

TRANSPARENCY IN INFORMATION MARKETS

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ABSTRACT

This study focuses on the effects of market transparencies on consumers' perceived value of information. Information goods have two key special characteristics: they are experience goods, and they are often given away for free. The study implements three transparencies related to market goods – cost, operational, and price transparencies - in an experimental information market to examine their effect on the perceived value of information goods. Perceived value is assessed by willingness-to-pay (WTP). The research method is a controlled experiment including preliminary questions, a visual vignette depicting a health app and two value elicitation questions.

Three groups of participants were exposed to each transparency form when price is not known. When cost transparency is applied, participants are more likely to download the app. Operational transparency has no effect on information goods. Price transparency diminishes the perceived value of the information good (WTP changes by -61.8%) and participants are 80% less likely to download the app.

When users received cost information related to a free information good, the perceived value of that good increased by +122.7% compared to the control. Operational transparency did not produce a statistically significant difference in WTP. The combined transparencies produce WTP which is higher than for operational transparency alone, but lower than for cost transparency alone.

Overall, in the case of information goods, cost transparency enhances value perception while price transparency diminishes it. To date, cost transparency is rarely practiced in information markets. The current results suggest that the cost of producing information should be visible to information consumers. The lower combined effect of cost and operational transparencies may be indicative of information overload and the diminishing value of additional information.

KEYWORDS

Information Markets, Transparency, Willingness-to-Pay, Perceived Value

1. INTRODUCTION

Markets rely on varying implementations of excludability, rivalry, and transparency to ensure competition. Information markets are a special type of market where excludability and rivalry are often challenged as evidenced by the vast availability of free information and by easy copying. Furthermore, it seems that transparency in information markets is taken as a given because most markets are digital and inherently offer data and metadata. However, the special nature of information as experience good raises questions regarding the assumption of transparency. This study applies forms of transparency to an information good and examines their effect on people's value perception of the information good.

Experience goods are the case in which consumers are only able to learn about their preferences for a certain product after experiencing it (Villas-Boas, 2006). Before experiencing information products, a consumer knows: (1) the price (zero or else), (2) partial content such as title or description, (3) metadata such as author, publication, date, etc. In addition to the information they know, consumers may have scant indication regarding the quality of content, but they do not know the actual value to them for their needs and expectations. The full evaluation of the information good is revealed after actual use (Rusho & Raban, 2020). Therefore, there is an inherent "gap" of information between experience goods and their ability to present full transparency, an inherent opacity. On one hand, consumers wish to experience the information good prior to the decision to purchase, and on the other hand, if they experience the good, the good may become redundant.

Transparency in markets is generally defined as a key mechanism that reduces the information asymmetry among market participants thereby promoting market efficiency (Bleck & Liu, 2007). What is the role of transparency in the case of experience goods? Can firms that sell experience goods risk full transparency? How

can sellers and buyers overcome this “gap” of knowledge? For example, in the consultancy reports market, full transparency can be a double-edged sword. Consumers would like to know exactly what they are paying for or if the specific information they desire is fully researched in the report, while firms can only disclose a high-level abstract.

According to Buell (2019), the consumer-firm relationship is based on three types of transparency: cost, operational and price. Transparency requires clear disclosure of information in each of these areas. Information markets raise new challenges. What happens to transparency when the price is zero, i.e., when products are given for free (at least, without a direct pecuniary charge), as is the case for information? Do the other types of transparency become more salient, or do they also fade? Focusing on the special case of transparency in information markets may offer relief to both challenges raised here: information as experience good and the abundance of free information.

This paper proceeds as follows. First, we describe the special case of information as a market good, followed by an explanation about willingness-to-pay as a form of value perception and defined as the dependent variable in this research. Then, we describe the three types of transparency (cost, operational and price) in consumer goods markets and their expected behavior in the information goods market. Finally, we outline the experiments hypotheses, presented in the research, across a variety of instantiations of the different transparencies.

2. RESEARCH BACKGROUND

Since digital goods are often non-rival, they have some unique characteristics, such as zero cost of duplication and transportation and no geographic boundaries. While the production costs and effort may be considerable, the marginal costs are zero or close to zero (Shapiro & Varian, 1999). This unique cost structure results in a tendency for pricing to often be set at zero, explaining why information is freely available. However, free availability may come at other, social, costs, such as information overload which may bear a negative effect on personal productivity (Sabeeh & Ismail, 2013) or fake news, conspiracy theories, urban legends and the like (European Parliament & Frau-Meigs, 2020). It stands to reason that transparency of and about information may help to reduce these social costs and at the same time, increase the perceived value of information.

