), and it has long been seen as an unwelcoming place for visitors. In an ethnographic journal written a century ago, American zoologist Edward Morse (1903) mentions that the local host in Canton is astonished that his American guest asks to visit and sketch the kitchen rather than the elaborate apartments. Morse (1903) observes that the Chinese see their kitchens as an “unsavory place” because of its “disorder.” Morse further argues that a kitchen's ethnic features are associated with family life that persists through many generations, which can explain why many Chinese people's disapproval of showing guests their kitchens remains very strong.

Another factor that deters connecting the kitchen with the dining area is the Chinese tradition of “no-talking at dinner.” In *The Analects*, Confucius says one should not converse when eating (1979). Confucius's principle of “not talking while eating” has been adopted by the Chinese for centuries so the Chinese customers are less likely to adopt the idea that a kitchen and dining area should be integrated to build up a shared space for social interaction. Interestingly, this design in the software is an excess of operational and instrumental affordance because it offers options that local users are very unlikely to adopt due to cultural and historical traditions.

The use of open-kitchen templates in the software could be a double-edged sword. On the one hand, it indeed nurtures operational and instrumental affordance in some cases. Templates can simplify the design process as users do not have to build up an electronic kitchen from scratch. On the other hand, however, what comes with the fixed templates is the loss of the complex historical and cultural traditions embedded in the kitchen. In addition to the efficiency and convenience arising from the templates, users' satisfaction towards this design feature might diverge. Swedish users and U.S. users in urban areas are very likely to be more accepting because an open kitchen resonates with the ideology and lifestyle they are familiar with. Chinese customers will be reluctant to adopt this design because an open kitchen cannot sustain their social need.

As my analysis demonstrates, *Kitchen Planner*'s instrumental affordances are rooted in its operational features, and social affordances are constructed through users' interactions in local contexts. The same operational feature and instrumental affordance might bring about diverse social affordances in different contexts, but it is also possible that the same operational or instrumental affordance may fail to generate social affordance in one context even though they can perfectly sustain social affordance in another situation.

Uptakes in localization

As analyzed in this article, IKEA *Kitchen Planner* does sustain affordance in some degree at the operational level, the instrumental level, and the social level. Due to some deficiency in its design concept, users might not fully achieve the goal of designing a kitchen and purchasing furniture/appliances through this software. One thing I notice, as I design my kitchen with this software, is that *Kitchen Planner* is a good practice tool for interior designing regardless of its many inadequacies. A number of design tutorials and resources also suggest employing a design tool to help with brainstorming at the early stage of design process. A mismatch between users' choices and store storage might occur. A lot of times IKEA is not able to provide all the furniture chosen by the users, leaving users frustrated when they find they cannot renovate the design using the furniture they desire due to the shortage of store storage. Users very likely will use the software merely as a practice tool. By organizing and arranging multiple pieces in a draft on this platform, they can acquire the basic concepts of home designing as well as familiarize themselves with the furniture and appliances needed in the kitchen.

While information about the financial profit brought by *Kitchen Planner* has not been disclosed, the software itself does have some merits, especially the unique experience of designing like a professional. As Dick, Eden, Fischer, and Zietz (2012) suggest, when people are involved in making something themselves, they attach greater value on that activity and are more likely to continue to invest time, effort, and other resources (say, purchasing) in it. Even though the use of *Kitchen Planner* might not directly lead to a sale, it is still an engaging strategy of marketing and branding. IKEA's endeavor also echoes Joseph Pine and James Gilmore's groundbreaking theory of experience as a new form of business (1999). Pine and Gilmore (1999) argue that with the development of technology, "experiences" is evolving to a more effective and competitive form of business compared to the older forms such as commodities, goods, and services. IKEA *Kitchen Planner* is such a space that gives users memorable and highly personal experience as professional designers. Turning designing into a discursive empowerment process, the business encourages its consumers/users to take an active role. Thus, it initiates creative uptakes in local contexts.

