The Effect of Default Options on Consumer Decisions in the Product Configuration Process

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Abstract. Product configurators have been accepted as an important enabling toolkit to bridge customer needs and company offerings. In the configuration process, customers choose from a set of predefined attributes and their options. The combination of choices forms the desired product configuration. It is observed that some online configurators provide default options for each attribute. Although previous studies show that the default option significantly affects customers' choices during the product configuration process, it is not clear how other factors mediate this impact. In this paper, we investigate how product types, number of choices, customers' degree of expertise, the importance of the attributes and the configuring sequence affect consumers' decisions in the configuration process when default options are presented. Based on a series of empirical experiments, we find that customers' degree of expertise, the rating of the attribute importance, and the number of attribute choices have a significant effect on customers' choices for utilitarian products. For hedonic products, the importance of the attributes and the configuring sequence are significant factors.

Keywords: status quo effect, configurator, default option, customisation

1 INTRODUCTION

Due to the rapid growth of the Internet and e-commerce over the past ten years, online choice configurators have become an important toolkit for customisation by customers. This configure-to-order-based mechanism has been widely used in industry. Successful cases include Dell computers, Adidas, and Nike. By using configuration systems, firms can increase their profit through better sales and higher flexibility. Greater customer involvement in the choice configurator also increases customer satisfaction [1]. Thus, companies can improve their competitive advantage and position by using these toolkits [2].

However, some challenges persist. One of the major challenges is to provide a more user-friendly interface to facilitate choice navigation and decision making in the configuration process. Some effort has been devoted to this research direction. For example, Wang et al. proposed information theory and game theory based method to elicit customer needs adaptively [3] [4]. The configuration sequence is also customised based on the active customer's previous specifications during the configuration process. In this way, the customers' choice navigation process is more efficient and more user friendly. Customers can get what they want quickly and with less burden of cognitive load. Studies have proposed needs-based configuration systems facilitate consumer decision making, particularly for customers without much domain knowledge [5]. The needs-based configurators show a series of product descriptions to customers. Customers then just need to indicate importance or relevance of the descriptions and use semantic words (e.g., 'cheaper' or 'larger') to modify an existing reference product. This can greatly reduce the semantic gap between customer needs and the company's offerings, although the needs in natural language is still not supported.

To help customers make easy decision, default options have been provided in many commercial configurators since mid-1990. Studies also found that the default could potentially help predict customers input when using an interactive online platform [13]. Recently, it has been observed that some online B2C configurators provide default options as well. If a customer makes no choice on the attribute, the default option is selected in the final product, as can be found in the Mini Cooper's configurator in Figure 1.

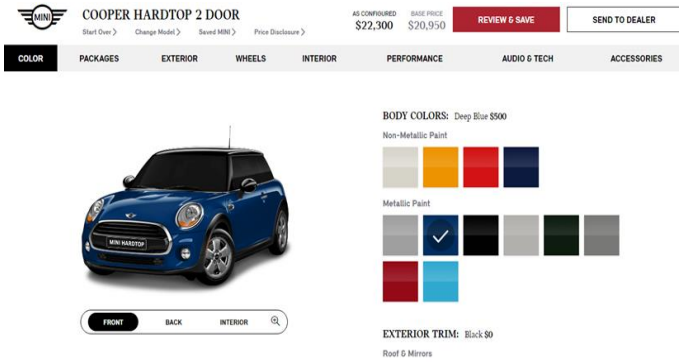

Figure 1. Screenshot of the Mini Cooper's online product configurator with default choices (accessed May 2017)

In the study of economics and psychology, it has been acknowledged that the current situation (status quo) is often considered a reference point from the decision makers' point of view. Deviation from the status quo is considered a loss, a phenomenon called 'status quo bias'. According to Mandl and Felfernig [6], status quo bias exists in product configurators, meaning that consumers' decisions are affected by the default options.