The next section describes value perception which is operationalized as willingness-to-pay (WTP), which is the dependent variable in the research.

2.1 Value Perception

Due to the nature of information goods, consumers’ perceived value before using the information is related only to the initial description they have about the information. This stands in contrast to physical goods, in which value is mostly known in advance (Rusho & Raban, 2018). From an economic point of view consumers’ willingness-to-pay (WTP), reflects their perceived value of information (Lopatovska & Mokros, 2008). Therefore, in the research we use willingness-to-pay (WTP) as the dependent variable to measure individual value perception for each state of transparency.

WTP is the maximum amount an individual is willing to pay for a product or a service (Hanemann, 1991). WTP is a fairly common measure of subjective value which combines the economic and psychological approaches to allocating value to information (Rusho & Raban, 2018). It provides a behavioral assessment of value perception (Horowitz & McConnell, 2003) and as such, it is an indicator of preferences.

In the following, we explain the nature of cost, operational and price transparencies. Each transparency has different effects on consumers perception regarding the value of information.

2.2 Cost, Operational, and Price Transparencies

A firm’s disclosure of cost information reveals information about its profit margins, which could make the firm vulnerable to negative consequences, such as consumer ire or supplier price increases (Derlega et al., 1993; Mohan et al., 2020). Although cost transparency is considered sensitive information for a firm, it can engender trust and deepen the relationships among companies and consumers (Aron et al., 1997; Sedikides et al., 1999). Firms typically treat their costs as tightly guarded secrets, however, Mohan et al. (2020) demonstrated that

when cost transparency is voluntary rather than forced by regulation, it increases purchase interest by enhancing consumer perceptions of a firm's trustworthiness. In addition, willingness to buy was higher in the presence of cost transparency due to increase in trust even when prices were unexpectedly low.

The challenge in information markets is to set a positive price given the widespread norm of free information. We posit that revealing the cost associated with the production of an information good may provide part of the needed description to enhance its value as perceived by its users. Cost transparency may contribute to reducing the inherent information asymmetry leading to the first hypothesis:

Hypothesis 1 (H1): Cost transparency in information goods markets will increase WTP.

Recent research revealed that operational transparency increases sales and increases people's trust and satisfaction in online services (e.g. digital travel agents), retail (i.e. highlighting the costs and processes involved in manufacturing) and even in settings where trust is otherwise low, such as government services (Ryan W. Buell et al., 2021).

Operational transparency increases perceptions of value because of increased perceptions of effort and resultant feelings of reciprocity between consumer and the firm (Chinander & Schweitzer, 2003; Gershoff et al., 2012). Operational transparency is a driver not only of perceived value but also of satisfaction and repurchase intentions (Ryan W Buell & Norton, 2011).

Following the same logic, we suggest that operational transparency may increase value perception in the information goods market. Free availability of information does not mean free or effortless production process. Consumers do not know the extent of effort put into creating the information good. If consumers become aware of the effort invested in producing the information good, it may increase their perception of value. Therefore, we posit that revealing the process associated with the production of information may have similar effect as in consumer goods markets, leading to the second hypothesis:

Hypothesis 2 (H2): Operational transparency in information goods markets will increase WTP.

Price transparency is defined as the extent to which information available about prices organizes, explains, clarifies, or projects the contextual direction and/or rationale for the seller's pricing (Hanna et al., 2019). An example of price transparency is price partitioning which refers to the common technique of revealing the price of the component parts of a product; for example, by dividing a product's price into its base price and shipping and handling (Bertini & Wathieu, 2008; Morwitz et al., 1998). Price transparency and price partitioning have both been found to increase purchase intentions, and to do so via a cognitive process (Morwitz, 1998).

