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Store Information Processing in IT based Retail Merchandising

Key Words: Retail management, Store Information Processing, Merchandise, Coordination

ABSTRACT

Many studies arguing about retailers' buying behavior treat retailers as hierarchical organization structure. These studies presuppose that merchandising (MD) plan is determined by only merchandisers at the beginning of period based on predicted demands without cooperating stores. However, recent computerization could bring about information coordination between stores and buying department. This coordination enables retailers to be close to their customers but critically requires stores to process information about facing uncertain retail environment to minimize the gap between MD plan and actual customer behavior. Practically, a Japanese top retailer installs IT systems and let each store process information and coordinate to optimize the MD on hierarchical organization. This study aims to investigate what information stores should process and estimate the effect of information processing and coordination on business outcome.

1. Introduction and Objectives

Many studies in marketing and distribution insist the importance of retailers staying close to their customers. However, traditional studies argue about retailers' buying behavior treated retailers as hierarchical organization structure. Each retailer's merchandising (MD) plan is determined by only merchandisers at the beginning of period based on predicted demands, without cooperating with stores (e.g. Hansen and Skyette, 1998; Nilson and Host, 1987). On these traditional studies about MD, there is no assumption to utilize information accumulated in stores. Or there is assumption that

merchandisers can set the MD plan based on the demand forecasts constructed by sales information they can get. Based on these assumptions, types of product or merchandise and personal factors of buyer influencing on buying behavior and its process (e.g.Sheth, 1981; Fairhurst and Fiorito, 1990; Davis, 1994; Johansson, 2001; Silva et al., 2002), MD requirements (e.g. Fiorito, 1990; McLaughlin, 1995; Hansen and Slytte, 1998), technical factors effect on buying process (Knight, 1984; Dale, 1994; Hansen and Skytte, 1998; Johansson, 2001), are the main topics in prior studies.

But in such unstable and diverse environment, gaps between MD plan and actual consumer buying behaviors have occurred. This is because, as prior studies' assumptions, merchandisers set MD plan without utilizing regional information accumulated in each store. So it has critically important to share and combine store information, especially regional information on each store, into MD plan.

Based on the theory of organizational architectures (e.g. Aoki, 2001; Chabaud and Codron, 2005), the structure that traditional retail studies presuppose are explained by "hierarchical decompositions", whereas the structure of sharing and combining store information were "information assimilation". Advanced information technology (IT) is essential for retailers to construct each structure (e.g. Brews and Ticci, 2004; Takashima, 2010). In other words, IT enables retailers to construct either hierarchical decompositions or information assimilation. But some researches pointed out that IT would provide information assimilation (Takashima, 2010). One reason is that stores and merchandisers conduct each specialized information processing separately (e.g. Dale, 1994), hierarchical decompositions would inhibit each specialized information processing. Another reason is that environments addressed by each department are so unstable. Even though the MD plan is set based on precise demand forecast, MD gaps would occurred. To minimize these gaps, it is necessary to coordinate store information (such as POS, actual customer responses, changes by climate) with MD plan. In other words, store information processing is critically important to treat and feedback such short-term factors into MD plan. This research aims to classify the store information processing, and to investigate the effects of each information processing and coordination.

2. Literature Review:

Retailer Buying Behavior

Several studies on retailers buying behavior focus on MD. For instance, Sheth (1981) constructs the model of MD buying behavior that contains MD requirements, intra-organizational factors, inter-organizational factors, choice calculus, supplier accessibility, competitive structure, and corporate image. Ettenson and Wagner (1986) define the retailer buying behavior as "the decision-making process through which the retail buyer identifies, evaluates, and selects merchandise for resale to the customer". As this definition, Sheth (1981)'s model divided into two parts, one is the process to decision which product to buy and assort, another is actual product choices. Some studies investigate the factors influencing on these two parts of retail buying behavior, which is types of product or merchandise (Sheth, 1981; Fairhurst and Fiorito, 1990; Johansson, 2001) and personal factors of buyer influencing on buying behavior and its process (Martin, 1973; Ettenson and Wagner, 1986; Fairhurst and Fiorito, 1990; Davis, 1994; Kline and Wagner, 1994; Johansson, 2001; Silva et al., 2002), MD requirements (e.g. Nilsson and Host, 1987; Fiorito, 1990; McLaughlin, 1995), technological factors effect on the buying process (Knight, 1984; Dale, 1994; Hansen and Skytte, 1998; Johansson, 2001).

