

Clarification of characteristics required for cost information: Building a framework of “Cost information quality”

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Abstract

This study clarifies and deciphers characteristics required for cost information. It is not sufficiently clear why characteristics other than accuracy are required, despite their importance being suggested. It is because previous studies have focused mainly on accuracy, and empirical evidence on other characteristics is limited. To explore the requirements of cost information in the usage phase, this study building a framework of “Cost information quality” using the concept of information quality from information systems theory. Concretely, based on Wang and Strong (1996), cost information quality is assumed to composed of four quality dimensions: intrinsic, accessibility, representation, and context. A field study presented in this paper confirms that multiple characteristics are required in the case organizations. Moreover, required characteristics depend on the purpose of use and organizational contexts. As the main contribution, this paper demonstrates the existence of a variety of characteristics required for cost information. This study confirms that the accuracy is intentionally reduced to ensure usefulness of information due to a trade-off with other characteristics. Therefore, the study highlights the importance to provide high quality cost information with various characteristics including but not limited to accuracy.

Keywords

Cost information, Cost accounting, Information quality, Accounting information, Field study

(1) INTRODUCTION

The purpose of this study is to clarify and decipher the characteristics required for cost information. Companies use cost information for various purposes, and previous studies discussed its usefulness. Recent studies have focused on overhead cost allocation and accuracy (Arai et al., 2010; Brierley, 2008). Accuracy of cost information is the realistic reflection of management and production costs. Accurate

cost information can be provided only by sophisticated costing that appropriately maps daily activities and causal flows (Horngren et al., 2015; Kataoka 2011). Since traditional costing is criticized for being less accurate and encouraging erroneous decision making, previous studies elucidated factors improving accuracy and impacts of accurate costing (Kataoka, 2011). Activity-Based Costing (ABC) intended to improve accuracy through a greater number

of activity cost centers (Drury, 2015, p.311), became one of the main topics in management accounting research in the 1990s. However, ABC is not widely used in practice, and the results of studies on the effects of ABC are not consist (Gosselin, 2006).

However, some studies demonstrated the importance of characteristics other than accuracy. Brierley (2008) found that characteristics such as understandability and completeness are required, suggesting a problem in previous studies focused on accuracy. Pizzini (2006) found that the level of detail and frequency of reporting affected the usefulness of cost information. Other studies suggested the importance of rapidity and relevance.

Previous studies have some limitations. First, we have little known how and why characteristics other than accuracy are required. As previous research has been focused on accuracy, empirical evidence on other characteristics is limited. Second, in studies that focused on characteristics other than accuracy, such as Brierley (2008), there is no clear understanding of the characteristics required for cost information because the relationship between characteristics of the cost information is unclear. Some characteristics, including completeness and detail or relevance and decision usefulness, may have inclusive or causal relationships. However, since studies based on various theories and used several dependent variables, it is difficult to organize the relationships between the characteristics discussed in previous studies. Additionally, previous studies focused on specific characteristics independently, but it is necessary to clarify the relationship between these characteristics, as there may be cases where characteristics are required simultaneously. Therefore, we should clarify

empirically the characteristics required for cost information and why those characteristics are required, based on a framework including multiple information characteristics.

This study achieves this research question through two steps. First, this study builds a research framework based on information quality (Section 2), which measures conformity of information with requirements. Previous studies clarify the characteristics required of management information. This framework allows to organize and investigate a variety of characteristics. Second, this study conducts a field study (Section 4) and empirically confirms the characteristics required for cost information and their determinants (Section 5).

(2) BUILDING A FRAMEWORK

1. Information quality

According to Lee et al. (2002), Sekiguchi (2013), and Yakuwa (2010), information quality is defined as "fitness for use" and means the degree to which management information provided is consistent with requirements. The technical model, which had received a lot of attention in information systems theory, could not show what useful management information is, and researchers realized the importance of other aspects of information accuracy and technics of management systems.