Price transparency is effective at influencing consumer behaviour, especially when combined with low variability pricing strategies. Consumers are not only willing to pay more when pricing is clear and transparent but also likely to accelerate their purchase (Hanna et al., 2019). In the case of information goods, the lack of pricing (availability at no direct monetary charge) drives consumers towards hoarding behaviour and overconsumption (Edelman, 2009). Free availability may be interpreted as maximum price transparency which supports over-consumption. Imposing a price where the norm is free availability is likely to reduce the rate of transactions, but the implication for WTP is unclear. We posit that the effect of price transparency, when price is not zero, for information goods is similar to the effect of transparency on consumer goods. Therefore,

Hypothesis 3 (H3): Price transparency in information goods markets will increase WTP.

All three types of transparencies have different underlying mechanisms such as enhanced trust for cost transparency, increased effort perception for operational transparency, and increased value perceptions for price transparency (Mohan et al., 2020). Moreover, because consumers do not typically think about firms' costs, when they encounter an unexpectedly high price, they are likely to infer the high price as a reflection of high margins (as opposed to high costs). Since a firm's voluntary revelation of its costs increases trust, it also increases purchase interest both when prices are surprisingly high as well as when prices are surprisingly low (Mohan et al., 2020). But what happens in information markets when price is zero? Increased value perception via price transparency is not a possible underlying mechanism. In that case, trust and effort perception may alone become the underlying mechanism. Therefore, we posit that where price is zero, cost transparency and operational transparency in information goods can increase the rate of transactions. Therefore,

Hypothesis 4a (H4a): Cost transparency will increase WTP for free information goods compared to the control.

Hypothesis 4b (H4b): Operational transparency will increase WTP for free information goods compared to the control.

Hypothesis 4c (H4c): Cost and operational transparencies will increase WTP for free information goods compared to the control.

Hypothesis 5 (H5): transparencies increase the rate of transactions for information goods compared to the control.

3. METHOD

The purpose of the research is to examine the effect of cost, operational, and price transparencies, and interrelations among the three transparencies on the perception of value of information. The research building blocks are expressed in the hypotheses above and are shown in Figure 1.

To investigate the effects of the three types of transparency in a market for information goods, we conducted an experiment eliciting the participants' perceived value as WTP when they were presented with transparency related to an information good. The independent variable was transparency, which had three levels (cost, operational and price). The dependent variables were the consumer's WTP – the private value a consumer was willing to pay for an information good and the willingness to download an app.

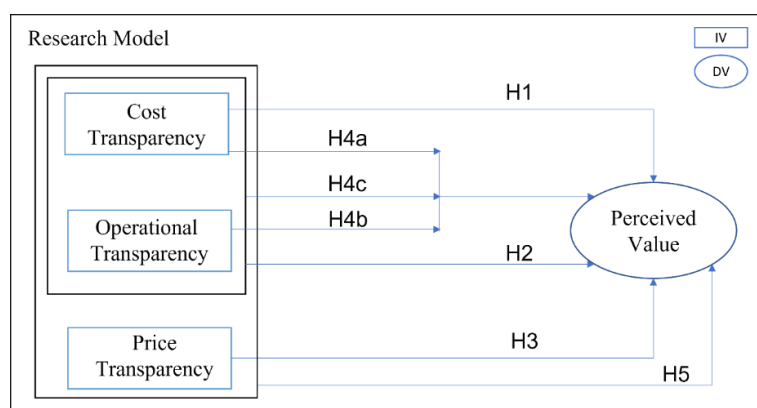


Figure 1. The research model for the study of transparency in information markets

A controlled experiment served to test the causal relations described in the hypotheses. The experiment included preliminary questions, a visual vignette and an elicitation of subjective value (WTP). Forms of transparency were manipulated via the visual vignette. Each manipulation was presented to a new group of participants to avoid dependence. To test the five hypotheses, we needed a control group and six experimental groups. The information good was an app that checks the combination of symptoms and personal information against the aggregated knowledge and experience of thousands of doctors and their clinical insights to provide a possible diagnosis, along with the resources to provide help the ailing the patient.

Research participants were recruited via Midgam Project Web Panel, a company specializing in services for internet research to academic scholars and research companies. Each group included about 35 participants for a total of approximately 245 participants. The sample included Israeli adults who are regular users of mobile phone apps at the ages of 20-75. The independent variable: Types of transparency (cost, operation, and price). The dependent variables: 1. Willingness-to-pay (WTP) – the sum consumers were willing to pay for an information good; 2. The rate of app download transactions (in H5). Participants were randomly assigned to the control and six experiment groups. Each participant opened a link that directed him/her to the experiment comprising the following sequence of web pages: 1. Welcome page and consent form; 2. Background questions (age, gender, education level, apps used); 3. Activity instructions; 4. An infographic with the information good details; 5. Transparency manipulation followed by an input window with a prompt regarding WTP for the presented information good; 6. Closing and thank you. Figure 2 summarizes the screens that comprise the experiment interface.