Focusing on the personal factors of buyers, Martin (1973) mentions that a retail store's success is in part due to whether or not the organization realizes the importance of having older and more experienced buyers. Etterson and Wagner (1986) find that experiences affect the judgment strategies of buyers, assistant buyers, and students when evaluating the salability of merchandise. Fairhurst and Fiorito (1990) investigate more personal factors of buyers, which is experience, degree, gender, and training. They conclude that experiences and training influence significantly on GMROI (Gross Margin Return on Investment). On the other hand, the extent of training required for the buyer's job negatively influence on GMROI.

Different from these personal factors, the criteria buyer using are also investigated. Some studies investigate this criteria such as MD requirement, which is defined as the buying motives and criteria used by the retailer to evaluate different product offerings (Nilsson and Host, 1987; Hansen and Skette, 1998). Although many studies investigate and identify MD requirements separately on new products presented to retailer or on decisions for the assortment (e.g. Gordon, 1961; Grashof, 1970; Nilsson, 1977; Etterson and Wagner, 1986), Nilsson and Host (1987) systematize and conclude that many criteria can be reduced to ten categories and twenty five sub-categories (see table 1). As McLaughlin (1995)'s study implies, types of MD drive a number of specific product characteristics to be used in the MD requirements. The differences between accept and not accept products within the same product lines is fixed by product characteristics through this MD requirements.

Table 1. Merchandise Requirement

A. Profitability and Sales	**E. Supplier marketing**
A1 Overall profitability	E1 Introductory marketing campaign
A2 Rate of turnover	E2 Continual marketing
A3 Sales potential	
B. Economic Conditions	**F. Supplier characteristics**
B1 Supplier's price	F1 Supplier representatives
B2 Gross margin	F2 Reputation and reliability
B3 Allowances and rebates	F3 Sales force organization
B4 Support to cooperative advertising	F4 Services and functions
B5 Credit terms	F5 Other characteristics
B6 Other economic conditions	**G. Competitive considerations**
C. Assortment considerations	
C1 Existence of private brands	**H. Distributive factors**
C2 Relations to other products	H1 Transportation adaptation
	H2 Store adaptation
D. Consumer evaluation	**I. Tactical considerations**
D1 Overall consumer value	
D2 Retail price	
D3 Product's physical characteristics	**J. Salesman presentation**
D4 Product's psychological characteristics	
D5 Pachaging	

Source: Nilsson and Host (1987)

The relationship between buyer's experience and MD requirement was also studied. For instance, inexperienced buyers are more inclined to use objective criteria such as net margin and price for delisting products, whereas more experienced buyers use less objective measures (Davis, 1994). However, Ettenson and Wagner (1986) found the opposite result that the more experienced buyer use mark-up and sales data as buying criteria. As Hansen and Skytte (1998) mention, the results of the influences experience on MD requirement are mixed.

These 2 focus es (buyers' personal factors and MD requirement) are aim to investigate

the characteristics of the buyers or factors affecting on the relationship between buyers and suppliers, whereas some studies argue the technological factors effect on the buying process (Hansen and Skytte, 1998; Johansson, 2001). Johansson (2001) emphasizes that information availability creates more transparency, making it easier to make choices throughout the buying processes. Information for managing the interfaces with the consumer and suppliers on steady-state operations can be managed through information from internal systems (EPOS, EDI, ERP-systems, etc.). These information technologies (IT) influences on buyers' criteria which to buy through the type of information the buyer needs, the sources of information, and the way of processing throughout the buying process (Johansson, 2001).