A few other thoughts: Computer-aided design technology in a new era

The analysis of IKEA *Kitchen Planner* also gives us a good lesson on computer-assisted design technology. An important question emerged as I analyzed uptake: how can we cope with problems stemming from technology failing to connect online design action with offline activity (i.e., in-store service in this case)? It takes some effort to complete tasks in the electronic world, but it might take users even more time locating furniture's pieces in the store. Here is a scenario very likely to happen: a user chooses a printed version of design draft, and then he/she will need to bring 35 pages to the store. What if some pieces are out of order? How do customers change

or alter the design accordingly when some pieces are not available in the store? How can customers control their budget effectively? These concerns remain unsolved. From IKEA's point of view, the desired outcome is to have the customer complete a draft and to encourage customers to purchase products from IKEA. If *Kitchen Planner* cannot boost sales due to storage or logistic issues, we have to question the decision of developing and maintaining this software with a considerable amount of investment. For any user, if one cannot physically access and install all the chosen pieces, what is the point of designing a dream kitchen that only exists in an electronic space?

I will also call attention to collaboration between different departments of labor. As Spinuzzi (2003) argues, technology as a genre is functioning in a dynamic situation and often requires collaboration between multiple departments or units. In the case of *Kitchen Planner*, labor involved in the designing and purchasing process includes users, specialists who are providing consulting service either online, on hotlines, or in-store; and in-store staffs. If any member involved fails to offer the expected work, the consequence will negatively impact user experience. A failure of this kind teaches software designers that the usefulness of a technology does not only rely on the operations of keyboards and screens; it is also shaped by the invisible force beyond the interface such as labor, collaboration service, products' logistic and supply, and many more.

Tracing back the history of computer-aided design, we can see how this technology is becoming accessible to users outside the traditional designer circle. Computer-aided design (CAD) emerged in the 1970s and has been widely employed in industrial design, electronic design, and architecture. At first, it aimed to assist professional designers in increasing productivity and quality of design. One of the earliest programs in architecture, CAD could design building layouts by optimizing circulation patterns (as cited in Lawson, 2004 *What Designers Know*). As personal desktop computers became more and more affordable in the 1980s and 1990s, the areas of CAD application expanded to interior design. Kitchen design, one of the most demanding and refined areas in interior design, benefits from the development of technology as well. Fischer and Morch (1988) introduce a cooperative software called CRACK. CRACK enables its users to complete certain design tasks by providing them with domain-specific building blocks. With certain design knowledge and principles pre-stored in the system, CRACK is able to detect shortcomings in users' design and provide feedback accordingly. A remarkable feature of CRACK is that it affords users' freedom to either follow the system's diagnosis or to modify the system's knowledge base when humans disagree with the software. CRACK is developed for professional designers, and more design software options are now available to non-expert users today. For example, in Apple's APP store, users can find over 50 design apps.

After all, design is an instrument of power (Buchanan, 1995). Ever since its birth in the Industrial Revolution, design holds a principle that "lies in the power of individuals to control their surroundings, satisfy needs and desires, and influences social life through mechanization and technology." (Buchanan, 1995 p. 47.) As technology advanced along with the progress of industrialization, the scope and range of design have extended so significantly that it no longer is an exclusive instrument of the privileged, such as the merchant princes. Design has evolved to an instrument of power through which a great number of individuals may exercise the possibility of

design to better daily life. In recent years, multinational corporations have paid prominent attention in design research, and their power and pervasiveness in our everyday life, as well as their configuring impact on cultures, are truly undeniable (Adamson, Riello, & Teasley, 2011). While *IKEA Kitchen Planner* does have a good intention of empowering users through its service, it fails at sustaining some affordances at multiple levels which limits the degree of empowerment. The marketing of an open-kitchen design reflects the fact that big multinational corporations tend to force their own lifestyles and ideologies to local users in other parts of the world.

Conclusions and suggestions for future research

Based on the analysis of *IKEA Kitchen Planner*'s operational features and an in-depth analysis of its affordance at multiple levels, we can conclude that this software is a standardized kitchen design tool, with accessible customization/localization in each country. While the technical elements, furniture pieces, and the interface remain the same across different versions, it is the affiliated service, the human factor, and the socio-cultural sensitivity that distinguish each version. *IKEA Kitchen Planner*, shaped by a Nordic culture that highly values creativity, social interaction, and participatory design activities, could be seen as a genre responding to IKEA's home culture, whereas its two localized versions are meaningful variations responding to local cultural traditions. The U.S. version does not fully sustain linguistic affordance because it does not provide a Spanish language version to its large body of Hispanophone users. The lack of a conversion tool also affects international users in the U.S. who are more familiar with the metric system. In the case of the Chinese version, linguistic affordance has been well supported despite a few deficiencies in the *Users' Guide*. The open-kitchen templates embedded in the design system is a major drawback to the Chinese users because their need for a close-up space that is low in social function cannot be met through an open-kitchen, whereas Swedish and U.S. users might be very receptive to this design.

