［論文］

Research for Distribution Business based on the Development of IT
: New Distribution Business

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1. Introduction

The outlook for today's distribution business remains challenging. Many distributors find themselves confronted by unpredictable customer spending and increasing competition. Distributors are leveraging IT and developing a new business in an effort to attain operational excellence and differentiation.

Some people say that this IT is a passing fashion, while others believe it is a turning point in business history. One thing is certain, however: nothing like the IT has ever existed in distribution business field before. No one can deny that IT is transforming the distribution business at surprising rate. In general, businesses that utilize IT have a unique "profit structure" than existing business (Heinze A, Griffiths M, Fenton A, Fletcher G, [2018]).

One of the keys to understanding the difference is to know about the profit structure of existing business. First, Section 2 and 3 will divide "existing business" into 2 categories, manufacturing and distribution, and examine the "profit structure"of each business. Next, Section 4 examines the change of trading companies. This one will verify that the change with the introduction of IT between a trading company (labor-intensive) to capital-intensive or knowledge-intensive business Finally, Section 5 will reconsider the impact of IT on the distribution business [1)].

2. Existing Business I: Features of Manufacturing Business

It's widely believed that existing business can be classified into 2 categories. In japan, the one is capital-intensive business, such as the chemical industry, semiconductor industry, railway,

telecommunications and energy industry. The capital-intensive business needs a comparatively big amount of fixed costs. The other is a "distribution business" consisting of wholesalers and trading companies, which is a "labor-intensive business" that costs a lot of variable costs [2)].

In economics, the most commonly spoken about fixed costs are those that have to do with capital. Capital can be the fixed price for buying a warehouse for production, machines (which can be paid once at the beginning and not depend on quantity or time of production), and it can be a certain total for the salaries of a certain quantity of unskilled labor. Many things are included in fixed costs depending on the product and market.

These fixed costs, also known as indirect costs or overhead costs, are business expenses that are not dependent on the level of goods or services produced by the business. They tend to be recurring, such as interest or rents being paid per month. This is in contrast to variable costs, which are volume-related (and are paid per quantity produced) and unknown at the beginning of the accounting year. These fixed costs are not permanently fixed; they will change over time, but are fixed, by contractual obligation, in relation to the quantity of production for the relevant period.

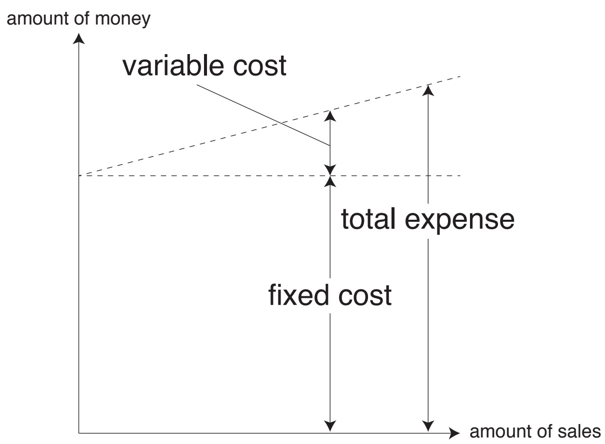
On the other hand, variable costs are a part of anything business related, some common examples include sales commissions, labor costs, and the costs of raw materials. Capital-intensive industries generally require a great amount of money for new entry, so barriers to entry are high, which makes it difficult for market forces to work and tends to lead to an oligopoly by several companies.

This capital-intensive business has high fixed costs, but comparatively low variable costs. At first, the capital-intensive business has many fixed costs. This shows that they will not difficult make a profit if the sales surpass fixed costs. The ratio of variable costs to sales is known as the variable ratio, and in a capital-intensive business, where the variable ratio is low, as soon as the sales surpass some amount, we are able to produce a huge profit. It's the sales amount which is the same as the cost. It is known as the "break-even point of sales".

In a capital-intensive business which needs a huge amount of fixed costs, it is difficult to achieve the break-even point. However, as soon as sales surpass that point, it will make a huge amount of profit for the variable costs are low. Fixed costs can be the reason a company doesn't enter the market (if the costs are too high). These costs and variable costs have to be taken into account when a company wants to determine if they can enter a market. (Figure1)

In recent years, fixed costs gradually exceed variable costs for many companies. There are 2 reasons. Firstly, automatic production increases the cost of investment equipment, including the depreciation and maintenance of old equipment. Secondly, labor costs are often considered as long-term costs. It is difficult to adjust human resources according to the actual work needs in short term.

