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Self-control and Consumer Behavior

Abstract

This research aims to use shopping path data and sales history data, to verify how self-control failure affects customer purchasing behavior. It is known that people control their impulses and desires. However, when their limited inner resources (regulatory resources) deplete, they fail at self-control. This research focuses on time spent in store causing depletion of regulatory resources, and clarified effects on customer purchasing behavior. According to the results, we found that within a certain time, as time passes, the customer's impulsive purchasing tendency becomes stronger. However, we found that after a certain time passes, in reverse, the tendency to purchase weakens. These findings confirmed that failure of self-control in the store arises to a limited extent with the passage of time.

Keywords

Self-control, regulatory resource, impulsive purchasing, shopping path

1. Introduction and Objectives

For in-store marketing, in addition to purchasing results, it is important to understand the process that leads to purchases. For example, assume that two customers purchase the same quantity of the exact same product. One person makes that purchase in 3 minutes, but the other person takes 30 minutes to reach the same purchase result. This shows that these 2 people have the same purchase result, but different physical or psychological processes until purchase. Considering such a situation, in addition to the purchase result, it seems important to know the physical and psychological process until purchase.

Previously, the process until purchase was often treated as a black box. However, the development of sensor technology such as RFID (Radio Frequency IDentification) has made it possible to observe the physical process in a store by which customers reach a purchase. Data from RFIDs includes what sales locations the customer went to, in what order, and how much time the customer stayed there. Hui, Bradlow and Fader (2009) etc. use such shopping path to research behavior in store.

Another important point in reaching a purchase is the customer's psychological aspect. It is known that the customer does various information processing until she decides to purchase. In the store, the customer makes purchase decisions while being swayed by many temptations. The customer can reject desires that arise, but she can also do impulsive purchasing according to desires. Psychology uses the concept of self-control to explain such phenomena. People use inner resources called regulatory resources to exercise self-control, and regulate their impulses and desires (Baumeister 2002; Vohs and Schmeichel 2003). It has been found that these regulatory resources are limited, and when a person continues to use and deplete them, she cannot regulate impulses, and fails at self-control (Baumeister, Vohs and Tice 2007; Muraven and Baumeister 2000; Vohs and Schmeichel 2003). Vohs and Faber (2007) did research that verified the effects of a customers' self-control failure on purchasing behavior. In that research, laboratory experiments showed that subjects who depleted their regulatory

resources tended to increase the monetary amount and quantity purchased in a virtual store. However, previous research on self-control is limited to laboratory experiments, so the effects on purchasing behavior of customers in actual stores is unclear.

This research aims to use shopping path data, and verify that self-control failure affects purchasing behavior of customers. In the verification, we focus on time spent in store as a factor that reduces inner resources of customers, and we treated purchases of unhealthy food as failures in customer self-control that result in impulsive purchasing. By verifying the purchasing probability for each passage of time in store, this research can clarify self-control failure's effects on purchasing behavior of customers.

2. Literature Review

In psychology, irrational behavior of people is explained by the concept of self-control. Self-control is the adjustment of one's own behavior and thinking, towards reaching long-term best interests and rules (Muraven and Baumeister 2000). People use self-control to regulate their arising impulses and desires, and thus manage their social lives. The existing research about self-control focuses on the regulation of their impulses and desires, while Fujita (2011) proposed a comprehensive definition of self-control.

Behavior such as not smoking, calorie limits during diets, and avoiding unhealthy products are examples of behavior based on self-control (Baumeister, Vohs and Tice 2007). However, like the purchases of unhealthy food handled in this paper, people sometimes fail at self-control and end up behaving inappropriately. So, how do people fail at self-control?