This paper contributes to current scholarship in HCI research, technical communication research, and technology design research. First of all, the “etic-then emic” (Thatcher, 2011) method in which I employ an expert walkthrough test and an autoethnographic approach can provide a more comprehensive view of affordance and uptake. The autoethnographic approach connects technology genre with local culture and activity. Secondly, this study explores a new way to interpret usability test results, which is using a usability test to measure operational and instrumental affordance. The five categories suggest possible operational definitions of two variables—operational affordance and instrumental affordance, adding practicality to the original hierarchical framework proposed by Sun (2012). As the data collected through a usability test yield meaningful discovery of social affordance, we can see the potential of usability testing as a useful tool to evaluate operational and instrumental affordance, which can be further extended to user experience research that “vested interest in the cultural lifeways” of users and other communication stakeholders (Getto, 2014). Thus, we can develop a systematic approach towards an integrated research scope. Last but not least, adding to the notion of Sun (2012) and Sun & Hart-Davidson (2014) that the same instrumental affordance might sustain different social affordance and social use in different contexts, this study provides a new angle to this discursive relation: the same operational or instrumental affordance does not always lead to social affordance. Through the analysis of open-kitchen templates, this study demonstrates a special

situation in which the same operational feature/affordance fails to generate the affordance that the designers expected to produce.

For future study, we can extend the scope of user experience study by using the results from the autoethnography to further develop a project that includes a variety of data source from a larger group of users. A large pool of participants can also contribute to triangulation as a means to increase reliability. We may further explore the possibility of empowering users in the era of globalization with culturally and socially sensitive design through the lens of affordance that is “dialogic, discursive relation” (Sun & Hart-Davidson, 2014).

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Appendix A: An analysis of IKEA *Kitchen Planner*: Swedish version

Learnability	<p>High learnability (easy to learn).</p> <p>The visual presentation of icon (i.e., the icon image and a cursor image) and meaning is very clear.</p> <p>Mouse hover is used to illustrate icon functions.</p> <p>Navigating the functions does not require a mastery of furniture design principles or skills. A basic understanding of furniture assembling, such as the direction and placement of cabinet handles, would be sufficient.</p> <p>The instruction text is clear and easy to follow.</p>
Efficiency	<p>High efficiency.</p> <p>Through the sections on the left side of the interface and icons underneath the design areas, users can easily maneuver the icons to complete design tasks.</p> <p>The interface is easy to navigate. It also meets users' preference of metric system.</p> <p>It provides users with 13 kitchen templates to choose from.</p>
Memorability	<p>High memorability level with some minor issues.</p> <p>The software and its functions are easy to remember since all the functions are clearly visualized through images of icons.</p> <p>To install <i>IKEA Kitchen Planner</i>, users need to follow a few steps: accepting License Agreement (users need to click the box), creating a profile (users need IKEA family membership or emails to register), signing up (a pop-up box will appear, and users need to adjust the settings), setting. Users need to spend extra effort in memorizing and learning to master software installation</p>
Accessibility	<p>Medium level accessibility.</p> <p>The link to the software appears at the footer/bottom of the page named "Planeringsverktyg." Users cannot easily locate and access the entry page as the link is placed in the footer of the page, a place where users expect to find contact information and copyright information.</p> <p>Users can not successfully install and use the software if they do not have enough computer knowledge such as plug-in and software installation.</p> <p>The software cannot be connected to any mobile app.</p>
Satisfaction	<p>High satisfaction level.</p> <p>The software is monolingual (Swedish). It will meet the linguistic need of local customers as Swedish is the only official language in Sweden.</p> <p>The software provides easy maneuver and simple presentation.</p> <p>The technical requirements, such as those for processor, graphics, screen resolution, operation system, and internet browser, are not demanding. A regular PC would meet all the technical requirements.</p>

