Hands on: Information Experiences as Sources of Value

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Value perception increases when people engage in producing physical objects. However, information differs from physical objects by being intangible and easy-to-copy. Information as an experience good is inherently challenging to evaluate a priori; therefore, comparing value before and after different types of experience is likely to inform theory about users’ preferences regarding information. Prior research mostly refers to consuming information and rarely considers the experience of producing information as a factor affecting information value. The current research compares the effect of experiencing online information through production and consumption processes on value perception. In a set of 6 experiments with 178 participants, willingness-to-pay by consumers and willingness-to-accept payment by producers are measured before and after consumption and production of information, independently and as repeated measures. In the experiments, we define and implement a framework for an information production process. The results show that the value of information is dynamic. Value perception increased after experiencing information, especially when people engaged in producing information compared to consuming it. This study offers a window toward the practical design of new digital information products.

Introduction

Information is an experience good (Nelson, 1970; Shapiro, Carl, & Varian, 1998; Van Alstyne’s, 1999), meaning that consumers need to acquire and use information in order to assess its value. This traditional consumer-centered approach has not considered another form of experience which has become prevalent since the advent of the web—the experience of producing information (Ciampaglia, Flammini, & Menczer, 2015; Sigala, Christou, & Gretzel, 2012). This study examines how engaging in information production affects value perception by individual users producing an information product in an online system, as compared to consumers of an identical product.

A fundamental assumption in this research is that value perception may change as a result of engaging in information production. This assumption comes from a study, which coined the concept “Ikea Effect,” indicating that value perception increases when people produce physical objects (Norton, Mochon, & Ariely, 2012). Yet information is a unique type of good in the market; therefore, it is substantially different from physical objects. Information is not only an experience product, but it is intangible (Buckland, 1991). People ascribe less value to intangible digital information products than to physical versions of the same goods (Atasoy & Morewedge, 2018). A third difference between physical products and information goods lies in the ability to copy and distribute them. Information goods are easily transferred by producing copies identical to the original. A fourth difference refers to ownership. Since much of the distribution of information occurs by copying, access seems to prevail over ownership. Moreover, information does not necessarily need to be owned, it can be controlled and modified before reuse by technological means (Shapiro et al., 1998). Given that information is intangible, easy to copy and distribute, and largely devoid of ownership rights, the current study examines whether the experience of producing information influences value perception.

In order to research the effects of information experience on value perception, we present a framework to study the interplay between experiencing by consuming and producing...
information at the individual level. The framework includes a definition of the information production process and an experimental approach for value perception assessment. Consumption experience is accomplished by an individual’s exposure to information for the purpose of acquiring knowledge. Information production experience is a circular five-stage process in which individuals create an information product. In both cases, the value of information is the dependent variable.

In this study, information consumption and production take place as part of assignments in an online information system. The particular domain of interest is Web Accessibility, because in this field both consumers and producers of information on the web are involved due to the requirement by international and national regulations.

The main foreseeable innovations in the current study are the model for information production process, and the relation between consumption and production information experiences and value perception. Understanding the relationship between information production as an experience and the value of information may aid in recommending information experience design, systems’ interface and interaction outlines for planners of information systems, online educational environments, and organizations’ knowledge management platforms.

**Literature Review**

This article deals with the question: How does information production, compared to consumption, affect value perception? The following sections unpack the concepts mentioned, including a definition of the circular process of information production.

**Information Value Perception**

Information in this study is considered as an economic good, which can be transferred, has some utility (usefulness), is capable of having an economic value attached to it (Bates, 1990), and has some metadata (Nelson, 1970). Information systems deal directly with information-as-thing in the form of bits and bytes and may include texts and documents in any electronic form (Buckland, 1991). Examples of information products include films, music, books, software, and firm’s competitive analyses (Linde & Stock, 2011). Information products may also include academic articles, professional presentations, and brochures. Peter and Varian (2016) classified information products as four storage media: print, film, magnetic, and optical; and four communication flows: telephone, radio and TV, and the Internet.

Information is characterized by the fact that prior to using it, seeking information is considered an economic problem, in which cost or effort affects user behavior and evaluation (Azzopardi, 2011). In the process of seeking and gathering information, users modify their strategies in order to maximize their information value perception (Pirolli & Card, 1999). Before experiencing the information, consumers have only some indication regarding quality, but they do not know the actual value to them for their particular needs and expectations. Prior to experiencing, consumers know the price, some initial content such as title and author name, the type of information (whether it’s a book, a movie, an academic article, and so on), metadata such as tags or ratings, and the manner of use (consume or produce, for example). Therefore, their perceived value before using the information is related to the only initial description they have about the information. This stands in contrast to physical goods, in which value is mostly known in advance.