These previous studies are conducted based on the premise that the decision which to buy or not are made by the buyers and all information are gathered and used by the buyers. This means the structure of retailers as centralization, in which the MD plan is set by buyer or buying department and each store only conduct in accordance with that plan. These studies on buyers' characteristics or criteria assume using the information that is accumulated in each store such as sales data, whereas not assume the coordination between buyers and stores to share the information that only stores can observe like actual customer buying behaviors. As Swindley (1992) mentions buyers' judgments do not always reflect marketing activities and bring the company's success, it would be difficult to fit the changeable environments as long as only buyers make the decisions which to buy and formulate MD plan based on the information they can get their own. In this regard, because each store and buying department are specialized to process different information such as "selling" and "buying" respectively, centralization would inhibit these two specialized information processing (Knight, 1984; Dale, 1994).

Traditionally in Japanese retailers, stores and buyers (or buying department) formulate the MD plan with coordinating and sharing the information each other. In the case of the MD gaps occurring, re-coordination and modifying that MD plan are conducted even during the period. The Japanese retail market would be rapidly changing and consumers regard product quality and assortment as important comparatively in the world. Even if the traditional Japanese retailers become large scale and centralize its organizational structure, many of these retailers regard the regional information that only accumulating on each store as important to fit these regional customer demands. For example, Japanese top retailer AEON installs the IT system "ODBMS (Open Database Merchandise System)" in order to control each store's assortment and stocks in real time. The aim of this IT system installation is to transfer the ordering authority from each store back to the buying department. This enables to optimize the demand forecast and stocks on each store accurately. Overstocks and loss of the sales opportunities can be prevented and the gaps of ordering accuracy on each store also can be reduced by this centralization. However, this centralization brings it difficult to fit each regional characteristic. To make matter worse, it become difficult to reflect customer needs because of this regarding efficiency as priority on layout of the floors. So, AEON modifies this system, which enables each store and buying department to share the data of actual customer behaviors. This modifying makes buying department correspond to each regional characteristic flexibly and succeed accomplishing improving the order prevision.

As this case, each store have important role on retail buying behavior. Concretely, it is important for buying department to get accurately data of regional customer behaviors, which depends on each store's capability to perceive and analyze the MD gaps. Hansen

and Skytte (1998) mention some retailers has central buying unit through which all buying takes place, whereas other retailers have different concepts and individual store has some degree of autonomy to decide their assortment. However there are almost no investigates focusing on the stores in previous retail studies because of the difficulty to access data and its series of unqualified tasks performed by plain executants (Chabaud and Codron, 2005).

This research focus on retail stores and aim to investigate what capability is needed for stores to analyze the gaps and to improve the business outcome. In order to argue the relationships between stores behaviors and buying department behaviors, I review the organizational architecture based on the informational view next step.

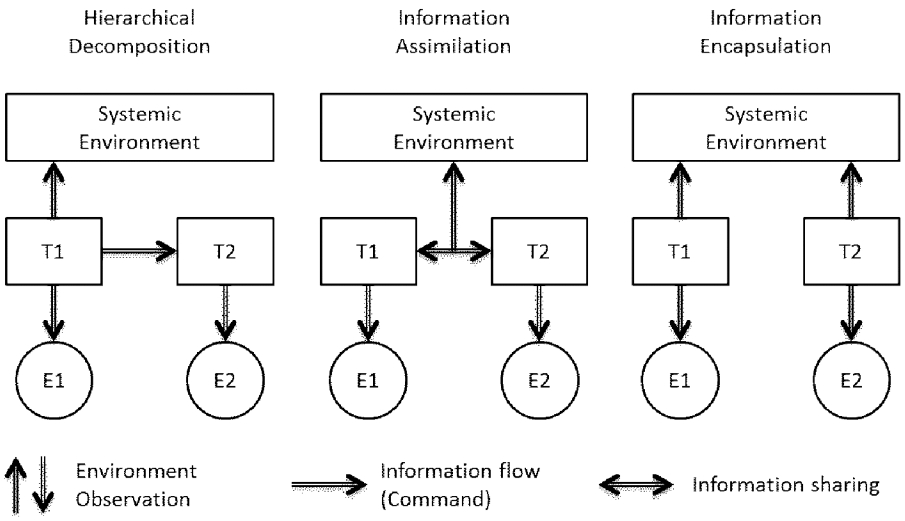
Organizational A rchitecture and the Structure of Retail Information Processing