Figure1 Features of Manufacturing Business



3. Existing Business II: Features of Distribution Business

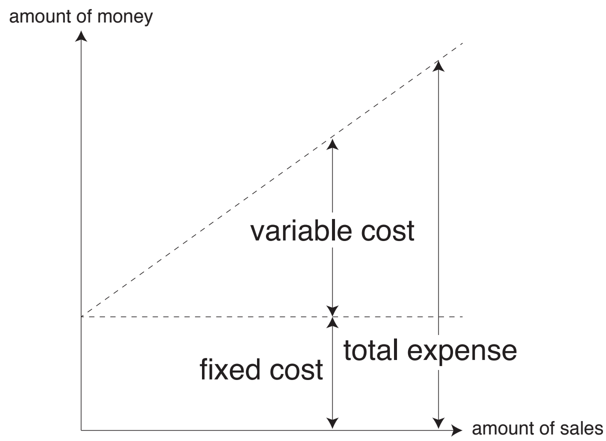
Distribution business have high variable costs, but lower fixed costs. The chemical industry, semiconductor industry, railway, telecommunications, energy industry companies, for instance, require an enormous amount of capital investment, but wholesales do not need such a vast amount of capital investment. Therefore, the distribution business such as trading companies is a “labor-intensive business”.

In a distribution business which has low fixed costs, it is not difficult to achieve the break-even point. It’s everybody knows, once sales exceed that point, it will produce a profit, the reason why the fixed costs are low. The features of distribution business are the followings, such as

1) the fixed costs are low
2) entering the market is easy
3) the competition is hard

On the contexts of a distribution business, where the variable costs are high, it’s very difficult to produce a huge profit even if the sales value goes above the break-even point the reason why the variable costs also increase. It is low risk, low return. (Figure2)

Figure2 Features of Distribution Business



It’s true that distribution business doesn’t make huge profits. Because they don’t need much capital investment, entering the market is not difficult, and competition is hard. That’s a feature of distribution business. Based on this feature, next, this paper will examine a change of distribution business. First, on the stand points of system approach, this paper will analysis business system of distribution into 2 existing business, and next part examine the profit structure of trading company.

In system approach, there seems to be a basic agreement as follows (Westerman, G. Bonnet, D., McAfee, A. [2014]). A distribution system is generally understood to be a method of identifying the complexity created by an interacting element and identifying their relationships (Westerman, G. Bonnet, D., McAfee, A. [2014]). Usually, distribution system models are to describe an understanding of relationships. Descriptions of distribution system comprise targeted ranges and established relationships. There are various methods of explicit descriptions. One of the most straightforward and popular description methods is to describe the distribution system model as a mathematical structure.

3.1. Distribution System model (Definition 1)

(Definition 1)

Distribution system model M consists of the following (Oheki [2005]).

1) Set of support M:
2) λ (i) -nomial set of M $\{R_i \mid i \in I\}$,
   Note that $\lambda : I \to N^+$;
3) μ (j) -nomial set of M $\{f_j \mid j \in J\}$,
   Note that μ : J → N.

Suppose M be

$$M = \{M ; \{R_i \mid i \in I\}, \{f_j \mid j \in J\}\} \quad (1)$$

Distribution systems are established by perspectives that determine relationships with the target. This is called distribution systematic perspectives. Usually there are several distribution systematic perspectives to define a given target. Thus it is possible that more than one system model exists. Observing multiple targets at the same viewpoint indicates the existence of the same type of distribution system model.

In general, distribution systems recognized as responding to the distribution system model are used. However the following three conditions must be satisfied to be recognized as a system.

Targets:

1) Are a collection of several elements
2) Display specific interactions between elements
3) Have an overall order or system

Of course, targets can be expressed as a formal distribution system model in the range where systematic perspectives approach the target, even beyond the field of marketing theory in such areas as operations research. For example, input-output distribution systems are expressed as

$$M_{I/O} = \{X \cup Y ; S, X, Y\} \quad (2)$$

Note that this is expressed as

$S \subset X \times Y$, where X and Y have a unary relationship

Distribution's system structure is primarily a relationship that generates the basic properties of distribution system models. Relationships of basic properties of a system are called an axiom. Formal distribution systems or theories are used to structure distribution systems with using mathematical linguistics. It is not necessary to develop formalized reasoning with or other means in distribution systems.

