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# How Does the Prior Purchase of Vice Category Products 

## Affect the Next Purchase?


#### Abstract

The purpose of this study is to verify the effect of prior purchases on subsequent purchases, using customer's shopping path data collected by RFID. In existing research,it has been indicated that the balance of virtue category products (which are relative necessities) and vice category products (which are relative luxuries) in the shopping basket, which is called virtue-vice balance, affects the next purchase behavior. In particular, it was shown that the previous purchase of vice category products makes the customer refrain from subsequent purchases of virtue category products. This effectis expected to affect the purchase of any category products. Therefore, this study investigated the effect of prior purchase of vice category products on subsequent purchase behavior under various conditions. From the results, it was clarified that the effect changes due to the previous virtue-vice balance in the basket and the category of products that may be bought subsequently.


## Keywords

Shopping path, purchase probability, vice category products, virtue category products, virtue-vice balance

## 1. Introduction and Objectives

Recently,the advancement of information measuring devices such as RFID (radio frequency identifier) and eye-tracking enables us to accumulate detailed data on phenomena that previously could not be observed. In this environment, research onshopping paths is one of the most attention-getting research areas related to the study of the in-store purchase process of customers(Hui et al. 2009a). The purpose of this study is to use customer's shopping path data collected by RFID, to verify the effect of prior purchases on subsequent purchase behavior.

In existing research, it has been indicated that the balance of virtue category products (which are relative necessities) and vice category products (which are relative luxuries) in the shopping basket, which is called virtue-vice balance,
affects the next purchase behavior. For example, Hui et al. (2009b) used customer shopping path data collected in a supermarket, to verify the relation between the virtue-vice balance and purchase behavior. That paper showed that the previous purchase of virtue category products prompts the customer to buy vice category products in subsequent purchases. Relying on that framework, Ishibashi et al. (2015) verified the effect of the previous purchase of vice category products on the next purchase behavior related to virtue category products. The result showed that a customer who previously put many vice category products in her/his shopping basket tended to avoid subsequent purchases of virtue category products. As a reason, it is guessed that the purchase of vice category products stimulates the goal of saving money. However, the previous research verified this effect on one product category only. Thus, it is necessary to clarify this effect on the purchase behavior of various product categories. In addition, the effect of the previous purchase of vice category products when a customer put many virtue category products in her/his basket has not been clarified.

The purpose of this study is to clarify the effect of the prior purchase of vice category products on subsequent purchase behavior. In order to verify this effect, we define the previous purchase state of each customer with shopping path data collected by RFID in the supermarket. Firstly, relying on the framework of Hui et al. (2009b), the virtue-vice balance of customer is expressed by the ratio of each category of products in the shopping basket. Then, we measure the customer's prior purchase state, and verify the probability of next purchase behavior. In this way, we can indicate the relationship between the prior virtue-vice balance and the subsequent purchase behavior by paying attention to the previous purchase of vice category products. Therefore, this paper clarifies the effect of the prior purchase of vice category products on subsequent purchase behavior in consideration of the unsolved problems in Ishibashi et al. (2015).

## 2. Literature Review

Novemsky and Dhar (2005)verified that the product choice of a consumer is affected by previous behavior.In order to grasp the time series effect of purchase behavior, many researchers and practitioners have focused on the study of customer shopping paths collected by RFID (Larson et al. 2005). For example, Hui et al. (2009b) extended the concept of "Licensing effect" (Khan and Dhar 2006), and verified the effect of previous purchases on subsequent purchase behavior in a supermarket.

Licensing effect is related to prior purchased products. Khan and Dhar (2006)
argue that a prior intent to be virtuous boosts self-concept and reduces negative self-attributions associated with the purchase of relative luxuries. In other words, this effect indicates that the previous purchase of virtue category products prompts the customer to buy subsequent purchases of vice category products. For the analysis of this phenomenon, Hui et al. (2009b) and Zhao et al. (2015) classified products sold in the supermarket into virtue category products which are relative necessities (such as vegetables, organic food and health-oriented products), and vice category products which are relative luxuries that put a strain on one's body such as beer and ice cream. Then, they investigatedlicensing effects in each country, and verified the effect of the prior purchase of virtue category products on next purchase behavior. Furthermore, Hui et al. (2009b) pointed out that the prior purchase of vice category products may affect next purchase behavior related to virtue category products.