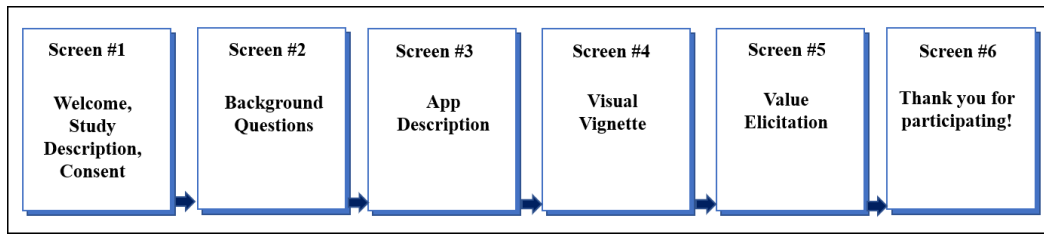


Figure 2. The experiment flow

4. RESULTS

This study set out to discover the influence of market transparencies on the perceived value of an information good. The control group was exposed to the health app without market transparency and the experimental groups saw the same app with the addition of market transparencies. Descriptive data and two-tailed t-test statistics appear in Table 1. The unit of measurement of WTP is virtual money, New Israeli Shekels.

Table 1. Descriptive statistics and two-tailed t-test for the dependent variable, WTP of an information product

Group	Manipulation	Group Size	WTP Range	WTP Mean	Std. Dev.	t-Test*
Control	none	35	0-100	25.06	34.28	
1	Cost transparency	34	0-250	43.68	78.65	1.28
2	Operational Transparency	34	0-100	17.15	30.28	-1.02
3	Price Transparency	34	0-80	9.56	19.28	-2.31*
4	Cost transparency, free app	36	0-300	55.83	86.24	1.97*
5	Operational transparency, free app	37	0-150	38.19	49.10	1.31
6	Cost & operational transparency, free app	35	0-300	49.69	66.34	1.95*

* $p < .05$ in a two-tailed t-test comparing the control group with each of the experiment groups

An important observation (Table 1) is that the introduction of cost transparency is associated with the highest average WTP ($M=43.68$). The absence of a main effect is likely due to the high standard deviation.

For price transparency in information goods, a statistically significant difference at $p=.024$ in WTP was found. When the users are exposed to price transparency, the perceived value of the app decreases (WTP changes by -61.8%).

A one-way ANOVA (Table 2) compared the means of groups 1-3 where transparency manipulations were applied to the information product while users were not aware whether the product was free or fee-based. A statistically significant difference was found ($F(2,99)=4.379$, $p=.015$). A post-hoc test revealed a statistically significant difference ($p=.016$) between cost transparency (group 1, $M=34.68$) and price transparency (group 3, $M=9.56$).

Table 2. ANOVA post hoc Tukey's test for mean WTP in the presence of cost, operational and price transparencies

Group (I)	Group (J)	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
1 Cost	2 Operation	26.529	12.106	.078	-2.28	55.33
	3 Price	34.118*	12.106	.016	5.31	62.92
2 Operation	1 Cost	-26.529	12.106	.078	-55.33	2.28
	3 Price	7.588	12.106	.806	-21.22	36.39
3 Price	1 Cost	-34.118*	12.106	.016	-62.92	-5.31
	2 Operation	-7.588	12.106	.806	-36.39	21.22

* The mean difference is significant at the 0.05 level

A t-test comparing group 4 to the control group indicated a statistically significant difference. When users received cost information related to a free information product, the perceived value of the information product increased by $+122.7\%$ compared to the control. In the experiment, the zero price of the app was presented as a temporary price. A t-test for independent samples comparing group 5 to the control group was not statistically significant ($p=.195$). To test the effect of combining cost and operational transparency on WTP when the price

of the good is zero, a t-test for independent samples compared group 6 to the control group. An effect was found at $p = .055$. We consider this to be statistically significant. When the users know the app is free and they receive information regarding the costs and operations associated with developing the app, the perceived value of the app increases (WTP changes by +98.3%). This effect is smaller than the effect of cost transparency alone.