For example traditional uniqueial equations,used today for set theory, are convenient to describe specific distribution system structures. This does not mean using uniqueial equations is not fundamental.

Distribution system structures have a system modelling language consisting of relational symbols corresponding to the system model relationship R_i and function f_j , functors and the basic property set axiom.

3.2 Distribution System Model (Definition 2)

(Definition 2)

Structure of distribution system model $M = \{M ; \{R_i \mid i \in I\}, \{f_j \mid j \in J\}\}$ is a combination of (L ; Σ). Here, L can be expressed as

$$L = \{\{R_i \mid i \in I\}, \{f_j \mid j \in J\}\} \quad (3)$$

R_i and f_j in the model are the expressions of each R_i and f_j. Σ is a formulation set consisting of the language of first-order predicate logic and L, also referred to as the distribution model's axiomatic system.

For example, when the target is recognized as input/output system, this input/output system acquires the following

$$M_{I/O} = \{X \cup Y ; S, X, Y\}, \quad (4)$$

Its structures ($L_{I/O}$; $\Sigma_{I/O}$) would be

$$L_{I/O} = \{S, X, Y\} \quad (5)$$

$$\Sigma_{I/O} = \{\varphi\} \quad (6)$$

Note that

$$\varphi = (\forall \times y)(S(x, y) \to X(x) \wedge Y(y)) \quad (7)$$

Of course, the expressions are at a time of distribution system recognition. From above, when distribution system

structures are given, it is recognized as structural variation be language L, or the change of an axiomatic system Σ.
When variable structure is set with parameter as
$(L_s ; \Sigma_s) \rightarrow (L_t ; \Sigma_t) \rightarrow \cdot \cdot \cdot \cdot \cdot \cdot$

Mechanism of parameter change would be an issue. When parameter is set from outside, variable structure would produce controlling issue. In distribution system, positioned standpoint to be a parameter with solving controlling issue to set outside would be possible.

Mechanism of viewpoints acquired from distribution system recognition where in direct marketing is that view points are not individually optimized but they are coexistent simultaneously, therefore they maintain stability interactively. In other words, it is necessary to understand entire distribution system that subsumes individual mechanism interactively together. It will not be able to clarify even if not understand individual mechanism role that are nothing but parts.

When distribution system is considered as various collection of elements as a system, the distribution system works to reach optimizing entirely rather than individual optimization because wide-ranging and diverse distribution systems immanent.

4. The logic of new distribution business

On the standpoint of business system, the most important point is that distribution business is a system of analytical systematic method. It is purpose is to solve problems (usually complex and complicated tasks) given to a decision maker. The current distribution system is used by researchers to define system range as a concept. This is recognized to be a very convenient concept.

Based on this consideration, next we will consider distribution business. In general, Distribution (Labor-intensive business) must pay rent and utility bills irrespective of sales.

Distribution business generally didn't make a great profit the reason they have many variable costs. However, recently, it is mentioned that trading companies as an example of a type of distribution business have been making huge profits. So, trading companies are classed as a distribution business.

Japan has a special class of "general trading companies" (sogo shosha). The original business of a trading company is the agent, which has large and highly diversified businesses that trade in a wide range of goods and services. These trading companies are businesses working with different kinds of products which are sold for customer, business, or government purposes. Trading companies buy a specialized range of products, maintain a stock or a shop, and deliver products to customers. Different kinds of practical conditions make for many kinds of business.

Importers or wholesalers maintain a stock and deliver products to shops or large end customers. They work in a large geographical area, while their customers, the shops, work in smaller areas and often in just a small neighborhood. Distribution business so far must be labor-intensive business [3).

Lately, trading companies are unique than that of existing trading companies. According to Jones, Geoffrey [2004], trading companies are exceptions among the distribution business at present. Many trading companies have been shifting existing business from distribution to global investment (Jones, Geoffrey [2004]). For example, the energy divisions of some trading companies have lately product a huge profit. Recently, the energy divisions of some trading companies are rather similar to a capital-intensive business. There are typically 3 main reasons for a trading companies to make capital investments:

1) To acquire additional capital assets for expansion, enabling the business to, for example, increase unit production, create new products, or add value.
2) To take advantage of new technology or advancements in equipment or machinery to increase efficiency and reduce costs.
3) To replace existing assets that have reached end-of-life (a high-mileage delivery vehicle or an aging laptop computer, for example).