Another core aspect regarding information value perception in this study is its subjective nature. Value, in its narrow meaning, represents the economic worth of an object. However, value has a broader meaning referring to what people subjectively consider important to them. Value Sensitive Design is an approach that measures a set of subjective values of information, such as the subjective value of informed consent and the subjective value of privacy in public spaces (Friedman, Kahn, & Borning, 2009). The current research focuses on the economic value of information and highlights its subjective nature. In other words, information evaluation may vary according to the needs of users, experiences, and perceptions (Raban, 2007; Raban & Mazor, 2013). In addition, value perception may change according to the type of information (Raban & Ruscho, 2018) and according to source nature and status (Raban & Rafaeli, 2006).

From an economic point of view, the amount of monetary units that consumers are willing to pay (WTP), reflects their perceived value of information (Cooper, 1973; Lopatovska & Mokros, 2008). Willingness-to-pay (WTP) is a common measurement method to estimate consumers’ highest readiness value to pay for a service or product. From a sellers’ point of view, willingness-to-accept (WTA) is the lowest subjective value owners are ready to accept as compensation for selling a similar service or product. The subjective perception of information causes a gap between the amount consumers are WTP for a product and the payment sellers are WTA as compensation for giving up an identical product. Consumers tend to evaluate higher information goods in their possession than the same goods that are owned by others (Raban & Rafaeli, 2006). This is known as the Endowment Effect, which is explained by loss aversion—people attribute more value to products they own than the value attributed by others (Kahneman, Knetsch, & Thaler, 1991; Raban & Rafaeli, 2003).

When referring to ownership, studies differentiate between a product (physical or a service) one owns as a result of having purchased it, and a product prepared or crafted (Alchian & Demsetz, 1972). More recent studies relate to information in the sharing economy, where access to online information products is dominant (Hamari, Sjöklint, & Ukkonen, 2016), and usually disregard whether the products were received as gifts, by sharing, by exchange on a market, or by producing in collaborative platforms (Belk, 2014).

Highlighting the creation aspect, Norton et al. (2012) specifically refer to the production of a product and
indicate that WTA increases when people engage in making physical objects. This behavior is known as the “Ikea Effect.” Creating products increases positive thoughts about the product and emotional attachment to it, which influence and enhance WTA.

While the Endowment Effect shows that buyers and sellers have different value perceptions, the value assigned by producers of information has not been investigated. Given the substantial differences between information and the previously researched physical goods, our first question is: Is there a difference in value perception between consumers and producers of information prior to the experience? Taking the Endowment Effect findings together with the Ikea Effect findings, we hypothesize that value perception by producers will be at least as high as the value assigned by sellers. Following the same logic that shows that sellers assign greater value before selling, the point in this study is that value perception will be enhanced even before the act of producing merely based on being assigned the role of producer. Therefore, the first hypothesis is as follows:

H1. Production experience of information is associated with higher perceived value before experience than consumption experience.

For example, the value of information that an author assigns to a book s/he plans to write is expected to be higher than the value that the reader associates with the same book before reading it.

Another key aspect of information is its experiential nature. The perceived value of information might change upon exposure and use. For example, the perceived value of a book is revealed to the consumer only after reading the book. Similarly, the value of academic articles is revealed upon reading. In the current study, consuming and producing information via an online information environment are referred as two different types of information experiences. The next section explains the core theories regarding information experience on the web, including consumption and production of information goods.

Information Web Experience

Information is a peculiar product in that anyone can act as consumer and producer. Each role in the information cycle may lead to differing views of experiences. Therefore, information experience is treated in this research in two perspectives. The first is the consumer’s perspective—consumer’s interface design is composed, among others, of content. The content is what the web interface presents to users, including text and media (Lee & Benbasat, 2003). According to this approach, an experience is obtained by using information good via an online platform.

The second perspective is from a producer’s point of view: the experience of producing information via a web interface. Interestingly, a search of the literature did not yield a single, clear definition of the information production process.

The next sections refer to consumption experiences on the web, underline the missing definition of the information production process, and describe the specific case of information production on the web.

Information Consumption as Web Experience

Information consumption and production have been described by four levels of participation in online social technologies (Raban, Danan, Ronen, & Guy, 2017). The consumption side ranges from inactive, where participants sign up but do not use the social platforms and do not even read others’ messages, to participants who only read others’ messages. In the production side, participants either respond to existing information or messages, or they initiate new messages or publish new information on the web.

In the context of web experience, users consume information collected, created, and published by others. Users interact with the information. Therefore, consumption experience on the web includes searching, selecting, using, observing, reading, or listening to information through a web platform.