H5 results: To test the effect of transparency type on the rate of transaction (willingness to download the app) we conducted a logistic regression. Table 3 displays a statistically significant difference related to cost transparency at $p=0.02$ with positive $\text{Exp}(b)=2.4$ value. According to these findings, cost transparency increases the likelihood to download the app by +140% (2.4 times) compared to other forms of transparency. A statistically significant difference found for price transparency $p=.001$ with negative $\text{Exp}(b)=-.214$ explains the opposite effect. Price transparency reduces the likelihood of downloading the app by -80%.

In summary, H1, H2, H4b are rejected, H3, H4a, H4c are accepted and H5 is partially accepted.

Table 3. Binary regression results of willingness to download the app per type of transparency

Group	B	S.E.	Wald	df	Sig.	Exp(B)
1 Cost	.875	.376	5.410	1	.020	2.400
2 Operation	.236	.345	.468	1	.494	1.267
3 Price	-1.540	.450	11.725	1	.001	.214
4 zero price cost	-.223	.335	.443	1	.506	.800
5 zero price operation	.054	.329	.027	1	.869	1.056
6 zero price cost and operation	-.651	.356	3.338	1	.068	.522
99 Control		.374	5.997	1	.014	2.500

5. DISCUSSION

This study set out to assess how forms of market transparency affect people's value perceptions of an information product and their willingness to download the product. The main research objective was to establish causality by comparing experimental treatments with a control. Another objective was to evaluate the relative influence of the various transparencies. The study relates to two sub-groups of hypotheses. One sub-group examining a scenario when users are not aware whether the product is free and the other sub-group analyzing similar scenarios with a clear indication that the product is available at no cost for a certain time.

The difference between the group exposed to cost transparency and the control group was not statistically significant. Nevertheless, cost transparency produced the highest average WTP compared to the control group and the other two experimental groups exposed to operational and price transparency, respectively.

Revealing cost information increased the likelihood of downloading the health app by +140% compared to other transparencies. The findings that when cost transparency was observed participants were willing to pay the highest price and were more likely to download the app established that cost transparency increased value perception. This finding was aligned with earlier findings where willingness to buy was higher in the presence of cost transparency (Mohan et al., 2020). The present findings indicate that a similar effect occurs for purely digital goods that carry no particular company or provider information. This attests to the subjective nature of information value perception and to the importance of cost transparency in the market for information products. A future study could establish whether there is an added effect by adding an identity or a brand name to the information provider.

When comparing the operational transparency group to the control group, the difference was not statistically significant. Previous literature indicated that operational transparency increased perceptions of value because customers appreciated the effort involved in the process which led to increased customer satisfaction (Ryan W. Buell et al., 2021). The present results highlight an interesting difference in the effect of operational transparency between market goods and information goods. To better understand the effect of operational transparency on WTP, we suggest conducting the same experiment with a larger sample size to reduce statistical errors. In addition, examining a finer manipulation check of the operational transparency may help to determine whether, indeed, there is no statistically significant difference.

When users are unaware of app pricing, price transparency diminishes the perceived value of the product (WTP changes by -61.8%). Participants are 80% less likely to download the app. When price becomes salient, users are considerably less willing to make a transaction. This finding is noteworthy because the users' natural

inclination to pay is higher (control group) when they are not told that payment is required as compared to the case of group 3 in which the users were told that payment is mandatory. Along this line of thinking, a recommendation for companies developing experience goods, would be to allow users to experience the good prior to showing the prices. For example, offering a trial and separately providing the price. The emphasis in a product trial should be on product experience rather than on emphasizing a “free period” which draws attention to pricing. While price transparency is known to support market transactions for regular market goods (Hanna et al., 2019), an opposite effect appears in the case of a digital information product. In the case of information goods, consumers usually expect to find free availability of information and zero pricing. Therefore, price transparency (a non-zero price indication) may contradict with this basic axiom, leading to diminishing market transactions.

The statistically significant difference in WTP between the cost transparency group and the price transparency group is aligned with the theory explaining that cost transparency information is the most sensitive information a company can share, and users value the disclosure of this information (Mohan et al., 2020). Overall, in the case of information products cost transparency enhances value perception while price transparency diminishes it. Cost transparency is rarely practiced in information markets. According to the present results, cost transparency would be a substantial catalyst for transactions in information markets.