Appendix B: An analysis of IKEA *Kitchen Planner*: U.S. version

Learnability	<p>High learnability (easy to learn).</p> <p>The visual presentation of icon (i.e., the icon image, a cursor image, etc.) and meaning is very clear.</p> <p>Mouse hover is used to illustrate icon functions.</p> <p>Navigating the functions does not require a mastery of furniture design principles or skills. A basic understanding of furniture assembling, such as the direction and placement of cabinet handles, would be sufficient.</p> <p>The instruction is clear and easy to follow.</p>
Efficiency	<p>High efficiency with some minor issues.</p> <p>Through the sections on the left and icons underneath the design areas, users can easily maneuver the icons to complete design tasks.</p> <p>The interface is easy to navigate.</p> <p>It only provides imperial units such as inch and feet.</p> <p>A total of 8 kitchen templates are available.</p>
Memorability	<p>High memorability. The software and its functions are easy to remember since all the functions are clearly visualized through images of icons.</p> <p>To install <i>IKEA Kitchen Planner</i>, users need to follow a few steps: accepting License Agreement (users need to click the box), creating a profile (users need IKEA family membership or emails to register), signing up (a pop-up box will appear and users need to adjust the settings), setting. Users need spend extra effort in memorizing and learning to master software installation</p>
Accessibility	<p>High level accessibility with minor issues.</p> <p>Link to the software appears in <i>Your IKEA Essentials</i> section at the lower part of the homepage. For an assisting tool, this position will not distract users from primary content of the page while remains visible and accessible.</p> <p>The hyperlink is indicated in blue font.</p> <p>Users can not successfully install and use the software if they do not have enough computer knowledge such as plug-in and software installation.</p> <p>The software cannot be connected to any mobile app.</p>
Satisfaction	<p>Medium satisfaction level.</p> <p>The software is monolingual (English). English-speaking users will be content while Spanish speakers might not be satisfied.</p> <p>The software provides easy maneuver and simple and presentation. The technical requirements, such as those for processor, graphics, screen resolution, operation system, and internet browser, are not demanding. A regular PC would meet all the technical requirements.</p> <p>The software is only available in imperial units, so international users will need external source of conversion as they are more used to the metric system (meter, centimeters, etc..)</p>

Appendix C: An analysis of IKEA *Kitchen Planner*: Chinese version

Learnability	<p>High learnability (easy to learn).</p> <p>The visual presentation of icon (i.e., the icon image, a cursor image, etc.) and meaning is very clear.</p> <p>Mouse hover is used to illustrate icon functions. Navigating the functions does not require a mastery of furniture design principles or skills. A basic understanding of furniture assembling, such as the direction and placement of cabinet handles, would be sufficient.</p> <p>The instruction is clear and easy to follow.</p>
Efficiency	<p>High efficiency.</p> <p>Through the sections on the left and icons underneath the design areas, users can easily maneuver the icons to complete design tasks.</p> <p>The interface is easy to navigate.</p> <p>It uses metric units such as meter and centimeter.</p> <p>A total of 7 templates are available.</p>
Memorability	<p>High memorability with minor issues.</p> <p>The software and its functions are easy to remember since all the functions are clearly visualized through images of icons.</p> <p>To install IKEA Kitchen Planner, users need to follow a few steps: accepting License Agreement (users need to click the box), creating a profile (users need IKEA family membership or emails to register), signing up (a pop-up box will appear and users need to adjust the settings), setting. Users need spend extra effort in memorizing and learning to master software installation</p>
Accessibility	<p>High level accessibility with minor issues.</p> <p>Link to the software appears in the <i>Your IKEA Essentials</i> session on the homepage.</p> <p>The software is connected to any current mobile app.</p> <p>The hyperlink is indicated in blue font.</p> <p>Users can not successfully install and use the software if they do not have enough computer knowledge.</p>
Satisfaction	<p>Medium satisfaction.</p> <p>The software is monolingual (Mandarin Chinese). Mandarin Chinese is the only official language in mainland China. International users who do not speak Chinese might find it difficult</p> <p>The technical requirements, such as those for processor, graphics, screen resolution, operation system, and internet browser, are not demanding. However, the software does not support iOS, a fact that will bring about trouble for many MacBook users.</p>