Moreover, information systems deal directly with information-as-thing in the form of bits and bytes and may include texts and documents in any electronic form. Any stored and retrieved information is defined by Buckland (1991) as information-as-thing. A different view is represented by Dervin (1983), who declares that information is not a brick or a thing which can be thrown at people, and that people are expected to catch it. Both approaches consider information as being consumed, whether as a thing or as a product of human observing.

On the other side of the continuum, production experience occurs when participating in the production process of that information good in an online platform. The following section details the production side of web experience.

Information Production as Web Experience

Many studies mention the term “information production”; however, a strict definition for information goods production is missing. Is writing a social media post online considered information good production? Reviews are information posted in online opinion platforms by customers as a way to express their service experiences (Yan & Wang, 2018). Is writing a review in a web blog considered production of information? Or do writing a book, a presentation, and an article considered productions of information good? To examine the effects expected by information production, this research lays the foundation for the definition of the information production process.

In contrast to the lack of definition for the general information goods production process, there are definitions for knowledge production, creativity production, and strict definitions for specific categories, such as software. Therefore, we shall analyze processes of production with a focus on software, which is an information good.
The process of creating knowledge consists of two stages: the first stage relates to implementation of existing skills in order to solve concrete problems. The second stage refers to the reflection when a specific knowledge is translated into generic knowledge, which contributes to the progress of science (Tress, Tress, & Fry, 2007). Although this research clearly defined necessary knowledge-related concepts such as disciplinary, multidisciplinary, interdisciplinary, transdisciplinary, participatory, and integrative, it lacks in defining the process that leads to the creation of information from which knowledge is created.

The creative process consists of three phases, explained in the context of a creative artwork production: (i) conception and selection of an idea; (ii) idea development—where the artists structures, expands, and enriches the selected idea; (iii) the actual making of the artwork. Creativity process takes place over a period of time rather than being implemented and created at a single point of time. Creative ideas are revealed throughout a career by research and investigation. Therefore, the creativity production process cannot be associated with a specific artwork (Mace & Ward, 2002).

Information production process does take place in a single point of time, whether a short or a long period of time. Therefore, when searching for a model to conceptualize the process of information production, the process of creativity is not suitable.

The third category to be discussed is software. Software is an experience good whose production is described in terms of a product lifecycle. Thanks to several similarities between information goods and software, this research adapts the lifecycle approach, generalizes it to the case of information, and defines an information goods production process.

The first similarity between software and other information goods is the lifecycle property. Software development is a circular process. During the steps of this process, changes in specifications, design, and implementation are being proposed, analyzed, and validated for a new release of the system. System components are redesigned and reimplemented and the system is restated for new versions (Kotonya & Sommerville, 1998). Each version is an upgrade of the previous version due to the cycle of production. Information products have the same attribute. For example, in an academic article information production process is circular, as information is both an input and an output of information (Benkler, 2006). Inputs are ideas and labor, which are often grounded in previous academic articles. Existing academic articles help to produce new academic articles. Another example is the production lifecycle, which was mentioned by Levitan (1982), who criticized the classic “channel” and “system” models (Channel contains a black-box mediator between the creator and the user; System contains a black-box mediator between the input and the information good). Levitan modeled information production in a lifecycle schema, where information production is a value-added process and information goods are derived from information resources, not from information sources. To clarify, a source, according to Levitan, is a person from whom one can learn. A resource is an asset or a set of assets, used to achieve a goal.

Combining Benkler (2006) and Levitan (1982), information production is a value-added process, in a repeated loop. The approach of a sequence of activities that leads to the production of a good was also mentioned by Kotonya and Sommerville (1998), who described the production of a software product. They claimed that a software development process is a whole lifecycle process, which may vary between different types of application. Even though there are many different software processes, they all include the same fundamental activities.

The second similarity between software and other information goods is the experience aspect of the products: software and other information goods are experience goods. In relation to software, the concept of “experience” has special meaning in the field known as “user experience.”

According to Hekkert (Desmet & Hekkert, 2007, p. 160), a software experience is “the entire set of effects that is elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience).” Desmet and Hekkert (2007) defined a framework for product experience, referring to three parameters in the interaction between customers and the products: aesthetic experience, experience of meaning, and emotional experience. Norman, Miller, and Henderson (1995, p. 155) are known as the pioneers who coined the phrase “user experience,” as “Critical aspects of human interface research and application at Apple.” User experience (UX) fulfills functional and instrumental needs, as well as the subjective, complex, and dynamic state of the user (Hassenzahl & Tractinsky, 2006).