With the recent energy price hikes, the energy divisions in trading companies have made much greater sales, exceeding the break-even point. Trading company's capital investment is considered to be a very important measure of the health of the economy. When trading companies are making capital investments it means they are confident in the future and intend to grow their businesses by improving existing productive capacity (on the other hand, recessions are normally associated with reductions in capital investment by businesses).

When trading companies generally reaches a break-even point, their total sales equal their total expenses. This means that trading companies are bringing in the same amount of money they need to cover all of the expenses and run the business. When trading companies break-even, their business does not profit. But it also does not have a loss. Typically, the first time, trading companies reach a break-even point means a positive turn for the business. When trading companies break-even, they're finally making enough to cover their operating costs. Finding their break-even point can help their determine if they need to do one or both of the following:

1) Increase the prices
2) Cut expenses

According to Miles, Ian [2018], the reason why a trading company produces a profit is that its profit structure matches the business (labor-intensive business, capital-intensive business, knowledge intensive business) in which the trading company has invested. It is depending on the type of intensive business [4].

When a trading company invests in a capital-intensive business, its profit mechanism will be similar to that of the capital-intensive one. Similarly, an investment in an IT business will make similar returns to those acquired by the profit structure of the IT business. Consequently, trading companies are able to produce huge profits. The current trading company have a profit structure that changes depending on the investee, as well as the investee.

It would follow that new distribution businesses don't require a great deal of monetary investment to maintain. Examples of some businesses as like distribution's features include tax accountant firm, consulting firm, software development firm, finance firm, or any type of virtual business. These firms don't have large amounts of facilities or equipment to invest in or maintain. Businesses that require a large financial investment to start and run are capital intensive, whereas companies that don't need much money to start or maintain are not capital intensive.

For general trading company as a distribution business, breaking into a capital-intensive business can be difficult as it requires a great deal of up-front capital. There's no economy of scale here. Even with a great idea and a strong business plan, financing a capital-intensive business can be challenging, depending on the type of business. Usually, "Knowledge intensive firm" means "a business that is difficult to scale up". There are 2 reasons [5].

1) Even if it is made large, the merit of scale is not so good.
2) If we try to expand the business, many management costs and extra fixed costs will be incurred.

In other words, even if we want to make our business bigger, it'll still need many management costs or increased fixed costs. If we start an IT business on a small scale and expand it later, it's not a real.

The difference from a "company" is that rather than having employees come together to form a single company, firm is an independent, individually qualified professional, such as a Japanese law firm or accounting firm. It has the nature of a group of.

Attorneys with independent abilities are often used by companies that have their own customers and are organized as a group. Represents a company in which each individual has special qualifications and abilities and works independently.

On the other hand, a trading company as a new distribution business that "starts on a small scale and can grow later" can be said to be a new business system today (Heinze A, Griffiths M, Fenton A, Fletcher G., [2018]).

5. Conclusions and Agenda

A lot of distributors find themselves confronted by unpredictable customer needs and Intensifying competition. The prospect for distribution business for the future remains challenging problems.

In this paper, we studied the trading company which has drawn the attention from distribution researchers across the globe and examined effectiveness of the distribution business. The change to a trading company that utilizes IT can be said to be a new business system. More specifically, we conducted an analysis of distribution that is developing rapidly for new trends such as IT (Heinze A, Griffiths M, Fenton A, Fletcher G., [2018]).

The original business of a trading company is the "agent (Labor-intensive business)" which is to buy the products of other manufacturers and distribute them to somebody else. But today trading company mainly refers to global investment company (Knowledge intensive business). In addition, the trading company highly specialized in one goods category and has a strong logistic organization (Capital intensive business). After all Changes in practical conditions such as faster distribution, IT and modern marketing have led to changes in their business systems.