This study is based on Wang and Strong's (1996) information quality model¹. This model measured and evaluated information quality by presenting the characteristics required for management information in a comprehensive and systematic manner. Concretely, it showed that information quality has four quality dimensions, and they can be measured and evaluated by the consistency of the

¹ Although Wang and Strong (1996) describe it as "data quality," we discuss it as "information quality" in this study. According to Sekiguchi (2013, pp.28-39), information is the addition of knowledge and meaning to data. Therefore, in Wang and

Strong (1996), information corresponds to data, because it includes characteristics related to knowledge and meaning, such as ease of understanding. They later use the terminology of information quality (Lee et al., 2002); therefore, there is no problem.

information used with the requirements for lower characteristics that make up each quality dimension. For example, if the management information meets the requirements for conciseness and understandability, which are sub-characteristics of "representational quality dimension," it can be evaluated as "representational quality is high." These four quality dimensions will be discussed later in subsection 3.

2. Modeling cost information

Wang and Strong's (1996) model contributes to the study of cost information for two reasons. First, it is based on a large-scale survey and careful statistical analysis; therefore, its structural concepts are comprehensive. Hence, using this model provides a broad view of research on cost information. This enables us to discover characteristics that have not received much attention in cost information research.

Second, the systematic nature of the model overcomes the unclear relationships between characteristics presented in previous studies, as they did not have a unified framework and developed in various ways. This model organizes characteristics required of information in four dimensions, making it possible to organize the findings of previous studies.

3. Cost information quality and its component dimensions and sub-characteristics

In this study, the concept of information quality is used to measure the conformity to requirements of cost information in the usage phase, which is called "cost information quality." High quality cost information meets user requirements.

Furthermore, this study relies on Wang and Strong's (1996) information quality model to elucidate the characteristics that constitute cost information quality. Cost

information quality is assumed to consist of nine sub-characteristics in four dimensions: intrinsic, accessibility, representational, and contextual quality dimension² (Table 1). To fit this model to cost information research, each quality dimension and the implications of each sub-characteristic are discussed, based on previous research on cost information.

Table 1: Cost information quality, component dimensions, and sub-characteristics

Sub-characteristics	Examples of Prior Research
Intrinsic quality dimension	
accuracy	ABC studies and many others.
objectivity	Myers et al. (2017)
Accessibility quality dimension	
ease of access	—
ease of operation	—
Representational quality dimension	
understandability	Brierley (2008)
conciseness	Cardinaels (2008)
Contextual quality dimension	
relevance	Mia and Chenhall (1994)
completeness	Pizzini (2006)
timeliness	Chenhall and Morris (1986)

3.1 Intrinsic quality dimension

The intrinsic quality dimension, i.e., the numerical dimension of information, is assumed to be composed of two sub-characteristics: accuracy and objectivity.

The accuracy of cost information means the values of cost information realistically reflect the actual situation of management and production. Some argue that inaccurate cost information, based on the allocation calculation that deviates from the actual management situation, leads to erroneous decision making (Dater and Gupta, 1994), and its importance has been elucidated mainly in ABC studies.

² Among the sub-characteristics included in Wang and Strong (1996), reliability, reputation, value-added, interpretability, consistency, and safety are excluded, as they

are judged to be of little relevance in cost information or are encompassed by other sub-characteristics.

The objectivity of cost information means that cost data are not biased and arbitrary. Arbitrary allocations and subjective estimates reduce the reliability of cost information. Myers et al. (2017) found that informal cost information without the approval and monitoring of the IT department is not used often, even if the results of the calculations are the same due to low objectivity and verifiability.

3.2 Accessibility quality dimension

Accessibility quality dimension, i.e., the dimension related to the convenience of using the information, consists of ease of access and ease of operation. Ease of access of cost information means users can retrieve information without hassle. For example, the usefulness of the cost information to make managerial decisions is low if managers must go through complicated procedures to obtain information. Managers are not willing to use the cost information if such complicated procedures are present.

Ease of operation of cost information means ease of process such as aggregation, extraction, and transfer of cost information. For example, when making decisions, managers need to divide costs into relevant and sunk costs, or to classify costs. Therefore, when cost information is difficult to aggregate, the operability of the cost information is poor, and its usefulness is remarkably low.

3.3 Representational quality dimension

Representational quality dimension, i.e., the dimension relating to the format of information, consists of understandability and conciseness.

Understandability of cost information means the presentation style is such that users can easily comprehend the meaning and background from cost information. Brierley (2008) demonstrated the importance of understandability, and some studies showed that its usefulness is enhanced by setting up cost drivers and cost pools that are understandable for manufacturing managers who may not be so familiar with accounting (Hiromoto, 1988;

Merchant and Shields, 1993).