A third similarity between software and other information goods is their tendency toward personalization and adaptation. In recent years, both interface design and information selection, retrieval, and presentation in web platforms have advanced. Nowadays, users expect information/content and software’s interface to be personalized and adaptive, such as with Netflix’s movies recommendations, Amazon’s products recommender system, and Google’s intelligent word suggestion. The production process of software platforms and information on the web is suggested to be based on a deep understanding of users’ traits (Hall, Champoux, Garver, Harriott, & Chauncey, 2018).

Following the explanations about the similarities between software and other information production, we find the input–output model to be exceedingly simplistic. In addition, the knowledge and creativity production models are not suitable for the purpose of information production modeling, due to their generality, or the different nature of the object created and the process of its creation. Therefore, this research elaborates the process of software production. The next section suggests a model for the process of producing information.
The design step includes the experience design. Designing experience means planning the information experience for the consumers, in order to meet the specification. Experience design results from an iterative process of exploration, scripting, and staging, and is treated as business art (Pine & Gilmore, 1998; Pine II & Gilmore, 2011). Information is an experience good so the design step is an essential part of the production process. The experience should be designed in a way that will influence value perception and, if possible, enhance it. The design step includes designing the type (consumption or production), form of media, interface design, interaction design, and level of experience intensity, which consumers will have when using the information good. In the case of Web Accessibility presentation, the design should combine texts and images to best explain problems and solutions for accessibility support. For online information systems displaying information goods, the design step may include considerations of security and usability (Dhillon, Oliveira, Susararu, & Caldeira, 2016). In our case, mainly usability requires design.

The development step includes the content creation itself, based on the previous steps. The creation may be writing, typing, filming, photographing, coding, and so on. For example, if in the specification step the producer decides to explain about Web Accessibility from a positive perspective—the content will include explanations regarding the social contribution of Web Accessibility. Alternatively, if the producer decided to explain about Web Accessibility from a negative perspective—the content should include details about the law and penalties for website owners who do not support Web Accessibility.

The validation step ensures that information fulfills consumers’ expectations and needs and that mistakes are minimal. Testing and validation processes increase the chances that proofreading errors or mistakes are fixed before the information good is published and released. The validation step involves a comparison between the initial goal of the product, as was defined in the specifications phase, and the final production. If the comparison shows a wide gap between the specifications and the outcome, the design should be redefined. For example, if a presentation about Web Accessibility was intended to serve publishers with minimal technical knowledge, however, the resulting product includes interactive elements that display a high technical level, the content must be modified accordingly.

The evolution step includes modifications to reflect changes required by consumers over time. If new information had been published, this step may include updating the information according to the new releases. In the example of Web Accessibility presentation, updating the information with new regulation rules or current technical solutions might be needed.

The current research suggests distinguishing between the production processes of formal and informal information goods. Following the lifecycle definition, a formal information good is considered as such if its producer had carried out all the steps. It follows that comments, reviews, and posts are
not considered as formal information goods; they constitute communication activity and are treated in this research as informal information goods. Examples of formal information goods, which carry out all five steps are an article, an entry on Wikipedia, a book, a song, a film, or a presentation.

The previous sections contributed to the understanding that the experience of information affects its value. In order to answer the question of whether the effect is positive or negative, we refer to Van Alstyne’s (1999) definition: the difference in value before and after the use of information derives from the experience itself. Since the experience itself is a personal process, after which perceived economic value is revealed, it is assumed that the experience activity increases the value.

Having explained the role of experience in the context of information value perception and the process of information goods production, following are the hypotheses which answer the question: Does information value perception change as a result of consumption and production experiences?

H2a. Value perception postconsumption experience is greater than before consumption.

H2b. Value perception postproduction experience is greater than before production.

For example, from the consumers’ perspective, the value of information that a person associates with an online presentation about Web Accessibility is likely to be higher after reading that information than before reading it. From the producers’ point of view, information value perception once finalizing the process of creating formal information through the five stages is expected to be higher than before the production process.

Contrast Between Consumption and Production Experiences

Up to now, we explained the differences between consumers and producers. Following the Ikea Effect, which shows that value perception enhances after creation, the third and final question we aim to answer refers to the production experience: Does production experience have a greater effect than consumption experience on subjective value perception?

This question specifically analyzes the effect of production experience on value perception after usage. The question is divided into two hypotheses:

H3a. Production experience of information is associated with a higher perceived value postexperience than consumption experience.

For example, producing a Wikipedia entry enhances value perception, compared with reading an existing entry.

H3b. Change in value perception through the production experience is greater than in consumption.

To summarize the last three sections, Figure 2 incorporates all hypotheses and shows the relation between them in the research model:

Method

With the purpose of examining the influence of information experience on value perception, the main method was a series of laboratory experiments.