Taking an in-depth look at the impact of transparency when price is zero offers some surprising insights. When users know that price is zero and they receive information about cost associated with developing the app, they are willing to pay +123% more for the app as compared to the control group. When they are presented with both cost and operational information, they are willing to pay +98% more as compared to the control group. Interestingly, the combined effect of two transparencies is a WTP value which is higher than for operational transparency alone, but lower than for cost transparency alone. One interpretation could be that since operational transparency does not have a significant positive effect, adding it to cost transparency diminishes the effect of the latter. Another interpretation could be a diminishing value of additional information, an indication of information overload. This should be further explored in a future study presenting additional general information in order to distinguish the general informational effect (i.e. information overload) from the specific operational information effect.

A practical recommendation to companies based on the current findings is to be short and focused on transparency information and not to overload users with information. The results indicate that the combination of free trials of experience goods and cost transparency lead to increased WTP. While many companies implement the logic of offering free goods, the shift to payment is non-trivial. This research offers insight into how to use specific transparencies to elicit and encourage consumers’ willingness to pay for an information good.

Next, we offer analyses that were possible using the available data, however, these analyses were not associated with specific hypotheses.

6. FURTHER ANALYSIS

When comparing group 2 (operational information with no price indication) to group 5 (operational information with indication of price zero), a statistically significant difference in WTP was found. When the users know the app is free and they receive information regarding the operations associated with developing the app, the perceived value of the app increases as compared to when users do not know that the app is free or fee-based (WTP changes by +122.7%). This finding provides insight regarding the relation between highlighting that the price is zero, even if temporarily, and operational transparency. Comparing each operational transparency (groups 2 and 5) to the control did not produce a statistically significant difference, however, comparing the groups to each other produced a significant difference. The increased WTP in group 5 is associated with the interplay between operational transparency and zero price information.

Another interesting finding is the statistically significant difference when comparing group 3 in which app pricing was not stated to groups 4-6 where the stated price was zero (group 4 $p=.003$; group 5 $p=.002$; group 6 $p=.001$). In group 3, participants saw price information of similar apps and were asked to submit their willingness to pay for the health app. This resulted in 61.8% decline in WTP of and an 80% decline in the willingness to download the app. In groups 4-6, participants were told that the current price of the app is zero and then they submitted their WTP bids. The results indicate that users value the free trial period and would

be willing to pay more afterwards by as much as +484%, +299%, +420% in groups 4, 5, and 6, respectively. These findings indicate that when information products are concerned, the accompanying information should not refer to price alone, but to other elements, which in the current setup are cost and operational transparencies.

7. LIMITATIONS

The different manipulations were descriptive paragraphs of the specific relevant transparency for each group. Although the questionnaires were identical in color scheme and infographic, the length of the transparency paragraphs were not identical. The operational transparency descriptive paragraph was longer than the other paragraphs. Future research may include identical length of descriptive information for each group.

Probably due to small sample sizes and large variances, some differences were not statistically significant. The immediate conclusion is that when eliciting WTP, which is a subjective measure characterized by large variance, larger group sizes are needed. Statistical power will be examined and implemented in selection of the sample size in a future study.

Another angle to consider is related mostly to selecting experiments as the main research tool. It is well-known that the external validity of experiments is limited, however, we rely on the long tradition of behavioral economics while striving to present realistic cases.

8. CONCLUSION

While transparency has been shown to be vital in markets, it has not received sufficient attention in information markets. Beyond the academic interest, transparency has important practical implications because information is critical in affecting people's choices and actions. Transparency in information markets is largely taken as a given because most markets are digital and inherently offer data and metadata. However, the abundance of free information implies that market mechanisms are lacking.

This research focused on three forms of market transparency (cost, operational and price) based on the consumer-firm relationship. Similar to previous studies on transparency in market goods, participants exposed to cost transparency information were willing to pay the most as compared to participants exposed to other forms of transparency. Hence, cost transparency increases value perception also in information goods markets. Interestingly, we found an opposite effect with price transparency in information goods and no effect regarding operational transparency. Further research should assess additional forms of transparency that might be unique for information goods market. By studying how separate and combined forms of transparency affect the perceived value of information, future research will provide theoretical and practical insights relating to people's information consumption.

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