Default options have also been studied in the marketing literature. They are considered a type of decision-making heuristic through which cognitive load can be significantly reduced [7][11]. Through empirical experiments, Johnson et al. also noticed that a lack of cognitive attention leads customers to select default

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choices. Customers may be paying little or no attention when they choose the default option [7][12]. This type of default is considered an attention-based default.

Brown and Krishna argued that the default options can contain information about the product and thus affect consumer decision making, i.e., they can be considered information-based defaults [8]. For example, they found that low (less expensive) defaults sometimes have more positive effects than high (more expensive) defaults in the case of information-based defaults. In addition, they may create negative effects when customers already know that the default option is the best choice. In this case, customers may be less likely to choose the default choice than the non-default choice.

Compared with expert customers, novice customers more easily accept the default options [9]. Because the complexity of custom decision-making tasks decreases the willingness of customers to participate and reduces the perceived value of the products, novice customers are more affected. This means that when customers are less familiar or have little knowledge of the product, the default options have a greater impact [10].

Although default options have been studied in marketing science research, it is not clear how the default options affect consumers' decisions or which factors are significant in the selection of default choices, particularly in the context of product configuration. Therefore, this paper addresses these questions through empirical experiments. This content is organised as follows. The factors which potentially mediate consumers' decision making under default option setting are introduced in section 2. Section 3 elaborate the design of the empirical experiment. Experimental results and discussion are in section 4. Section 5 concludes the whole paper.

2 POTENTIALLY SIGNIFICANT FACTORS

In response to the research question, we conduct empirical experiments to identify the significant factors in customer decisions when default options are presented. The literature suggests that default options affect customers' decisions. However, the process and context of product configuration are different from the product selection process studied in previous research. More factors are involved in the configuration process.

Product type - Products can be classified into two categories: utilitarian products and hedonic products [14]. For utilitarian products, customer choices are based purely on the functional requirements. A certain domain knowledge or expertise is needed to finish the configuring task. For hedonic products, customers' choices are made based their subjective preferences. For example, the corresponding attributes may be colour, shape or design. Customers' preferences for these attributes are subjective. In our research, we ask whether product type mediates customers' selection of default options.

Expertise - Experts have more experience and knowledge of the product, and therefore they may not be affected by the default option because they know what they want to purchase. Unlike experts, novice customers have less knowledge about the product, so they are easily affected by the default option.

Number of choices - it has been acknowledged that the number of choices may also affect consumers' decisions. For example, if an attribute has a large number of choices, the cost of evaluating them may be very high. In this case, customers may use the default options to save effort in the configuring process.

Order of the attributes – Levav showed that the order of the attributes also affects customers' decisions in product customisation [15]. In the present study, the order of the attributes in configurators is considered as a potentially significant factor in customers' choices when they face flexible option configurators.

Concern about the attribute - if a customer cares more about one particular attribute, he or she will be more motivated in the information processing task [16]. Often, consumers do not have enough mental capacity to evaluate all of the attribute levels for all of the attributes offered [17]. Consumers usually start with the most important attribute and proceed based on the order of the attributes' importance [18]. In the context of product configurators, concern about each product attribute is potentially a significant factor in customers' choices.

3 EXPERIMENT DESIGN

We develop configurators for a watch and a laptop, which are a hedonic product and a utilitarian product, respectively. Screenshots of the watch and laptop configurators are shown in Figure 2. We only include the components related to aesthetics to the watch configurators. Thus, all of the attributes of the watch can be considered hedonic attributes, meaning that customer choices are based purely on their subjective preferences. No expertise in watches is needed to finish the configuring task. For laptop, we only include the functional components in the configurators. Thus, the laptop's attributes are utilitarian. The choices are determined by customers' functional requirements. A certain amount of background knowledge is needed to finish the configuring task. Because the purpose of this paper is to study which factors affect customer decisions when default choices are presented and customers' satisfaction with the configured product and the configuring process, the comparative study is conducted using a traditional configurator. Thus, the four types of configurators used in this paper are developed as shown in Table 1. For each product, the base configurator is the normal version without default options. This is the configurator used as the control group. For the other versions, each attribute has a default option. To eliminate the effect of option difference on customers' choices, we ***randomly*** assign the default options for each experiment participant. It means that for difference customers, the default options encountered in the configuration tasks are different as well. This configurator is used to investigate consumers' decision behaviour. The default option for each attribute is also randomly selected for each experiment subject. This could offset the influence of choice on consumers' selections.