Aoki (2000) emphasizes that the important point is explicitly treating the organization as an information system. In order for firm to be internally integrative and organizationally effective, either coordination or incentive mode needs to be constructed into hierarchical, but not both of them (Aoki, 1990). He distinguishes two economical models; the American model which combines centralized (vertical) coordination and decentralized (horizontal) incentives and Japanese model which combines decentralized (horizontal) coordination and centralized (vertical) incentives. This Aoki (2000)'s study offers new perspective which gives insights on retail firm organization. The diversity of informational relations with ascending and descending describe the information flows between hierarchically distinct units and horizontal flows between the operational units.

Addition to these two modes, Aoki (2001) introduces a third generic mode of encapsulation which focuses on the activities with weak stochastic correlation of environmental uncertainties (see figure 1). Aoki (2001) uses the case of the organization which has two units, T1 and T2. These units have to make activity decisions that determine the organizational results in the faced environmental uncertainty. Each unit can estimate the environmental parameters in the first time, deriving from past experience or formal knowledge. Such knowledge helps to define the preliminary plan as an optimal decision choice. When firms ' activities start, environmental parameters can be observed. If firms can identify appearing events, it will be able to improve ex-ante plan and to bring cost-minimizing immediately. Because it is assumed that observations remain imperfect, the significant question is in the way of sharing information processing tasks between two operational units of the organization and in the ex-post decision rules that should be implemented at each level. Aoki (2001) defines differentiating two types of environment with corresponding uncertainty; the systemic environment and idiosyncratic environment. The systemic environment can affect the activity of both operational units, whereas idiosyncratic environments, E1 and E2, affect each unit respectively and are proper to each, so the idiosyncratic environment can only be observed by each unit.

Aoki (2001) distinguishes three economic models according to how processing tasks of information about systemic environment events are shared between two units as follow.

Figure 1. Diversity of Information Connectedness.



Source: Aoki (2001) , p.103.

Hierarchical decomposition (HD). T1 monitors the environment that common to both units, and makes a decision of their action in response to the whole environment and idiosyncratic environment (E1). T2 is informed of the choice of T1 and adjust on this basis its decision. So T1 is hierarchically superior to T2.

Information assimilation (IA). Both T1 and T2 observe the systemic environment. This model assumed the perfect correlation of these observations. T1 and T2 accumulate their observations in order to form an assimilated cognitive representation, enabling to have the same probability distribution over the environment. These units share and coordinate not codified information which separately generate from environment state and their activities, as Aoki (2001) use the term of "contextual information sharing ".

Information encapsulation (IE). Systemic and idiosyncratic environments are independently observed by each unit, and observation errors are supposed to be uncorrelated because of their differentiated cognitive perceptions of environment.

These three architectures are determined for what is the informational ly efficient organizational architecture by three variables, 1) task complementarity or substitutability , 2) correlation level between idiosyncratic environments, 3) communication costs. He provides 5 propositions offering the benchmarks for three way comparisons of information efficiency. As mentioned in these propositions, the information processing capacity also critical variables influenc ing on communication cost and information efficiency. Moreover, whenever the use of digital communications technology can reduce the disparity of information processing capacity across task units, the relative informational efficiency of hierarchical decomposition mode vis-à-vis the network-induce information assimilation mode diminishes when two tasks are complementary (Aoki, 2001). This proposition suggests that installing information systems would provide both hierarchical decomposition and information assimilation. Similar to this, some studies also mentioned the computerization improves the interdepartmental communications because it is easy to share the information as the data of selling and buying s eparat ely based on their specialized information processing (Bourlakis and Bourlakis, 2006; Takashima, 2010a). However, as Brews and Tucci (2004) insist, information system s improve each manager's capability of information processing, which enables managers to increase the number they

can manage. So computerization tends to reduce the hierarchy of the organization. If the computerization enables manager of headquarter (or buying department in the retail context) to gather the store information and to direct the stores directory, centralization (hierarchical decomposition) will be chosen. On the contrary, if the computerization improves the capability of store information processing and enables stores to make decisions and to share and coordinate themselves, decentralization (information assimilation) will be chosen.