The effect of the previous purchase of vice category products on subsequent purchases of virtue category products was verified by Ishibashi et al. (2015). However, many issues remain from the existing research. In the existing research, Ishibashi et al. (2015) assumes that the prior purchase of vice category products reduces the customer's self-concept, and increases positive self-attributions associated with the purchase of virtue category products. In their verification, it was indicated that this effect reduces the probability of the subsequent purchase of virtue category products. If main cause of this effect is the increase of positive self-attribution associated with next purchase behavior, it is guessed that this effect derives from the goal of saving money. Thus, the effect of the previous purchase of vice category products may affect subsequent purchase behavior, regardless of the purchasing product category. However, the effect on purchase of various product categories has not been investigatedin the existing research (Ishibashi et al. 2015). In addition, this effect has possibilities to be influenced by the prior purchase of virtue category products. For example, a customer who puts more virtue category products than vice category products into his/her basket is expected to be insulated from the effect of avoiding subsequent purchases. Therefore, this study aims to clarify the influence of both the previous purchase of vice category products and the virtue-vice balance of the basket.

## 3. Hypothesis and Method

In recent years, RFID enables us to trace detailed information about customer's in-store behavior (Hui et al. 2009a). In this paper, we use RFID to know customers' in-store behavior, such as visit and shopping. Then we
accumulate and analyze observed movement information as data. Shopping path is a customer's in-store behavior process starting right from the entry into the store, till s/he pays for the purchases at the cash register. Shopping path can be formulated by $P=\left\{S, i, X_{i}(t)\right\}$ (Hui et al. 2009b). $S$ is the environment where the data is obtained, $i$ is the customer whose movements have been identified by RFID, and $X_{i}$ is the in-store movement of the customer $i . X_{i}(t)$ expresses the location of customer $i$ in the store at time $t$. Then, the shopping path data is the set of $X_{i}(t)$ of each customer.

In this paper, an attempt is made to verify the following hypotheses by using the shopping path data, in order to clarify a time series effect in the process of in-store shopping.

H1: Previous purchase behavior affects later purchase-related behavior.

This paper follows the framework of Hui et al. (2009b, p. 486), and verifies three hypotheses below. First, based on Hui et al. (2009b), relative necessities, such as vegetables, organic food and health-oriented products, were classified as virtue category products; relative luxuries that harm the body, such as beer and ice cream, were classified as vice category products; products that were neither virtue nor vice, such as fish and meat, were classified as "other category products". By using this classification, a previous purchasing condition can be expressed as virtue-vice balance in the basket. Based on Hui et al. (2009b) and Ishibashi et al. (2015), this paper judges the strength of effects of virtue and vice categories. $\left|C_{\text {all }}\right|$ is the purchase quantity in the basket; $\left|C_{r}\right|$ is the purchase quantity of virtue category products among purchased products; $\left|C_{v}\right|$ is the quantity of vice category products. The condition in the basket at time $t$ is as follows;

$$
\begin{align*}
& \frac{\left|C_{v}\right|}{\left|C_{a l l}\right|}>\frac{\left|C_{r}\right|}{\left|C_{\text {all }}\right|}  \tag{1}\\
& \frac{\left|C_{v}\right|}{\left|C_{\text {all }}\right|}<\frac{\left|C_{r}\right|}{\left|C_{\text {all }}\right|} \tag{2}
\end{align*}
$$

If a customer's basket satisfies condition (1), s/he can be strongly affected by the influence of the prior purchase of vice category products. On the other hand, if condition (2) is true, s/he is expected to be strongly affected by virtue category products. Based on this classification, this paper considers the effect of
virtue-vice balance.
In order to measure the effect on subsequent purchasebehavior, we use the purchasing condition based on conditions (1) and (2), and the ratio of vice category products in the basket. In this paper, the ratio of vice category products in the basket is calculated by $\left|C_{v}\right| /\left|C_{\text {all }}\right|$. Subsequent purchase behavior is comprised of three stages (visit, shopping and buying), based on the decision-making process. If customer $i$ visits a sales area, then it is represented as $V_{i}=1$, and if s/he does not visit then it is represented as $V_{i}=0$. Next, if customer $i$ shops at the area (stops and considers a product purchase) then this is represented as $S_{i}=1$, and if s/he passed without shopping then this is represented as $S_{i}=0$.Finally, the prior purchase of vice category products is expected to encourage a customer to avoid subsequent purchasing, as described in section 2. Thus, if customer i bought products, this is represented as $B_{i}=1$; if not bought, $B_{i}=0$.