In the experiment, a participant is randomly assigned to one of the four configurators. After the configuring task, the participant is directed to another configurator with a different product type and configurator type. For example, if the first randomly assigned configurator is configurator III, which is a traditional watch configurator, then the next configurator the participant encounters is configurator II, which has different product type and configurator type. Before each configuring task, the participant completes a pre-experiment survey for each product. The pre-experiment survey is used mainly to determine the relative importance that customers concern about each attribute and their degree of expertise with the utilitarian product. The detailed

questions of the survey are shown in Figure 3. The experiment can be summarised as in Figure 4.

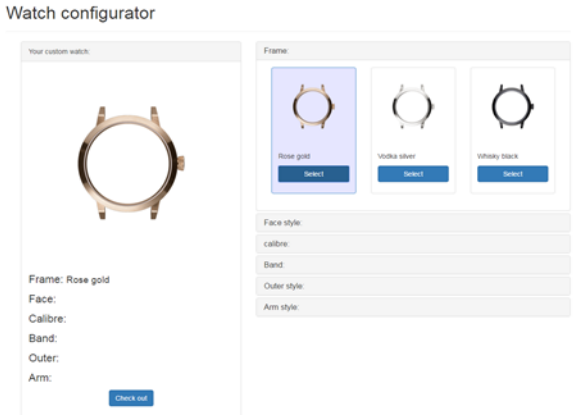

Figure 2(a). Screenshot of the watch configurators, with default options

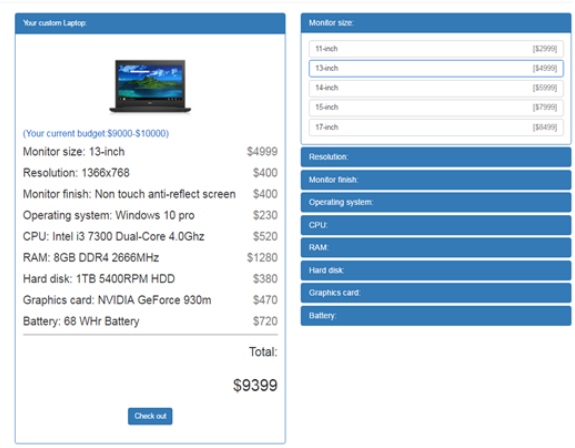

Figure 2 (b). Screenshot of the PC configurators, with default options

Table 1. Configurators used in the experiment.

	Base configurator w/o default options	**Configurator w/ default options**
Laptop (utilitarian product)	I	II
Watch (hedonic product)	III	IV