The conciseness of cost information means the format of cost information is straightforwardly organized. Cardinaels (2008) showed that providing concise graphical cost information based on users' accounting knowledge improved decision making. Moreover, accounting information overload reduces the quality of decision making (Chewning and Harrell, 1990).

3.4 Contextual quality dimension

The contextual quality dimension, i.e., the dimension of fit with the user's task, consists of relevance, completeness, and timeliness.

The relevance of cost information means a suitable and sufficient range of information is provided for users. The importance of reporting an appropriate range of cost information for users has been demonstrated by previous studies. Different ranges of cost information are not useful, because ranges in cost information have appropriate accounting units and periods for each user. The scope of accounting information determines the usefulness of the information (Mia and Chenhall, 1994).

The completeness of the cost information means the required data, without omission, are present in the cost information. Even if the relevance is adequate, if the comprehensiveness and detail of the information is not, usefulness is low. For example, Pizzini (2006) shows that detailed cost information enhances managers' decision making, and Brilery (2008) found that many management accountants consider it important to calculate all cost items of product costs comprehensively.

The timeliness of cost information means cost information is available when appropriate for users. The importance of timeliness of accounting information has been noted by previous studies (Gullberg, 2016) and is defined by appropriate reporting frequency and speed for users (Chenhall and Morris, 1986). The importance of timeliness has been empirically elucidated (Pizzini, 2006), and

the provision of cost information with appropriate frequency and speed for the user's task is required.

4. Provisions by decision-making environment and purpose of use

To elucidate why various characteristics of cost information are required, this study employs the decision-making environment and purpose of use as determinants of the cost information quality from previous studies.

4.1 Cost information quality and decision-making environment

Previous studies on cost information and information quality suggest a close relationship between the decision-making environment and cost information quality. The uncertainty and complexity of the decision-making environment lead to accuracy requirements and elaboration of allocations (Abernethy et al., 2000; Al-Omiri and Drury, 2007; Watanabe, 2000.). For information quality, studies showed that the quality of management information differs depending on the organization's situation, such as the decision-making environment (Sekiguchi, 2013; Petter et al., 2013).

Therefore, this study assumes that the requirements for and actual levels of the quality dimensions, which constitute cost information quality, differ depending on the uncertainty and complexity of the decision-making environment.

Uncertainty in the decision-making environment is defined as "the variability of factors that must be taken into account in decision making and the uncertainty of information about those factors" (Tani et al. 1993, p.76). Previous studies have focused on the degree of market competition, the frequency of new product development, and the difficulty of predicting the market environment. In such an environment, the importance of cost information increases due to difficulty in forecasting demand, high opacity of production plans and cost estimates, and large cost fluctuations.

Complexity in the decision-making environment is defined as "the number and

heterogeneity of factors that must be considered in decision making" (Tani et al. 1993, p.76). Previous studies focused on the diversity of products and services handled and of manufacturing technologies and processes. In such an environment, cost items and objects of costing become diverse as the management objects, such as processes, divisions, products, and services, become complex. Therefore, detailed and diverse cost information is essential.

4.2 Cost information quality and purpose of use

There is a close relationship between quality of cost information and purpose of use, leading to the maxim, "different costs for different purposes." Previous studies on costing showed that accuracy requirements and allocation elaborations vary depending on the purpose (Schoute, 2009). Research on information quality indicated that not all information characteristics are equally required in all situations (Sekiguchi, 2013). The importance of each information characteristic varies depending on the purpose of use.

Therefore, this study assumes that the requirements for the quality dimensions, which constitute cost information quality, differ depending on the purpose of use.

Following Drury (2015) and Horngren et al. (2015), this study divides the purposes of use into management decision-making purposes and planning and control (P&C) purposes. The management decision-making purpose includes decisions on pricing and product mix and decision on self-manufacturing or subcontracting. The P&C purpose includes cost management, cost improvement, review of production plan, and performance evaluation.

5. Research framework and research question

As the purpose of this study is to clarify the characteristics required of cost information and the reasons, the concept of information quality is used to explore conformity with requirements of cost information in the usage phase, defined as

"cost information quality." Based on Wang and Strong (1996), cost information quality is assumed to constitute of four quality dimensions: intrinsic, accessibility, representation, and context. The decision-making environment and the purpose of use (management decision-making purpose and P&C purpose) affect the requirements for cost information quality and levels of the requirements.