In this paper, we use the data collected from RFID attached to the shopping cart as shown in Fig. 1. The data was collected from August to October 2012 at a supermarket in a Tokyo suburbs, and simultaneously marketing information such as floor layout (Fig. 2), transaction data etc. were also collected. The total number of samples was 37,445 , the average amount that the customer spent was 2,765 yen, and average number of items bought was 13 .


Fig. 1. An RFID tag attached to each shopping cart


Fig. 2. Sales floor layout in the store
In this paper, the effect of the prior purchase of vice category products is investigated for each product category: virtue, vice and other. Thus, we focus on purchase behavior of areas that respectively have large sales of each category. Firstly, we look at fresh produce as anarea that has large salesof virtue category products. In the verification of fresh produce, we investigate customers who enter the store from the entrance which is located near the event space shown in Fig. 2, because it is difficult to accurately obtain previous purchasing conditions of customers who enter from the other entrance. Secondly, for the analysis of vice category products, we focus on the confectionary area. Thirdly, an analysis for the "other" category products is performed by using the data of the meat area. Finally, we analyze the Japanese deli as an area that contains each product category. The sales share of Japanese deli is comprised of $46 \%$ virtue category products, $11 \%$ vice, and $43 \%$ other. As a result of pre-processing, Table 1 shows the number of customers whose previous purchase conditions we were able to obtain.

Table 1. Result of pre-processing

| Sales area | Basket | Number of customers <br> who visited the area | Number of customers <br> who did not visit the <br> area |
| :---: | :---: | :---: | :---: |
| Japanese deli | Condition (1) | 1286 | 2666 |


|  | Condition (2) | 9667 | 10176 |
| :---: | :---: | :---: | :---: |
| Fresh produce | Condition (1) | 680 | 1079 |
|  | Condition (2) | 1971 | 2344 |
| Confectionary | Condition (1) | 1051 | 1282 |
|  | Condition (2) | 11422 | 13957 |
| Meat | Condition (1) | 679 | 2097 |
|  | Condition (2) | 5408 | 15429 |

In Table 1, the field of "Basket" means the purchase state before the visit to the area. In this paper, a customer is classified into conditions (1) and (2), based on the previous purchase state of the basket.Relying on Hui et al. (2009b) and Ishibashi et al. (2015), this paper verifies the effect of prior purchases of vice category products on customers of each condition according to the in-store purchase process. Ishibashi et al. (2015) point out that the effect of vice category products increase when the ratio of vice category products in the basket is large. Therefore, this paper posesthe following hypotheses about visitsto each sales area.

H2a: When there are many vice category products in the customer's basket, the probability of that customer's visit to a virtue product's sales location decreases.

H2b: When there are many vice category products in the customer's basket, the probability of that customer's visit to a vice product's sales location decreases.
H2c: When there are many vice category products in the customer's basket, the probability of that customer's visit to an "other" product's sales location decreases.

From the results of Ishibashi et al. (2015), it is expected that there is a strong tendency not to go into a shopping mode at sales areas when there is the effect of the prior purchase of vice category products. Shopping mode is when the customer's mindset is in a state prepared to make purchase decisions. Hui et al. (2009b) use shopping paths, and define "shopping mode" as the state of stopping at a sales location. In this paper, shopping mode is the same as their definition. Therefore, this paper poses following hypotheses about the transition of shopping mode at each sales area.

H3a: When there are many vice category products in the customer's basket, the
probability of that customer's transition of shopping mode at a virtue product's sales location decreases.
H3b: When there are many vice category products in the customer's basket, the probability of that customer's transition of shopping mode at a vice product's sales location decreases.