But as mentioned above, stores and buying department are specialized to process different information such as "selling" and "buying" respectively (Knight, 1984; Dale, 1994). Centralization would inhibit these two specialized information processing. Because each selling and buying environment become to be more and more uncertain, it is difficult to modify and fit each environment quickly by hierarchical architecture. For these reason, it is considered that computerization provide retailers the information assimilation (Takashima, 2010a).

Assuming high uncertainty, it is necessary for retailers to construct the postponement distribution system in order to fit the regional needs and to minimize stocks on each store, based on information assimilation. For this postponement distribution system, Takashima (2010b) emphasis that it is essentially important to coordinate the data accumulated on each store such as POS and regional customer needs with MD plan. In other words, the information processing capability about regional characteristics of each store and the factors of short-term demand fluctuations in each market area is the key factor. Especially, there are many staffs (not the manager) and part-time-workers in retailers today. Because of the high ratio of these employees, information processing capability of these employees is critically important for retailers to improve the efficiency of the information assimilation and postponement distribution system. In this sense, it is necessary to investigate what information should be processed in each stores and how information processing and coordination influence on the business outcomes.

3. Methodology

Prior studies do not investigate store information processing and its coordination. Computerization is able to process and coordinate each specialized information. In this situation, store information processing and coordination are to be critical for information assimilation and the postponement distribution system. Because there is no empirical study focusing on store information processing, it is necessary to investigate what information should be processed in retail stores firstly in this research. Based on this investigation, I will examine the effect of information processing and its coordination on store business outcome.

As step1, in order to investigate and classify store information processing, semi-structured interview was conducted on a Japanese Retailer Maxvalu, headquarters in Kobe, Japan. This retailer has 127 stores in western Japan and installs two different information systems. One is for categories of fresh food, another is for other categories. The reasons why this research chooses this retailer are a) developing stores in several regions which have different culture of consumption, b) existing both high and low performing stores clearly, and c) installing IT system "ODBMS" to optimize assortment, stocks and buying with each store having a part of authority. I conduct 32 semi-structured interviews (1 manager of sales department, 3 store managers, 2 vice-store managers, 9 store staffs, 6 part-time staffs, 4 buying department managers, 3 buying department supervisors, 2

training staffs, 2 management staffs). In these interviewees, managers, vice-managers, staffs, and part-time staffs of high performing store, middle, and low are included because this research aim to investigate the effect of store information processing on business outcome. From these semi-structured interviews, 11 information are described as table 2.

Table 2. Store Information Processing by Semi-Structured Interview

・stock turnover of strong seller items
・monthly actual sales of strong seller items
・price point (that achieve to have the most sales) of flagship it ems
・price range of flagship items
・gaps between monthly MD plan and actual sales in each categories
・expectations for services that frequent customers have
・customer needs for the assortments
・customer needs for the prices
・competitors' price of flagship items
・items on competitors' flyer.
・prices on competitors' flyer.

As step2, in order to test the classification and it s effects on business outcome, o f 2153 surveys for 127 stores distributed by interviewee retailer , 818 are returned for response rate of 37.1%. In this research, 275 samples on agricultural, livestock, fisheries, are used, because this research aims to classify information processing in each store and to investigate the effect on business outcome in the uncertainty or short-term environment fluctuation (e.g. regional uniqueness of customer needs, short-range stock possibility, climate and seasonal change).

Each items of store information processing are measured with 5-point scales anchored at 1 (*not ascertainment or understanding at all*) and 5 (*strongly ascertain or understand*). The aspect of information assimilation is measured by store activities sharing and coordinating store information such as modifying each items' order of assortment, volume, and price with buyers during the period, with 6-point scales anchored at 1 (*strongly disagree*) and 6 (*strongly agree*). And I measured the business outcome with each store's rate of achievement of the planed Operating Profit Margin (mean value=80.02, median value=84.70, maximum value=122.5, minimum value=26.2).