Subjects

A total of 178 participants took part in the experimental treatments. Seventy-six were academic adults (ages 21–30) and 102 were undergraduate students in their third or fourth year of various curricula. Each participant participated in one experiment. A preliminary quiz with seven questions about Web Accessibility indicated 21 participants had no previous knowledge; 47 participants answered one correct answer, 44 answered two correct answers, 39 answered three correct answers, 14 answered four correct answers, nine answered five correct answers, four answered six correct answers, and none answered all seven correct answers.

Variables: The independent variable: type of information experience. Experience type was randomly assigned to participants: consumption or production.

Dependent variables: (i) WTP subjective value—the initial value consumers were willing to pay for an information good; (ii) WTA subjective value—the initial value producers were willing to accept for their information creation; (iii) WTP winning value—the final bid that passed,
if any of the consumers’ bids passed for an information good; (iv) WTA winning value—the final bid that passed, if any of the producer’s bids passed for an information good.

Both WTP and WTA were measured in two points in time: before and after consumption or production.

Procedure

At the heart of the experiment was an online information-based task. In the consumption experience groups, participants viewed and interacted with a presentation about Web Accessibility. They were presented with the scenario in which they are students in an online international course about web technologies. As part of the scenario, the university introduces them to an online platform for presentations with additional information relevant to the course. Consumers were offered the option to acquire a presentation about Web Accessibility. One group of consumers was offered to purchase the presentation before seeing it, and another group was offered to purchase the presentation after viewing the presentation.

In the production experience groups, participants were presented with the scenario in which they were lecturers in an online international course. As such, they own a personal website that is not accessible to people with disabilities. The participants were asked to create produce the same information described above (a presentation about Web Accessibility). One group of producers was offered to sell the self-made presentation to a publishing company before creating the presentation. The second group was offered to sell the presentation after the production process. The process of creating the information included the five steps of the conceptual model for the process of information good production, described before: specification, design, implementation, validation, and evolution.

Two groups were offered to sell or purchase the presentation (information good) both before and after the experience with the information (repeated measures).

The motivation to purchase the information was part of the scenario: the presentation included additional information regarding Web Accessibility that is crucial for both students and teachers learning and teaching courses in the field of Internet.

To summarize, subjects participated in one experiment. Participants were randomly assigned to one of the following groups:

1. consumer, value perception measured before consumption;
2. consumer, value perception measured postconsumption;
3. producer, value perception measured before production;
4. producer, value perception measured postproduction;
5. consumer, value perception measured before and after consumption in a single experiment (repeated measures);
6. producer, value perception measured before and after production in a single experiment (repeated measures).

Value measurement is based on an incentive-compatible mechanism. In this research the mechanism for assessing WTP and WTA was the Becker–DeGroot–Marschak (BDM) principle (Becker, DeGroot, & Marschak, 1964). This method enabled the extraction of subjective values, by informing consumers about the existence of a (random) market price. Consumers did not know the market price and they were unable to affect it. All sellers who stated bids equal to or lower than the market price sold the good at market price. All buyers who stated bids equal to or higher than the market price purchased the good at market price. The assurance of paying or receiving market prices promotes truthful bidding of personal subjective values for objects of trade. Consumers and producers had three attempts to bid to buy or sell the information. Sellers who bid higher than the random market price, and buyers who bid lower than the random price, did not transact (Plott & Zeiler, 2005), but the information was displayed anyway. The reason being that we had already recorded the subjective value and thus wanted the participants to actually experience the information and continue the experiment.

The experiments flow is detailed in Figure 3.

Results

Descriptive statistics of the dependent variables are displayed in Table 1:

For all values, unit of measurement is virtual money, New Israeli Shekels.

The Effect of Experience Type on Value Perception Before Experience

H1 results. In order to test whether experience type, production, or consumption has an impact on subjective value before experience, a t-test for independent samples was conducted. No statistically significant effect was found t(95) = −1.310, p = .193. H1 was rejected: subjective value is not influenced by role assignment.

The Effect of Experience on Value Perception Postinformation Use

H2a results. In order to test whether consumption experience has an impact on perceived value perception, a t-test for independent samples was conducted. A statistically significant effect was found t(76) = 2.03, p = .046. Subjective value perception measured after consumption was higher than evaluation before the use of information, by independent groups.

Figure 4 displays subjective value measured before and after consumption of information.