H3c: When there are many vice category products in the customer's basket, the probability of that customer's transition of shopping mode atan "other" product's sales location decreases.

From the results of Ishibashi et al. (2015), it is expected that there is a strong tendency not to buy products at sales areas when there is the effect of the prior purchase of vice category products. Therefore, this paper poses following hypotheses about the purchase of each product category at each sales area.

H4a: When there are many vice category products in the customer's basket, the probability of that customer's purchase of virtue category products at a virtue product's sales location decreases.

H4b: When there are many vice category products in the customer's basket, the probability of that customer's purchase of vice category products at a vice product's sales location decreases.

H4c: When there are many vice category products in the customer's basket, the probability of that customer's purchase of an "other" category product at an "other" product's sales location decreases.

## 4. Results and Findings

In order to verify all the hypotheses described in Section 3, we applied logistic regression analysis.For all the hypotheses, the explanatory variable is the ratio of vice category products in the customer's basket, which is expressed by $\left|C_{\nu}\right| /\left|C_{a l l}\right|$.The dependent variable in $\mathrm{H} 2 \mathrm{a}, \mathrm{H} 2 \mathrm{~b}$ and H 2 c is the existence of customer's visit to that sales area ( $0-1$ data where $0=$ not visited, $1=$ visited), the dependent variable in $\mathrm{H} 3 \mathrm{a}, \mathrm{H} 3 \mathrm{~b}$ and H 3 c is the existence of transition to shopping mode on that sales area ( $0-1$ data where $0=$ no transition to shopping mode, and $1=$ there was transition to shopping mode), and the dependent variable in $\mathrm{H} 4 \mathrm{a}, \mathrm{H} 4 \mathrm{~b}$ and H 4 c is the existence of product buying by the customer on that sales area ( 0 or 1 data, where $0=$ did not buy, $1=$ bought). The analysis results of customers whose basket state satisfies condition (1) are shown in Table 2. Moreover, the analysis results of customers whose basket state satisfies condition (2) are shown in Table 3. Here, products of all categories are placed in the Japanese deli area. On the other hand, the fresh produce areaconsists of only
virtue category products, the confectionary areaconsists of only vice category products, and the meat areadoes not includevice and virtue category products. Thus, we verify hypotheses H2a, H3a, H4a, H4b, and H4c with the data of Japanese deli. On the other hand, analyses of other areas verify hypotheses of each category.

Tables 2 and 3 show the analysis results about the visits, the transition to shopping mode, and the purchase of each product category, in each sales area described in section 3. If the result of regression analysis is significant, the field of " $p<0.05$ " is "True" and that result is indicated by boldface; if that is not significant, it is "False". In addition, the regression coefficient is underlined it is a significant case an effect that is inverse of the hypothesis.

In Table 2, for $\mathrm{H} 2 \mathrm{a}, \mathrm{H} 2 \mathrm{~b}$ and H 2 c which are related to the effect of the previous purchase of vice category products on the visit of a customer who put many vice category products in his/her basket, only the case of the meat sales area was significant, but that effect was inverse. For H3a, H3b and H3c, all cases of the transition to shopping mode in those sales locations were not significant. On the other hand, for $\mathrm{H} 4 \mathrm{a}, \mathrm{H} 4 \mathrm{~b}$ and H 4 c , all cases of product buying in those sales areaswere significant. In the results of the meat sales area, H 2 c and H 4 c were simultaneously significant but these effects were inverse. Here, the effect on product buying in Tables 2 and 3 is limited under the existences of visit to that area and transition to shopping mode. From the additional analysis, the direct effect to product buying was significant, and its regression coefficient was $-0.911\left(\chi^{2}(1)=6.824, p<0.05\right)$. Therefore, it was shown that a customer who previously put many vice category products in his/her basket tends to avoid the purchase of products, when the rate of vice category products in the basket was large.