I conducted a factor analysis to investigate constructs of store information processing and the activity of information sharing. The result of factor analysis (varimax rotation) for information processing is in table 3. I examined the factor loadings to assess the validity of the measures. Cronbach's _ and AVE (average variance extracted) is indicated to assess the reliability. Firstly, Cronbach's _ is significant high (from .85 to 90.). Secondly, AVE supports the reliability of measures and the criterion for establishing reliability is that the AVE measures should exceed .50 (Baggozi and Yi, 1988). As in table 3, AVE of MD plan is under this criterion because the factor loadings of "*stock turnover of strong seller items*" and "*gaps between monthly MD plan and actual sales each category*" are comparatively low. However, repeatedly, this research aims to investigate the effect of store information processing on business outcome explorative ly. So I contain these two measurement items because of its significance for retailers. By this factor analysis, there are three factors. I

named these factors as information processing of *MD plan*, *customer needs*, and *competitors* (see table 3).

Table 3. The Result of Factor Analysis and Items Reliabilities

Construct	Scale Items	Factor loading	α	AVE
Information assimilation	sharing store information such as modifying each items' order of assortment with buyers during the period	.902		
	sharing store information such as modifying each items' order of volume with buyers during the period	.922	.907	.834
	sharing store information such as modifying each items' order of price with buyers during the period	.916		
Information processing about MD plan	stock turnover of strong seller items	.586		
	monthly actual sales of strong seller items	.703		
	price point (that achieve to have the most sales) of flagship items	.810	.856	.472
	price range of flagship items	.750		
	gaps between monthly MD plan and actual sales in each categories	.552		
Information processing about Customer needs	expectations for services that frequent customers have	.627		
	customer needs for the assortments	.883	.848	.552
	customer needs for the prices	.696		
Information processing about Competitors	competitors' price of flagship items	.658		
	items on competitors' flyer.	.920	.902	.715
	prices on competitors' flyer.	.931		

In the next step, in order to examine how effect these information processing in stores and activity of information sharing on business outcome, I construct the hypothes es how each factor effect on store business outcome.

4. Research Model and Hypothesis

Based on items obtained from semi-structured interviews, it is cleared that three types of information processing are existing. Firstly, information processing about MD plan would be able to optimize stocks in store. Secondly, information processing about customer needs would improve the fitness of assortments in their markets. However, information processing about competitors would bring the price competition in their market. This competition makes store profitability worse. If profitability becomes worse, the rate of achievement of the planed business outcome goes down. Finally, it is more efficient to choice information assimilation in high uncertain environment. In other words, store business outcome would become high by doing the activities of sharing store information or coordination with buying department.

H1: Information processing about MD plan in stores effects positively on store business outcome.

H2: Information processing about customer needs in stores effects positively on store business outcome.

H3: Information processing about competitors in stores effects negatively on store business outcome.

H4: The activities of information sharing and coordination on stores effects positively on store business outcome.

However, processing information about MD plan and customer needs have different nations. It is comparatively easy to process the information about MD plan because this requires observing the gaps between MD plan and actual sales with quantitative data or criteria. On the other hand, to process the information about customer needs requires paying more attention to observe customers ' qualitative aspects. This means that processing the information about customer needs requires more advanced information processing, compared to MD plan. Moreover, information about customer needs contains more diversity, this would occur the over adaptations, for example bullwhip effects (e.g. Lee et al., 1994; 2004; Croson and Donohue, 2006). In this sense, it is crucial to process the information about customer needs based on processing information about MD plan. If retailer process only information about customer needs without MD plan, it is assumed to trigger over adaptation to the market, which makes business outcome of stores worse.

H5: There is an interactive effect of information processing about MD plan and customer needs on store business outcome.

5. Results

In order to verify these hypotheses, I conducted regression analysis on 2 steps. Firstly I establish the model that information assimilation and information processing about MD plan, customer needs, and competitors are related to business outcome (each store 's rate of achievement of the planed Operating Profit Margin) by regression step 1. In step 2, interaction between information processing about MD plan and customer needs is included in model. Each dependent variable are constructed with combining each scales into factor scores by principal factor method, while the dependent variable of information assimilation (activities of coordination) is obtained by principal component analysis. To control the regional characteristics and the characteristics of product categories, each region and category included in this regression model as control variables.