Standard deviations: subjective and winning values have higher standard deviations postconsumption than before using the information. Calculating the proportion standard deviation/mean shows an increase in distributed value measured after consumption for both WTP values in proportion to mean value, as seen in Table 2.
TABLE 1. Descriptive statistics of the variables.

| Experience | Subjective value | Winning value |
|------------|------------------|---------------|
|            | N    | Mean | Median | Std. Deviation | N    | Mean | Median | Std. Deviation |
| Cons-before | 45   | 183.9 | 150  | 148.9 | 45   | 184.6 | 150  | 148.3 |
| Cons-post   | 33   | 359.4 | 150  | 248.1 | 30   | 282.7 | 150  | 291  |
| Prod-before | 52   | 245.3 | 150  | 281.8 | 52   | 246.3 | 200  | 104.4 |
| Prod-post   | 48   | 1652.5 | 500  | 2581.4 | 35   | 246.3 | 200  | 104.4 |
| Cons-both   | 45   | $\Delta -3.5^c$ | 0      | 131.9 | 45   | $\Delta -4.2^c$ | 0      | 131.3 |
| Prod-both   | 52   | $\Delta -145.4^c$ | $-65$ | 288.8 | 52   | $\Delta 36.2^c$ | 15      | 100.5 |

*aSubjective value is the first intuitive value offered by the participant.

bWinning value is the final bid that passed, if any of their offers passed.

c$\Delta$: Value measured both before and after experience. The delta value is calculated as value-post minus value-before experience.
In addition to the statistically significant effect, Figure 4 clearly displays the increase in subjective value postconsumption. Increment in distribution of the WTP value postexperience highlights the subjective aspect of information and the impact of the experience. H2a was accepted.

**H2b results.** In order to test whether production experience has an impact on value perception, a *t*-test for independent samples was conducted. A statistically significant effect was found *t*(98) = 3.908, *p* = .000. Subjective value perception measured after production was higher than evaluation before the production process, by independent groups.

Figure 5 displays subjective value measured before and after production of information.

Standard deviations: Both subjective and winning values are more distributed postproduction than before creating the information. Calculating standard deviation/mean in order to extract the distribution value in proportion to the average shows an increase in distributed value measured after production for both WTA values in proportion to mean value, as seen in Table 3.

In addition to the statistically significant effect *p* = .000, Figure 5 clearly displays the increase in subjective value postproduction. Increment in distribution of WTA value postexperience highlights the subjective aspect of information and the impact of the experience. H2b was accepted.

**The Effect of Production Experience**

**H3a results.** In order to test whether experience has an impact on perceived value postexperience, a *t*-test for independent samples was conducted. A statistically significant effect was found *t*(79) = −2.8, *p* = .000. Participants who produced information subjectively evaluated their creation higher than participants who consumed information. H3a was accepted.

**H3b results.** In order to test whether the change in value perception is greater for producers than for consumers, a new variable was calculated: change in value perception.

| TABLE 3. Standard deviation by mean before and after production. |
|-------------------|-------------------|
| Subjective value: | Winning value:     |
| S.D/mean          | S.D/mean          |
| Production-before | 1.15              | 0.69              |
| Production-post   | 1.56              | 0.83              |
TABLE 4. Mann–Whitney U-test for differences in change in value perception between single consumer and single producer.

| Experience type | N  | Mean rank | Mann–Whitney U-test |
|-----------------|----|-----------|---------------------|
| Change in value perception | | | |
| Single consumer | 45 | 42.1 | |
| Single producer | 52 | 54.9 | Z = -2.268 |
| Total | 97 | | |

A Mann–Whitney U-test was conducted. Results are displayed in Table 4. The reason for performing a nonparametric statistic test is that data are asymmetric, not normally distributed.

A statistically significant effect \( p = .023 \) was found between a change in winning value perception of consumers compared with producers.

It may be noticed that the delta in subjective value for producers is -145. The reason for the big drop in subjective value perception may be due to price anchoring. If the subjective bid provided by producers was initially high but reduced in the second and final bid, then the WTA after the production could be related to the final bid. In other words, producers who evaluated WTA both before and after the production in a single experiment referred to the final winning bid as their point of reference. For this reason, this hypothesis was tested on the winning value and not on the subjective value.

Due to a possible influence of price anchoring, we conducted four further tests of independent groups: value measurement before consumption, value measurement after consumption, value measurement before production, value measurement after production.

The H2a results show that average subjective value measured before consumption was 183, while average subjective value measured after consumption was 298. Therefore, the mean change in value perception for consumers in independent groups was: 115.

The H2b results show that average subjective value measured before production was 245. However, average subjective value measured after production was 1,652. Therefore, the mean change in value perception for producers in independent groups was: 1,407.

Overall, the change in subjective value measured in independent groups is higher for producers than for consumers.

Following these results, H3b was accepted.

Discussion

This study set out to compare value perceptions before and after experiencing information by consumers compared to producers. The main objectives were to learn how experience affects value perceptions and introduce information production as a major experience for investigation. Two core assumptions of the current study are that (i) value of information perceived by a user is subjective and changes with experience; and (ii) in line with the Ikea Effect, value perception increases as a result of production experience.