Table 2.Results of analysis of customers satisfying condition (1)

| Sales area |  | Japanese deli | Fresh produce | Confectionary | Meat |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Visit | Regression Coefficient | -0.015 | 0.177 | -0.223 | $\underline{0.415}$ |
|  | $\chi^{2}(1)$ | 0.008 | 0.662 | 1.844 | 5.093 |
|  | $p<0.05$ | False | False | False | True |
| Shop | Regression Coefficient | -0.189 | 0.303 | 0.385 | 0.327 |


|  | $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{aligned} & 0.305 \\ & \text { False } \end{aligned}$ | $\begin{aligned} & 0.441 \\ & \text { False } \end{aligned}$ | $1.276$ <br> False | $\begin{aligned} & 0.714 \\ & \text { False } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Buy virtue <br> category <br> products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{gathered} -2.010 \\ \mathbf{4 2 . 5 8 8} \\ \text { True } \end{gathered}$ | $\begin{gathered} -3.501 \\ \mathbf{8 2 . 0 3 4} \\ \text { True } \end{gathered}$ |  |  |
| Buy vice category products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{gathered} -1.661 \\ 17.060 \\ \text { True } \end{gathered}$ |  | $\begin{gathered} -0.967 \\ 10.667 \\ \text { True } \end{gathered}$ |  |
| Buy other <br> category <br> products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{gathered} -2.186 \\ 47.220 \\ \text { True } \end{gathered}$ |  |  | $\begin{gathered} -2.090 \\ 23.343 \\ \text { True } \end{gathered}$ |

In Table 3, all cases for $\mathrm{H} 2 \mathrm{a}, \mathrm{H} 2 \mathrm{~b}$ and H 2 c , which are related to the effect of previous purchase of vice category products on the visit of customer who put many virtue category products in his/her basket, were significant. For H3a, H3b, and H 3 c which are related to the transition to shopping mode, only the case of the Japanese deli was significant. For $\mathrm{H} 4 \mathrm{a}, \mathrm{H} 4 \mathrm{~b}$ and H 4 c which are related to the product buying, the cases about the purchase of vice category product (H4b) in Japanese deli and confectionary were significant. In addition, the case about the purchase of "other" category products (H4c) in meats was significant. Therefore, it was shown that a customer who previously put many virtue category products in his/her basket is affected by the ratio of vice category products in the basket, but those effects were not the same.

Table 3.Results of analysis of customers satisfying condition (2)

| Sales area |  | Japanese deli | Fresh produce | Confectionary | Meat |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Visit | Regression Coefficient | -0.863 | -0.792 | 0.579 | -0.451 |
|  | $\chi^{2}(1)$ | 25.955 | 4.260 | 12.246 | 5.835 |
|  | $p<0.05$ | True | True | True | True |
| Shop | Regression | -0.743 | -0.143 | 0.313 | -0.344 |


|  | Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{aligned} & 4.569 \\ & \text { True } \end{aligned}$ | $\begin{aligned} & 0.026 \\ & \text { False } \end{aligned}$ | $\begin{aligned} & 1.001 \\ & \text { False } \end{aligned}$ | $\begin{aligned} & 0.905 \\ & \text { False } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Buy virtue <br> category <br> products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{aligned} & 0.249 \\ & 0.873 \\ & \text { False } \end{aligned}$ | $\begin{aligned} & 1.328 \\ & 3.244 \\ & \text { False } \end{aligned}$ |  |  |
| Buy vice category products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{gathered} \underline{2.148} \\ 29.687 \\ \text { True } \end{gathered}$ |  | $\begin{gathered} \underline{2.711} \\ 89.480 \\ \text { True } \end{gathered}$ |  |
| Buy other <br> category <br> products | Regression Coefficient $\begin{gathered} \chi^{2}(1) \\ p<0.05 \end{gathered}$ | $\begin{aligned} & 0.150 \\ & 0.316 \\ & \text { False } \end{aligned}$ |  |  | $\begin{gathered} \underline{1.211} \\ 10.092 \\ \text { True } \end{gathered}$ |