The traditional distribution business theories are amplified, new research need to be systematized by leveraging IT. New distribution business is the adoption of IT to transform businesses, through replacing non-digital or manual processes with IT processes or replacing older IT with newer IT. IT may enable – in addition to efficiency via automation – new types of business system's innovation and creativity, rather than simply enhancing and supporting traditional methods .

In the past, trading companies in the distribution industry were labor-intensive, but with the introduction of IT, the part that relies on human resources has decreased. And now it has changed to a capital-intensive type or a knowledge-intensive type.

Except of the 'going paperless' and 'developing of individual businesses', one aspect of IT is the use of cloud computing (O'Donnell, Jim [2017]). This reduces reliance on user-owned "hardware" and increases reliance on subscription-based "cloud services". They are shift from "ownership" to "sharing" in business.

If there is a theoretical flaw in existing theory, systematic study of the theory is not necessarily clarified. For distribution business researchers across the globe, understanding phenomena of the IT has become an urgent research agenda.

Note

1) The definition of "IT" is an abbreviation for "information and communication technology" and naturally includes the latest AI (artificial intelligence).

2) A labor-intensive business, in other words capital intensive industry requires large amounts of manual labor to produce its goods or services. In such industries, labor costs are more of a concern than capital costs. Labor intensity is measured by its proportion to the amount of capital to produce goods or services. The higher the labor cost, the more labor intense is the business. Labor cost can vary because businesses can add or subtract workers based on business needs. When it comes to controlling expenses, labor intensive businesses have an advantage over those that are capital intensive and require a large investment in capital equipment, such as the automobile industry. When it comes to include economy of scale, labor intensive industries deal with many challenges: they cannot pay individual workers less by hiring more workers.

3) In case of high level of inflation in the economy, the labor-intensive industry can suffer to some extent. In times of high inflation, laborers are more likely to reveal their unwillingness to work at the same level of wage, because inflation lowers the value of their earnings. Before the industrial revolution, the major part of the workforce was employed in agriculture. Producing food was very labor-intensive. Advances in technology and worker productivity have moved some industries away from labor-intensive status, but many remain, such as mining and agriculture.

4) Capital intensive business, in other words capital intensive industry was a mid- to late- 19th century development in industry that required great investments of money for machinery and infrastructure to make a

profit. Capital-intensive industries generally require a large amount of money for new entry, so barriers to entry are high, which makes it difficult for market forces to work and tends to lead to an oligopoly by several companies.

5) Industrial progress was expensive and business people faced real problems. The start up costs of new enterprises skyrocketed. The early textile mills had required relatively small amounts of capital in comparison to the new ironworks and steelworks. Capital intensive industry replaced labor-intensive production, which relied on the hiring of more workers. The distribution and consumption of goods failed to keep pace with industrial growth. Increased productivity in both agriculture and industry led to rapidly declining prices.

References

A, Griffiths M, Fenton A, Fletcher G [2018]. *Knowledge exchange partnership leads to digital transformation*. Global Business and Organizational Excellence, 37: 6 – 13.

Chen, Jing [2016]. *The Unity of Science and Economics: A New Foundation of Economic Theory,* Springer.

Farris, Paul W.; Neil T. Bendle; Phillip E. Pfeifer; David J. Reibstein [2010]. *Marketing Metrics: The Definitive Guide to Measuring Marketing Performance.* Upper Saddle River, New Jersey: Pearson Education.

Heinze Bounfour, A [2016]. Digital Futures, Digital Transformation, Progress in IS. Springer International Publishing, Cham.

Jones, Geoffrey [2004]. *Multinationals and Global Capitalism: From the Nineteenth to the Twenty-first Century*.

Khan, Shahyan. [2017]. *Leadership in the Digital Age – a study on the effects of digitalization on top management leadership.* Stockholm Business School.

Miles, Ian [2018]. *Knowledge intensive business services: ambiguities and continuities.* Foresight. Emerald. 20: 1–26

Nählinder,Johanna [2005]. *Innovation and Employment in Services. The case of knowledge intensive business services in Sweden.* Diva. Linköping Sweden: Linköping University.

O'Donnell, Jim [2017]. *IDC says get on board with the DX economy or be left behind.* techtarget.com.

Oheki, J [2005]. *Competitionand Cooperation,* Gakubunsha.

Westerman, G. Bonnet, D., McAfee, A [2014]. *Leading Digital: Turning technology into business transformation*. Harvard Business Press.