To exercise self-control to regulate impulses and desires, people need inner resources called regulatory resources (Baumeister 2002; Vohs and Schmeichel 2003). These regulatory resources are limited, and deplete with continued use, which invites failure in self-control that can't regulate desires (Baumeister, Vohs and Tice 2007; Muraven and Baumeister 2000; Vohs and Schmeichel 2003). According to research results based on laboratory experiments, they found that in situations where regulatory resources depleted, when an issue is presented that require self-control, performance to achieve that issue tended to worsen (Baumeister et al. 1998; Inlicht and Schmeichel 2012). Among research on self-control failures caused by depletion of regulatory resources, many researchers have focused on research that explains irrational behavior of consumers.

In marketing, self-control failure is often used in a context that explains impulse purchasing. In laboratory experiments, Vohs and Faber (2007) found that subjects with depleted regulatory resources tend to increase the monetary amount and quantity of purchases in a virtual store. It is pointed out that even for simple decisions and thinking about something, people use regulatory resources (Twenge et al. 2001; Vohs et al. 2008) and reduce their regulatory resources in a long trip in a store, etc. (Baumeister 2002). This existing research suggests that people are always reducing their regulatory resources in daily life, and the passage of time in one day or passage of shopping time in store affects their purchasing behavior.

Much of past research used laboratory experiments, but there is little research that used

data collected in daily life. Hoffman et al. (2012) is one research that used data collected in such real living conditions. Hoffman et al. (2012) verified the effects of personality and situational factors on desire strength, conflict, resistance/self-control, and behavior enactment that people experience in daily life. They found that people's personality and situational factors strongly affect a series of processes of self-control. However, that considered daily life in general; it only touched on consumer behavior in shopping situations. Our research treats purchases of unhealthy food as irrational behavior, and uses consumer behavior data in an actual store to verify self-control failures.

3. Concept Frameworks and Method

This research aims to verify that self-control failures in an actual store affect purchasing behavior of consumers. The existing research (Muraven and Baumeister 2000; Vohs and Schmeichel 2003) found that when regulatory resources deplete, people fail at self-control. However, in previous research, all the verifications of self-control failures were only laboratory experiments. This is because it was difficult to quantify and scientifically verify customer behavior in actual stores. But currently, use of RFIDs makes it possible to track customer behavior in the store, and accumulate this as data. Such data on customer behavior in store is called shopping path data. Shopping path means the behavior process in store, from when she enters the store until she pays for things purchased at the register. Shopping path can be put into a formula as $P = \{S, i, X_i(t)\}$ (Hui et al. 2009, p322). S is the environment in which data was obtained, i is each customer whose movements are identified by RFID, and $X_i(t)$ shows the location in store of customer i at time t . Shopping path data is the set of $X_i(t)$ for each customer. In short, shopping path data contains information on the customer's movement path, sales locations visited, and stopping time. And by combining shopping path and sales history data, we can clarify the relationship between movement path and purchasing behavior in the store. This paper uses sales history data and shopping path data obtained by RFID, to verify the following hypothesis.

H: The longer the time spent in the store, the stronger the customer's tendency to purchase unhealthy food.

Figure 1 shows a theoretical framework to verify the above hypothesis. People use regulatory resources even to only make a simple decision or think about something (Twenge et al. 2001; Vohs et al. 2008). Regulatory resources deplete during a long trip in a store (Baumeister 2002). Therefore, this paper treats the time passed from the time of arrival at the store until the customer moved to the target sales location as a factor that depletes the customer's regulatory resources. Also, customer impulse purchasing that occurs due to failure in self-control is taken as purchases of unhealthy food (Vohs and Faber 2007). However, it is difficult to analyze all unhealthy foods of a store. In this paper, we analyze customer behavior at the confectionary sales location, which has the largest sales among the store's unhealthy foods. Based on these assumptions, a theoretical framework to verify the hypothesis can be

explained as follows. Generally, people in a store easily experience conflicts between goals and desires. This is because people have the goal of a healthy diet (Baumeister 2002) while they also frequently feel a desire to eat (Hofmann et al 2012). Also, customers repeatedly evaluate products and make purchase decisions in the store while they go around buying. This series of decision making by the customer uses her regulatory resources. Therefore, one can say that the longer the time spent in the store, the more the customer's regulatory resources deplete. So in a state with depleted regulatory resources, when an impulse arises for unhealthy food, the customer fails at self-control and purchases the unhealthy food. In short, if the hypothesis is valid that the longer the time spent in the store, the stronger is the tendency to buy unhealthy food, then one can say that the customer's purchasing behavior is affected by the depletion of regulatory resources.