First, the results are discussed referring to the subjective aspect of information. Further, the results are discussed from breadth and depth perspectives.

Referring to the subjective aspect of information, the results highlight this unique attribute of information in two ways. The first way is by comparing the distributions of subjective and winning values. This shows that the standard deviation of the subjective value is higher than that of the winning value for all groups, both before and after experience. The reason for that lies in the subjective nature of information. The value of information perceived by a user is subjective and changes by personal and social influences; it may be affected by a variety of behavioral biases, as well as by market structure and circumstances (Raban, 2007). This behavior explains the wide distribution of subjective value perception. However, after participants are required to sell or purchase the information according to market price, there is a convergence of the value, and the variance decreases.

The second way refers to a comparison between the distributions of subjective value measured before and after experience. Both WTP for consumers and WTA for producers after experiencing information have wider distributions, suggesting that the experiences of consumption and production have a broad spectrum of influence on people. Moreover, prediction before experience is more homogeneous, based on incomplete information or uncertainty in the subjective value of information. These findings contribute to the establishment of the subjective nature of the information.

The following analysis refers to the breadth and depth perspectives. A breadth perspective looks at the dynamic nature of information value perception under different experiences. Hypotheses H2a and H2b compare value perception before and after the experience in four independent groups of participants, in order to assess the influence of the experience itself. H2a compares value perception before and after consumption, while H2b compares the same only before and after production of information. In both experiments, value perception increases postexperience. The meaning is that experiencing information enhances value perception.

In addition to his definition for information-as-thing, Buckland (1991) refers to information-as-process as the act of informing. The current research highlights the fact that through the process of information production, value increases more than through consumption. These findings fine-tune the importance of the process while using or experiencing information.

The process of using information is not only the act of informing, as Buckland (1991) mentioned, but also the behavior of willingness to seek and consume, and actions taken before, during, and after the use. Before using the information, the accumulation includes the will to be informed, which is expressed as the perceived value before use. During the use of information, it is the process of experiencing, including the process of production, which is added to the process. The revealed value of information is the final perceived value, which ends the entire process of using information. Understanding that the use of information is a process that the user
starts before using, continues through the experience itself, and ends with the value obtained at the end of use—the willingness to invest in improving the process will increase. Teachers, educators, information system architects, designers, authors, and anyone who communicates information can invest in all stages of the process, not only in the information itself or in the container that presents it, such as the interface or the pages of the book.

It is worth mentioning that H2a, which compares value perception before and after consumption, has a p-value of .046 while H2b, which compares value perception before and after production, has a p-value of .000. This emphasizes the effect of the production experience, which is described in the following paragraph.

Taking an in-depth look at the impact of the production process on value perception offers some innovative insights. Hypotheses H1, H3a, and H3b compare the influence of producing information versus consuming information. H1 compares value perception versus consumption or production. Surprisingly, the difference in subjective value was not statistically significant. According to the literature, the locus of ownership influences WTP and WTA. WTP is lower than WTA for various market goods as well as for information goods. However, when it comes to value measurement, the Endowment Effect (Kahneman et al., 1991; Raban & Rafaeli, 2006) does not distinguish between property in possession and self-made property. The effect of creating the information blurs the distinction between consumers and producers prior to the interaction with the information. Users do not evaluate their future creation, probably due to a lack of knowledge or experience in producing information in general or in the domain of expertise in particular (Web Accessibility in the experiments in this research).

On the other hand, H3a compares value perception post-consumption and production. After the experience, there is a statistically significant difference between WTA and WTP. In addition, producers evaluate their creation significantly higher, compared with consumers who experience the same information good. The current study applies the Ikea Effect theory from the physical world, by examining the production of information goods. Moreover, the current study measured WTA and WTP before and after experience by independent groups. The results show that the experience of producing increased a positive attitude to the final production, which led to a higher evaluation compared with the effect of consumption. In addition, the current research defines the process of information goods production in a structured, circular conceptual model: specification, design, implementation, validation, and evolution, and follows these steps through the process of production in an online information-based experiment interface. Implementing a structured circular process highlights three characteristics of information products as follows.

The first characteristic of information is the value-added process (Benkler, 2006; Levitan, 1982), since information goods are derived from information resources. The output of each step in the circular conceptual model is the input of the next step in the production process. Similarly, the information product created after completing the five steps of the production conceptual model is the beginning of a new process of a new information product.

The second characteristic of information product is its subjective value, described before (Raban, 2007). The process of producing information is defined as structured and uniform. Participants created information based on this process, in experiments throughout this research. However, as opposed to the structured process of information creation, the value of information is subjective and varies from person to person. The subjective, personal value, which is different from one to another, is revealed in full force by the same process that the people went through in creating a presentation that also dealt with a uniform subject for everyone—Web Accessibility.