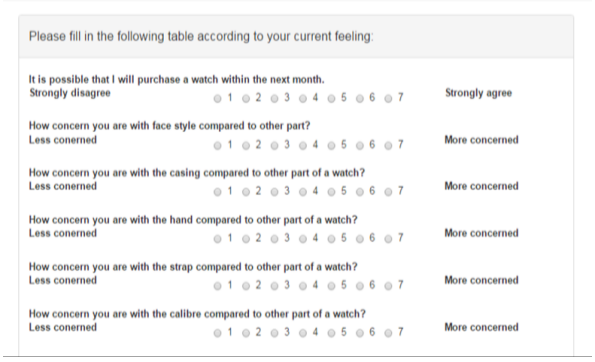

Figure 3(a). Screenshot of the pre-experiment survey of watch configurators

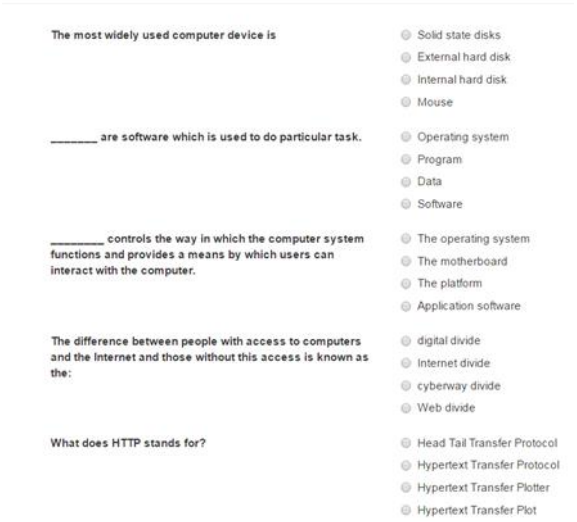

Figure 3(b). Screenshot of the pre-experiment survey (partial) of laptop configurators to determine customers' degree of expertise

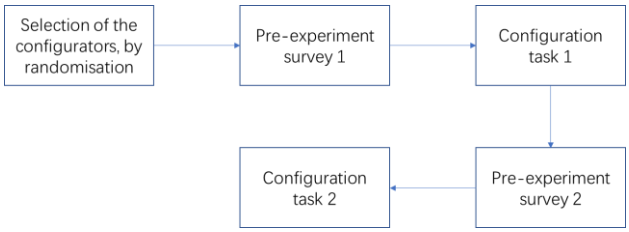

Figure 4. Experiment process

4 EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Basic statistics

One hundred forty participants are recruited from a university in Hong Kong. Each experiment subject receives 30 Hong Kong dollars as compensation for his or her time and effort. We check customers' choice distribution with and without default choices. The purpose is to see whether the default choices lead to a significant difference in consumers' behaviour.

The statistics on the choice distribution are shown in the following table. If the default options have no effect on customers' decisions, the distribution of customers' choices should not be significantly different for the two types of configurators, i.e., with and without default choices. A chi-square test is used to check the difference between the distributions. The p-value of the test result is shown in the last column.

Table 2. Consumers' choice distribution for watch attributes

Attribute	Number of Attribute choices	Attribute choice distribution (with default option, 40 subjects)	Attribute choice distribution (w/o default option, 52 subjects)	P-value of chi-square test
Frame	3	(15, 14, 11)	(21, 14, 17)	0.501

Band	6	(3, 9, 3, 11, 4, 10)	(2, 6, 0, 21, 3, 20)	0.004
Calibre	2	(10, 30)	(21, 31)	0.047
Outer	8	(8, 5, 6, 2, 8, 2, 5, 4)	(9, 9, 6, 2, 10, 8, 7, 1)	0.014
Arm	2	(19,21)	(15, 37)	0.009

Table 3. Consumers' choice distribution for laptop attributes

Attribute	Number of Attribute choices	Attribute choice distribution (with default option, 49 subjects)	Attribute choice distribution (w/o default option, 47 subjects)	P-value of chi-square test
Monitor	5	(19, 19, 8, 2, 1)	(6, 27, 9, 5, 0)	0.000
Resolution	3	(6, 35, 8)	(8, 31, 8)	0.64
Screen	2	(12, 37)	(20, 27)	0.011
Operating System	4	(16,12, 13, 8)	(18, 5, 17, 7)	0.014
CPU	6	(4, 17, 16, 4, 5, 3)	(2, 7, 18, 12, 6, 2)	0.001
RAM	9	(4, 4, 10, 1, 10, 8, 2, 5, 5)	(3, 3, 8, 6, 10, 4, 8, 1, 4)	0.000
Graphics Card	5	(11, 18, 13, 2, 5)	(8, 11, 20, 4, 4)	0.066
Hard disk	7	(7, 11, 4, 8, 8, 5, 6)	(7, 7, 10, 5, 8, 6, 4)	0.210
Battery	6	(5, 8, 12, 8, 5, 11)	(10, 4, 8, 11, 3, 11)	0.071