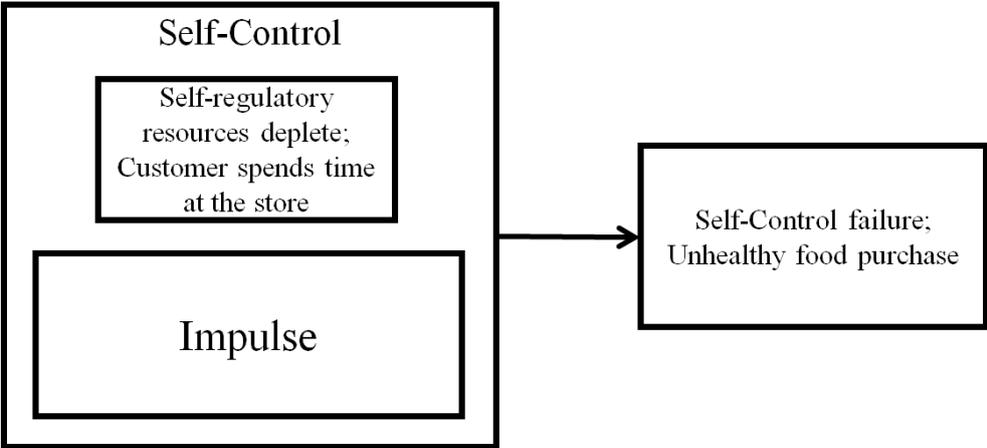


FIGURE 1. Process by which customer reaches an unhealthy food purchase

Radio frequency identification (RFID) technology was used to obtain the shopping path data used in this paper. Specifically, as shown in Figure 2, an IC tag is attached to the shopping cart, and the cart's movement path is recorded each second. Strictly speaking, the data obtained is the cart's movement path, so it is not the customer's movement route, but the cart's movements and stops are according to the customer's behavior, so we treat it as the shopping path. This shopping path data was collected at a supermarket in Osaka area of Japan in the period from November 24 to 30, 2013, along with the floor layout (Figure 3) and purchase history data. The sample size was 3,768 people, the average customer purchase amount was 2,598 yen, and the average number of items purchased was 13 items. As a result of preprocessing, we found that 1,594 customers visited the confectionary sales location, 730 customers purchased confectionary, and customers averaged 5.25 minutes spent until they reached the confectionary sales location.



FIGURE 2. An RFID tag is attached to each shopping cart.