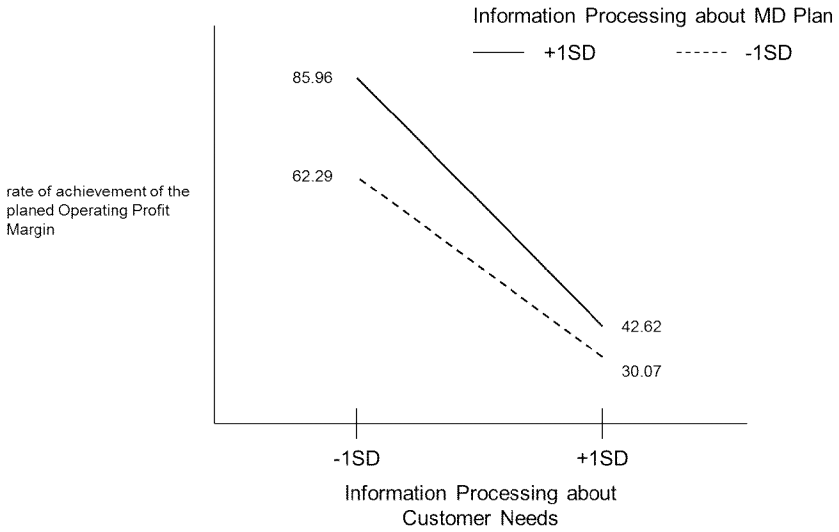
The results of step1 and step2 regression analysis are in table 4. To compute the effect of information processing about MD plan, customer needs and its interaction, these 2 variables are centered with each mean (Aiken and West, 1991; Cohen and Cohen, 1983). The change of R2 between step1 and step2 is significant ($p<.05$). Information processing about MD plan is significantly positive ( )$p<.05$ and customer needs is significantly negative ($p<.05$) and interaction effect between information processing about MD plan and customer needs is significant ($p<.05$). However, information assimilation, information processing about competitors are not significant. Interaction between information processing about MD plan and customer needs is drawn with ±1SD on each variable related to business outcome. The more each store processes information about MD plan, the worse its business outcome is to if they process more information about customer needs ($t=-2.707$. $p<.05$).

Table 4. The Result of Analysis of Regression Model

Dependent Variables	Step 1 Standard Error	β	t-value	p-value	VIF	Step 2 Standard Error	β	t-value	p-value	VIF
Information Assimilation	3.494	-.131	-.632	.540	1.909	2.945	-.285	-1.634	.133	2.136
Information Processing about MD Plan	4.600	.244	1.110	.291	2.140	4.177	.502**	2.521	.030	2.780
Informaiton Processing about Customer Needs	4.805	-.122	-.656	.525	1.526	7.487	-.793**	-2.748	.021	5.837
Information Processing about Competitors	4.712	.216	1.145	.277	1.587	4.006	.064	.401	.697	1.807
MD Plan * Customer Needs (Interaction)						3.222	-.716**	-2.707	.022	4.897
Control variable (region: middle of Hyogo)	10.887	.886***	3.760	.003	2.469	8.840	.986***	5.153	.000	2.565
Control variable (region: western Kobe)	20.492	-.267	-1.369	.198	1.691	16.543	-.336*	-2.132	.059	1.736
Control variable (region: Eastern Kobe)	10.463	.823***	3.631	.004	2.281	8.340	.838***	4.639	.001	2.283
Control variable (region: Eastern Yamaguchi and Hiroshima)	20.633	-.029	-.147	.886	1.714	16.999	.083	.512	.620	1.833
Control variable (region: Yamaguchi)	16.312	.419*	1.951	.077	2.050	13.124	.354*	2.047	.068	2.090
Control variable (Fisheries)	9.875	.065	.321	.754	1.844	8.082	.169	1.013	.335	1.946
Control variable (Livestock)	9.467	.360	1.650	.127	2.118	7.617	.427**	2.429	.036	2.161
Control variable (Part-time-work)	9.583	-.002	-.008	.994	2.315	8.225	.195	.997	.342	2.687
Adjusted R2					0.483					0.672
Adjusted R2 amount of change										0.189***