Based on the tables, we can see that for most attributes, the distributions of customer choices are significantly different, as the corresponding p-value is small. This means that default options affect customers' decisions during the configuring process. We notice that only the watch frame in watch, screen resolution and hard disk in laptop don't have significant difference between the base configurators and the default option-based configurators. After further investigation, we found that the choices for these three attributes either have very strong dominance relationship in terms of customer preferences (screen resolution or hard disk), or very heterogeneous customer preferences (watch frame, the choices can be found in Figure 2). For the former case, customers tend to choose the clearly superior choices regardless of the default options. For the latter case, customers' choices are purely determined by the preferences. Default options can hardly change their intrinsic preferences.

4.2 Which factors affect customers' decisions?

Because we want to study the effects of different factors on the selection of default options, it is natural to use a binary variable as an indicator that indicates whether the participant selects the default option in the configuring task for configurators II and IV, as mentioned in the previous section. The independent variables are the number of choices, the order of the attributes, the concern about each attribute and the customers' expertise (only for the laptop, the utilitarian product). The numbers of choices for the two types of products are shown in the second column of Tables 1 and 2. The relative importance that customers accord to each attribute is elicited from the pre-experiment survey. We use the pre-test survey to elicit information about the customers' concern about each attribute. A Likert scale ranging from 1 to 7 is used to allow customers to specify their degree of concern. '1' corresponds to the least degree of concern, and a larger number means a higher degree of concern. A sample question for the watch configurator is 'How concerned are you with the calibre compared to other parts of a watch?' Regarding expertise, we designed a basic knowledge test for laptops containing 10 multiple-choice questions. The number of correctly answered questions is used as the measure of the customer's degree of expertise.

Because the responses are binary variables, logistic regression is used to identify the relationship between independent variables and responses. The result is shown in Tables 3 and 4. For the laptop, the utilitarian product, expertise is an independent variable. For the watch, the hedonic product, the selection of attributes does not depend on customers' expertise; only subjective preferences matter. Thus, expertise is not considered in the regression model of the watch. Model 1 includes all of the independent variables and all of the first-order interactions between independent variables. A stepwise procedure is then conducted to remove the insignificant factors one by one from the model according to the p-value in the regression until only the significant variables remain.

Table 4. Relationship between response and different variables - laptop

Independent Variables	Model 1 (logistic regression)	Model 2 (logistic regression, stepwise result based on model 1)
Expertise	0.693* (0.384)	0.715** (0.321)
Concern about attribute	-0.339 (0.425)	-0.234*** (0.0802)
Sequence of configurator	-0.353 (0.614)	
Number of choices	0.198 (0.424)	0.402* (0.227)
Expertise * Concern	0.0022 (0.0483)	
Expertise * Sequence	0.0082 (0.0478)	
Expertise * Number of Choices	-0.1053** (0.0515)	-0.1028** (0.0504)
Concern * Sequence	0.0074 (0.0494)	
Concern * Number of Choices	0.0093 (0.0547)	
Sequence * Number of Choices	0.0613 (0.0991)	

*: p-value<0.1; **: p-value<0.05; ***: p-value<0.01

Remark: the numbers represent the coefficients of the corresponding independent variables in the logistics regression. The numbers in the parentheses are the standard deviation of the corresponding coefficients.

Based on the result shown in Table 4, we find that the degree of expertise is moderately significant in affecting customers'

decisions about default choices. The interaction of degree of expertise and number of choices is significant in affecting customers' decisions to choose the default options. Through a stepwise procedure, we can eliminate the insignificant independent variables one at a time. This leads to model 2, which consists only of the significant independent variables. We find that the degree of expertise, degree of concern about each attribute, and the interaction between degree of expertise and number of choices are significant in affecting customers' decisions. In particular, the coefficient of expertise is positive. This means that if a customer's expertise is greater, he or she is more likely to choose the default options. This finding seems different from previous study in [9]. It should be noted that we use logistic regression to identify the relationship between the independent variables and the choice of default options. In [9], the authors study the relationship between the number of selected default options and the expertise degree. Thus the research questions are different. This can explain the difference of the experiment findings.