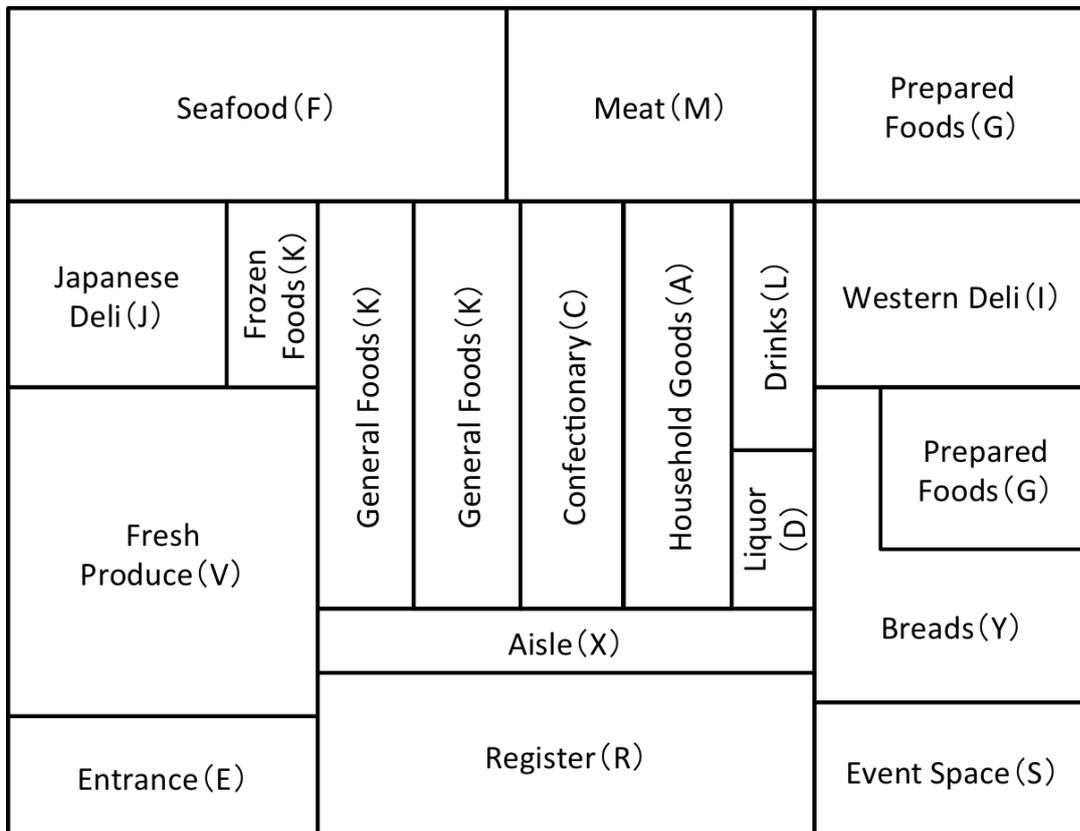


FIGURE 3. Sales floor layout in a store.

4. Results and Findings

We used logistic regression analysis to verify the hypothesis. For the explanatory variables, we used the time spent in store from arrival at the store until reaching the unhealthy food (confectionary) sales location that is the target sales location, and the square of that time. We use the square of that time spent because if a certain time is exceeded, the percentage of people who purchase unhealthy food decreases. The dependent variable is whether or not unhealthy food was purchased (0 = no purchase, 1 = purchase).

Table 1 shows the analysis results. The regression coefficient for time spent is 0.085, and it was significant ($\chi^2(1)=23.24$, $p<.001$). The regression coefficient for time spent squared is -0.002, and it was significant ($\chi^2(1)=11.32$, $p<.01$). Also, Figure 4 shows the unhealthy food purchase probability obtained from analysis, for each time spent. From arrival at the store until 27 minutes later, this purchase probability increases with the time passed, but after that, the purchase probability decreases.

From these results, we can conclude that customers' self-control failure tendency strengthens until a certain amount of time is passed, but subsequently this tendency reverses, as self-control tendency weakens. In short, our hypothesis is supported to a limited extent. Baumeister (2002) pointed out that the longer the time spent in store, the more the customer fails self-control, but this clarified that this tendency is limited in an actual store.

Table 1. Time passed effects on purchases of unhealthy food (result of logistic regression analysis)

Explanatory variable	Regression coefficient	S.E.	$\chi^2(1)$	Exp (B)
Time passed	0.085	0.018	23.24***	1.088
Square of time passed	-0.002	0.000	11.32**	0.988
Constant	-0.858	0.136	40.02***	0.424
N	1594			
Log likelihood	-1082.161			
χ^2	34.15***			
PseudoR2	0.015			