The third characteristic of information product is personalization and adaptation. The conceptual process includes steps for defining audience and goals, which lead to the ability to customize information and adapt it to different consumers. All experiments in this research implemented the five steps process for formal information production. Hence, formal information goods, such as a book, a presentation, and an academic article, require following the five steps in the production process, including updating and maintaining the information product.

H3b compared change in value perception between consumers and producers before and after the use of information. In order to answer this question, two experimental approaches were applied. In the first approach, value perception was measured both before and after experience and the delta between the values was calculated per participant (repeated measures). In the second approach, value perception was measured before experience in one group, and after experience in another, independent group. Both experimental approaches revealed similar results: change in value between before and after information experience is greater for producers. The “Ikea Effect” for information goods shows that production positively affects value perception. Moreover, these findings support the endowment effect by illustrating Buckland’s (1991) information-as-thing: “I produced it” causes perception of “I value it more,” like an IKEA product. Hence, experience matters and, moreover, production experience matters.

Limitations

The main limitation in the current study is that the research method was an experiment, a method usually criticized in terms of external validity. Although we tried to reduce interruptions and keep the interface clean, it is not possible to know for certain that there were no effects by other factors than the experience itself. We assume that if external factors had an influence, on average they would influence participants from all groups to a similar level.

Another limitation is the fact that one specific type of stimuli was selected and tested—a presentation regarding
Web Accessibility. While the content is likely to influence value perceptions, the focus in this study was twofold: first, the focus is on information experiences—the comparison between production and consumption. We show this difference through the size of the disparity before and after experience. The disparity is larger for production. The second focus of the study was the definition of the production process for formal information goods, a definition that is structured into the method.

It is important to note that the information disclosed to both producers and consumers was identical, as were the scenarios and the requests for bids and the bidding mechanism.

Future Work

A further study is required to stretch the intensity of information experience. In social networks, individuals’ cognition and behavior may vary depending on the degree of familiarity of the surrounding network (Sohn, 2014). This raises a question: Will consumption or production in groups of peers affect value perception? Further research is required to analyze the boundaries of value perception in collaborative experiences. Value perception may not be directly proportional to the actual quality of the information good, as a result of information consumption or production in a massive experience and use of the information.

Following the same logic as consuming versus producing, future research may explore situations of granting versus gaining access to information, sharing information versus accepting shared information.

This research focused on formal information goods. The production process of such goods was defined and examined, which opens research questions about additional formal information goods such as articles, books, and so on. In addition, it is suggested to examine the production process model for informal information goods, such as reviews, posts, tweets, and comments. Moreover, further research may examine different groups of participants.

Conclusion

The present study places the features of information goods in focus and examines how the use of information affects its value assessment. Information needs to be experienced in order to reveal its value. An information product is intangible, easy and cheap to copy and distribute, and its ownership is prevailed by access. It is therefore far from obvious that information goods would display value assessments similar to those of physical goods tested by Norton et al. (2012). The findings of this study emphasize the experiential aspect of information and the effect of the process that a person undergoes during the use of the information, on its value perception.

In a set of six experiments, WTP by consumers and WTA by producers were measured before and after consumption and production of information. The results show that the value of information is dynamic. Postexperience value perception is higher than preexperience. In addition, the change in value perception in a production scenario is larger than by consuming information. The meaning is that the “Ikea Effect” for information goods shows that labor put into the production process for intangible goods is translated to perceived value of information.

This study offers a window toward the practical design of new information products, and eventually information markets. In such products and markets the borders between reading and writing, listening and composing, watching and film-editing will blur by design in order to cater to the enhanced value possible by mixing experiences. Teachers and students, managers and employees, parents and children—all consume and produce information on a daily basis. The impact of consumption and production of information on value perception enables the planning of the use of information according to purpose of the information. Information systems mostly offer opportunities to produce informal information, such as comments and content reviews. This study, while emphasizing the subjectivity and dynamism of information evaluation and the effects of information production experience, suggests designing platforms for the production of formal information. Managers can provide tools for creating information as part of organizational methods, for employees to better appreciate the organizational information. Teachers and parents can accompany information creation processes with students and children to gain more benefit from the experience. In addition, cultural heritage institutions, governments, and other nonprofits can improve customization of information goods for people following the five steps of information production.

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Appendix A

Following are the main screens in the experiment interface:

FIG. 6. Consumer is offered to purchase the presentation and is informed about the three attempts. [Color figure can be viewed at wileyonlinelibrary.com]

FIG. 7. Producer is creating the presentation by choosing its content. [Color figure can be viewed at wileyonlinelibrary.com]