The sign of the coefficient of degree of concern is negative, indicating that if a customer is more concerned with an attribute, then he or she is less likely to choose the default options. The coefficient of number of choice is positive, meaning that if an attribute has more choices, customers are more likely to choose the default option. It has been acknowledged that when more choices are presented, the burden of choice is much higher. In this situation, customers may stay with the default option to save time and effort in product configuration.

Table 5. Relationship between response and different variables - watch

Independent Variables	Model 1 (logistic regression)	Model 2 (logistic regression, stepwise result based on model 1)
Concern about attribute	0.17 (0.337)	-0.218* (0.129)
Number of Choices	0.078 (0.145)	
Sequence	-0.333 (0.446)	-0.334*** (0.112)
Concern * Number of Choices	-0.0182 (0.017)	-0.016*** (0.00422)
Concern * Sequence	0.021 (0.089)	
Number of Choices * Sequence	-0.0315 (0.053)	

*: p-value<0.1; **: p-value<0.05; ***: p-value<0.01

Remark: the numbers represent the coefficients of the corresponding independent variables in the logistics regression. The numbers in the parentheses are the standard deviation of the corresponding coefficients.

For the watch configurator, the attributes are not technical. The selection is based purely on appearance, and no knowledge is required for the configuring task. Therefore, there is no individual variable to quantify the degree of expertise. Based on model 1, we find that none of the individual variables are significant. Through a stepwise procedure, the original regression model can be modified to model 2, in which all of the variables are significant. The degree of concern is moderately significant. Configuring sequence and the interaction of concern with number of choices are significant in affecting customers' decisions to choose the default options. We also notice that all of the signs of the coefficients are negative. Therefore, when customers are more concerned with the attribute, they do not choose the default option. This finding is identical to the case of the laptop. However, in contrast to the laptop configurator, the sequence of the attribute in the configuring process is significant. We think the reason is that for the laptop configurator, the numbers of choices for different attributes are quite similar. However, for the watch configurator, the number of choices ranges from 2 to 24. Thus, the sequence is significant in the customer's decision. In addition, it is observed that customers tend to choose the default options that are presented early. We also find that the interaction between concern and number of choices is also significant in affecting the choices.

5 CONCLUSION

Product configurator design has been widely studied in the area of engineering. Very little work investigates the effect of default options on consumer decision making during the configuring process. This paper studies whether default options have a significant effect on people's decisions in the context of product customisation. In the settings of product configurators, a default choice is highlighted for each product attribute. During the experiment, we find that some respondents accept the default choices and others reject them. It is of primary interest to study which kinds of products and what type of attributes are influenced most by the default options. Through a set of empirical experiments, we show that customers' choices are significantly influenced by default options. For utilitarian products, we also note that expertise, concern for the product attribute, number of choices and the interaction between expertise and number of choices significantly mediate the default options' effect on customers' choices. However, for hedonic products, concern about the product attribute, order of configuration and the interaction between concern and number of choices are significant factors. From companies' perspective, customers are more likely to select the default options. This could potentially benefit customisers and improve the operations of the company.

This research still has some limitations. The number of subjects can be larger and the subjects have similar background. Thus, only lab experiment is used to conduct the research. To provide more convincing research outcome, field experiment will be carried out. In addition, the methods on quantifying the expertise degree of the subjects is very sensitive to the discrimination of the questions in the pre-survey test. In our future work, we plan to recruit more participants and further polish the questionnaire to quantify the degree of expertise more accurately. Furthermore, the order of configuration may be a significant factor as well. In the future study, we plan to randomise the configurating order for the research.

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