** p <.01

*** p <.001

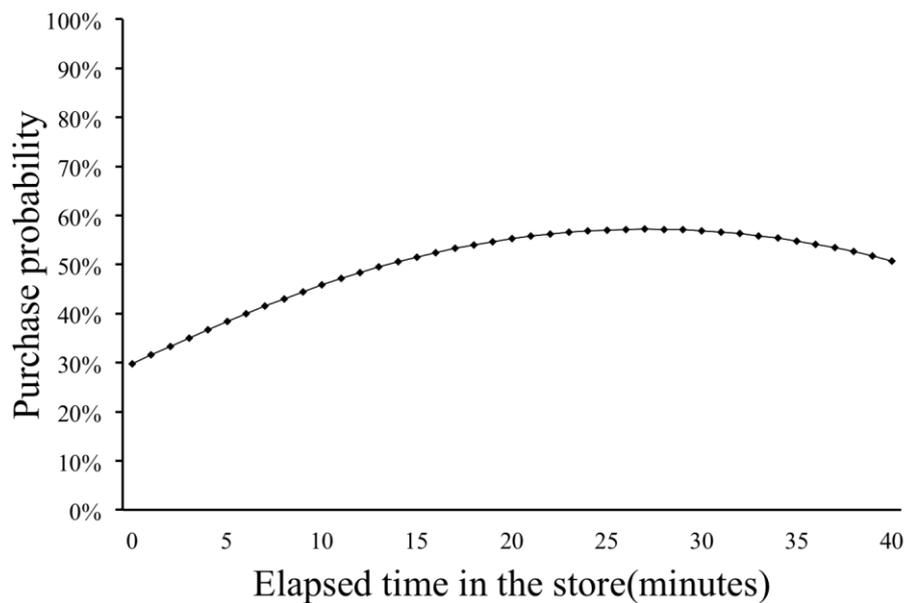


Figure 4. Unhealthy food purchase probability at each time spent.

5. Conclusions

This research showed the effects that self-control failures have on purchasing behavior of customers. Within a certain time period, the longer the time spent in store, the stronger is the tendency to purchase unhealthy food. This result empirically found that the customer's regulatory resources deplete with the time spent in store, and self-control failure occurs.

Also, Sequential Mitigation Effect (SME) could cause the result that the tendency to purchase unhealthy food is seen to weaken after a certain time period. Sequential mitigation effect is if a person previously made an impulsive selection and satisfied his desire, which reduces the possibility of impulsive choice when he selects subsequently (Dholakia et al. 2005). The results obtained in this paper can be explained by using the concept of sequential mitigation effect. When failure of self-control results in repeated impulsive purchases, desires reduce, and impulsive purchasing is done less.

The findings obtained in this research contain important suggestions for marketing. In this research, we obtained the finding that time spent in the store encourages the customer's impulsive purchasing, but after a certain amount of time is passed, that tendency weakens. Therefore, policies to keep the customer in the store are necessary, but this suggests that policies to keep the customer in store a very long time are not necessary. Also, when trying to understand customers' impulsive purchasing, one can say that it is insufficient to only analyze the goods the customer purchased; it is also important to know how the customer used her time in the store. As a theoretical contribution, previous research on verification of self-control used only laboratory experiments; in contrast, this research used shopping path data obtained in an actual store to verify the effects of self-control on consumer behavior.

Many issues remain from this research. For customers' impulsive purchasing, this paper focused on purchasing behavior at the confectionary sales location, which is unhealthy food.

However, unhealthy food includes many products, and it should be verified whether similar tendencies can be seen at other sales locations for unhealthy foods. Also, this paper focused on time spent in the store as a factor that causes depletion of customers' regulatory resources, but other factors should also be verified. For example, there is the time that passed since the customer woke up. Baumeister (2002) pointed out that the customer goes through his day while using his regulatory resources, so by evening, his regulatory resources have depleted, making it easier to fail at self-control. Moreover, Beedie and Lane (2012) proposed a Resource Allocation model of Self-control. This research analyzes the confectionary sales location, but we do not study the effects of priorities (healthy food, diet, monetary restrictions, etc.) held by customers that visit the sales location. There is a need to clarify the effects of these priorities on depletion of regulatory resources and on impulsive purchasing behavior. By continuing to verify these things, one can gain detailed knowledge of how self-control failure affects customer purchasing behavior.

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