However, these discussions are just assumptions. It is unclear how each characteristic is affected by the decision-making environment and the purpose of use. Therefore, this study empirically explores the research framework and addresses the following research questions (RQ).

RQ: How are the four quality dimensions constituting cost information quality affected by the decision-making environment and the purpose of use?

(3) RESEARCH DESIGN

We conducted a field study with semi-structured interviews. A field study is useful for elucidating RQs such as "why and how" (Yin, 2002) and allows this study to explore complex relationships for multiple variables.

The research sites are large companies in the materials industry in Japan to investigate the use of cost information for each purpose of use, including price determination. The use of cost information in price determination is limited to finished product manufacturers, as they have strong pricing power in the market. Therefore, we focus on the materials industry, where price determination is based on price negotiations between companies.

Three companies that agreed to be interviewed were selected as the research sites. We randomly sent out research request letters to firms matched the above conditions. In order to avoid increasing excessively in the number of companies agreeing to be interviewed in a short period, we divide the candidate companies into groups of about 10 companies and send them out at an interval of about two weeks until the number of

companies agreeing to be interviewed reaches three or four. We sent letters to 30 companies (7 companies responded, and 3 companies cooperated).

The interviewees were managers in the accounting department, as they are familiar with cost accounting and the preparation and reporting of information, and they have contact with many users of cost information and know the purposes and requirements of the information. When possible, plant managers, who are users of cost information, were interviewed to confirm no discrepancies between perceptions of users and providers of the information. We also visited a factory of Company A and observed the meeting. Moreover, we observed internal reporting documents on costs at all firms.

Table 2: Field study Overview

Company	Type of industry	Interviewees	Date
A	Plastic product manufacturing	General Manager, Accounting Department	2016/11/8 2017/5/19
		Plant manager	2018/8/23
B	Steel industry	General Manager, Accounting Department	2016/11/21 2017/8/18
C	Non-ferrous metal manufacturing industry	Manager, Accounting Department	2016/11/25 2017/6/26

Table 2 shows an overview of the field studies. All interviews were conducted in a conference room in the headquarters building, and each interview lasted 60 to 90 minutes. To enhance the objectivity of research, more than one researcher other than the author participated in the interviews. In addition, all contents of this paper were confirmed by interviewees to ensure that there were no factual errors, and all interviews were recorded with permission and later transcribed in writing.

(4) FIELD STUDIES

The results of the field studies showed that the requirements for each quality dimension vary according to the purpose of use (Table 3), and that several quality dimensions are eliminated depending on the

decision-making environment, making it difficult to respond to the requirements.

In this section, we will refer to each quality dimension as "high quality" when the characteristics of the information provided meet the requirements from the users, and "low quality" when they do not. For example, with respect to the intrinsic quality dimension, "intrinsic quality is high" is used when the cost information provided meets the requirements for accuracy and objectivity, which are sub-characteristics of intrinsic quality dimension.

1. The decision-making environment and the purpose of use

1.1 Company A: High Uncertainty and High Complexity

Company A's decision-making environment is considered to be highly uncertain. As the company belongs to the chemical industry, it is under intense competition for new technologies and markets, and new products are developed frequently. It is difficult to predict demand, and most materials are imported. Thus, the environment is subject to drastic changes in raw material costs.

The complexity of the decision-making environment is considered to be high. The number of products per plant exceeds 20,000, and manufacturing technologies are diverse. Furthermore, the manufacturing process is global, and the products are manufactured through complex processes, such as transporting partially finished products to overseas factories for completion.

The Business Strategy Office, a cross-divisional departmental unit, oversees management decision-making, and cost information is used for determining the price of new products and the product mix, and deciding on make or buy. For P&C purpose, the information is reported monthly to executives and plant managers for review to evaluate management and production plans.

1.2 Company B: Low Uncertainty and Low Complexity

Company B's decision-making environment is considered to be low

uncertainty. Since the steel industry is an oligopoly, competition in the market is not high, and demand is predictable.

The complexity of the decision-making environment is considered to be low. The average number of individual products handled by each division is about 10. Product manufacturing is completed in one plant.

As for the purpose of use, each operating division oversees management decision-making and uses the information for price determination, profitability confirmation, and product mix decisions. The purpose of P&C is the same as in Company A and is reported to officers and to each division and plant.