The results showed that the effect of vice category products was influenced by the sales areas and the previous virtue-vice balance of customer's basket. Especially, a customer satisfying condition (2) (s/he previously puts many virtue category products in his/her basket) is expected to be affected strongly by the product category of the sale location. In Table 3, significant cases in which the regression coefficient was positive value were the purchase of vice category products in Japanese deli and confectionary, and the purchase of "other" category products in meat. Firstly, in the purchase behavior at the confectionary sales location, it was shown that those customers tended to visit and buy. Using the concept of licensing effect, the purchase of vice category products when the customer previously bought many virtue category products was explained by Hui et al. (2009b). On the other hand, when the basket includes few vice category products, that customer has possibilities of refraining from buying vice category products due to his/her self-control (Baumeister 2002). Thus, this case is expected to be influenced by the customer's psychological state. Next, in the results of the meat sales area, the effect on visits was negative (regression coefficient was less than zero), whereas the effect on purchases was positive. In this case, the direct effect on purchases was not significant (regression coefficient was $\left.-0.091, \chi^{2}(1)=0.123, p>0.05\right)$. As a similar case, the effect on purchases in the fresh produce area was not significant, but its regression coefficient was positive. The direct effect of this case was also not significant (regression coefficient was $-0.181, \chi^{2}(1)=0.193, p>0.05$ ). It is guessed that
these customers have a weaker effect of avoiding subsequent purchase due to the previous virtue-vice balance.

From these results, we conclude that previous purchase of vice category products affects subsequent purchase behavior, but the effect changes due to the virtue-vice balance of the customer's basket.Firstly, when a customer puts more vice products than virtue products in the basket, the hypotheses of $\mathrm{H} 4 \mathrm{a}, \mathrm{H} 4 \mathrm{~b}$ and H4c were supported in all the sales areas. Thus, it was shown that a customer tends to avoid buying products with the increase of the ratio of vice category products in his/her basket, in the case which satisfies condition (1). Next, it was shown that the ratio of vice category products in the customer's basket has different effects due to sales location, when s/he puts more virtue products than vice products in his/her basket. In a sale area that includes many vice category products such as in confectionary, hypotheses H2b and H4b were supported, but these effects were opposite. In other words, the probability of purchasing vice category products increases with the increase of the ratio of vice category products in the basket when a customer buys many virtue products. On the other hand, for the purchasing virtue and "other" category products, H 2 a and H 2 c were supported, and a customer tended to avoid visiting that sales location when the ratio of vice category products was large. However, H4c was supported but had the opposite effect, and H4a was not supported but its regression coefficient was a positive value. In addition, the direct effects on purchases were not significant in both fresh produce and meat areas. Therefore, it was shown that the previous purchase of virtue category products not only weakens the effect of decreasing the probability of that customer subsequently purchasing products due to the prior purchase of vice category products, but also prompts him/her to purchase in some of the product categories. In conclusion, the hypothesis of H1 was supported. It was clarified that the previous ratio of vice category products in the basket affects subsequent purchase behavior, and this effect simultaneously relies on the virtue-vice balance of the basket.

## 5. Conclusions

In this paper, an attempt was made to clarify the effect of the prior purchase of vice category products on later purchase behavior. Through the analyses, it was verified that the prior purchase of vice category products had different effects on the customer, due to the virtue-vice balance of his/her basket and the category of
products which were placed in the sales location. This means that there is a specific pattern in the order of product purchases; this theoretically clarified the effect of store layout on purchasing behavior.

In this paper, it was shown that the prior purchase of vice category products had the reduction effect of later purchase behavior. In addition, it was found that this effect was blocked by the ratio of virtue category products in the shopping basket. Therefore, a store manager can promote customers' purchase behaviors by a floor layout considering the virtue-vice balance. For example, allocation of Sales area of virtue category products around the entrance and appropriate end displays of vice category products are expected to prevent the bias of virtue-vice balance.

Many issues remain in this research. This paper's analysis results suggest that a construction of model considering the previous virtue-vice balance of the customer's basket and the category of products placed in the sales location is necessary, to explain the effect more accurately. In the model of Hui et al. (2009b), the influence from products in the sales location was expressed as the ratio of the quantities of products in each categoryplaced there. Thus, it is necessary to verify the significance of that influence, by using those ratios as explanatory variables. On the other hand, for the virtue-vice balance of the basket, it is necessary to consider the effects of purchasing both virtue and vice category products. In addition, this paper verified the effect of virtue-vice balance on the customer's visit to a sales area, the transition to shopping mode and the purchase of products, but the effect on the purchase quantity of customers was not investigated. Therefore, it is necessary to verify the effect of virtue-vice balance on the continuous process of purchase behavior, in consideration of these elements.

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