***sig.<.01, **sig.<.05, *sig.<.1

Figure1. Interaction Effect between Information Processing about MD plan and Customer Needs



6. Discussion

This study investigates what information each retail store should process, and the relationships between information coordination activities, information processing in retail stores, and business outcome with IT based merchandising system. Firstly, this study classified the store information processing in retail stores through 32 semi-structured interviews, which have not been discussed in prior studies because of the premise that each store conducts store operation with complying with buyer 's MD plan. Consequently, three components are classified as the information processing about "MD plan", "Customer needs", and "Competitors ".

Secondly, I examined the influence of coordination activity and information processing on business outcome based on the IT system that enables buyers to get real time store data (e.g. assortment and stock in each store). Coordinating with buyers has no

significant effect on business outcome. This would be occurred because each store (especially part-time-worker of each store) is too busy for store operations or has no authority to communicate with buyers. Or, although each store and its staffs coordinate with buyers, buyers would not reflect store information into MD plan. It will be necessary to investigate the effect of the actual authorities of each store to coordinate with buyers or the relationship between the coordination activities and perceived reflection of their information. Moreover, it would be considered that buyers could not reflect store information into MD plan because suppliers have relatively high power to the buyers in constructing MD plan such as assortment and sales promotions. So it will be necessary to construct the model including suppliers ' power to the buyers.

However, the effect of processing information about MD plan is significant. This information processing is to process about stock turnover, actual sales, price point and range, and MD gaps. If the information about MD plan was processed, each store department 's sales would be improved. For retailers, it is important to modify MD plan and to be close to their actual environment. Each store actually faces the sales environment and can process gaps between MD plan and actual sales. In this sense, this type of processing is essential and it is necessary to get store 's staffs comprehend both MD plan and actual environment state.

Information about competitors would bring to achieve high stock turnover and temporary high amount of sales. On the other hand, if information processing about competitors were addictive, this would bear down on the long-term rate of operating profit margin because of the price competition. So these 2 aspects of information processing about competitors would be included in this result.

As a result, information processing about customer needs is significantly negative related to the business outcome. This is because that information processing about customer needs would be relatively difficult and necessary severe load in everyday business operation because of its qualitative aspect of customer behavior. Moreover, information about customer needs would be difficult to share with buyers because of its context. In addition, this negative relationship is occurred because there would not be developed the postponement distribution system. If store 's information processing and coordinating activities be would conducted, it become to be exceed the distribution capacity and over adapted to the market. However, this information about customer needs would be important to understand high regional uniqueness which cannot be understood by only MD information processing. If retailers would face or enter some high unique markets, it would be necessary to process customer needs based on MD plan with keeping balance. In this point, because this study focus on the retailer based on the relatively standardized IT based merchandising, it will be necessary to re-investigate in and compare with the retailer which faces much higher regional uniqueness, constructing high developed postponement distribution system with IT based adaptation merchandising for the future.

Moreover, I found that there is an interactive effect of information processing about MD plan and customer needs on business outcome. The result of this study suggests that it is less important to process information about customer needs if MD plan information is much processed. If stores processed MD plan and does not customer needs, the business outcome would relatively become better. This is considered that buyers would set and modify the MD plan with appropriate real time sales data through IT system, so process information about customer needs occurs the over adaptation to the market. This suggests

it is important to process MD plan preferentially . Stores process less information about MD plan and less information about customer needs indicate worse performance. In such store, it is necessary to educate staffs to understand what they should do with IT system and its importance at a first. Managers of these stores should have strong leadership and high capability to process MD information and to direct their staffs because part-time-workers of these stores would have low motivation and capability of information processing. In this point, it will necessary to construct and investigate the model including this manager 's capability, leadership, and staffs motivation for the future research.

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