1.3 Company C: High Uncertainty and Low Complexity

The decision-making environment for Company C is considered to be highly uncertain. The non-ferrous metals market has many substitute products and many innovations in production and processing technology, making it difficult to predict demand. Furthermore, the industry depends on imports of raw materials, which are heavily influenced by energy prices and exchange rates, resulting in large price fluctuations.

The complexity of the decision-making environment is considered to be low. The diversity of products produced in one factory is low, because each division has its own factory. The manufacturing process does not cross over multiple plants.

The purpose of use is the same as for Companies A and B. Company C has operating divisions systematized by product, and each division oversees management decision making. The purpose of P&C is reported monthly to executives, operating divisions, and plants managers.

2. Intrinsic quality dimension (accuracy and objectivity)

The intrinsic quality dimension is required for both purposes as the following interviewee said. For the P&C purpose, managers analyze the cost fluctuation

performance accurately. Therefore, understanding the results of the previous month as accurately as possible is necessary. Moreover, accuracy and objectivity are required because cost information is related to performance evaluation. For managers, accurate and objective cost information is required to make decisions accurately.

“There is no doubt that cost information is required to be as accurate as possible. If it's not, sometimes decisions are made incorrectly. (...). It has also impact on internal performance evaluations and personnel evaluations.” (Company A, Accounting Manager)

However, the intrinsic quality decreases for various reasons at each company, each of which is described below.

2.1 Company A: Dilemma due to the decision-making environment

In Company A, intrinsic quality of the cost information varies according to purpose of use. For P&C purposes in the factories, they provided cost information with high intrinsic quality to meet the requirements from the users. Due to environment complexity, where products are diverse, indirect cost allocation is complex. Therefore, by discussing and reviewing the cost drivers with managers every year, cost information is accurate and objective, in line with the production reality.

However, also for P&C purposes, the intrinsic quality of the cost information is low for reports to executives, due to the complex decision-making environment of Company A. The production process of one product spans the globe, and transfer pricing is involved in the cost information between processes. Therefore, it is difficult to monitor the breakdown of product costs throughout the manufacturing process. The accounting department simply simulates the cost structure. Although such a decrease in accuracy is a practical problem, the pursuit of accuracy makes it difficult to achieve timeliness (context quality dimension).

For management decision-making purposes, Company A uses cost information with low intrinsic quality, due to the uncertain decision-making environment. As the following interviewee said, because it is difficult to predict demand and there is a large variation in inventory and capacity utilization, the actual cost of products ranges widely. As the actual cost includes much noise, the operability (utilization quality dimension) is poor for users, and they may make wrong decisions. For example, if the sales department is provided temporarily low cost information because of inventory, they may reduce prices more than necessary. In response, for management decision making, Company A uses “budgetary cost,” which estimates the cost with lower intrinsic quality. The budgetary cost is formulated together with the budget annually. This is based on the actual cost in the medium term and is calculated by breaking down the total production volume for each product by comparing it with the sales plan and the production plan without noise. Once several years, the estimates made at the time of formulation deviate from the actual situation, making it impossible to use budgeted costs.

“The cost information includes the noise of the time, for example, the data at the time of a dramatic drop in operating rates, so if we use the information as it is, we might end up making a wrong decision. Then what is easier to handle is the 'budgetary cost', so we use it (for the purpose of management decision-making in the Business Strategy Office).” (Company A, Accounting Manager)

Table 3. Purpose of use and quality dimensions for each company

Quality dimension		Intrinsic	Accessibility	Representational	Contextual
P&C	Company A	High / Low	—	High	High
	Company B	High	—	High	High
	Company C	High	—	High	High
Managerial decision-making	Company A	Low	High	—	High
	Company B	High	High	—	High
	Company C	Low	High	—	High

“—” indicates no request

2.2 Company B: High quality on both purposes

In Company B, cost information with high intrinsic quality is provided for both purposes. For P&C purposes, sales expenses are allocated based on time spent on sales activities for each product, providing highly accurate cost information that is close to reality.

Intrinsic quality is high for management decision-making purposes. In deciding the price, Company B is asked frequently by buyers to lower the price. Therefore, to the company calculates the contribution profit of the product based on the cost information with high intrinsic quality and decides the appropriate selling price, because the price cannot be changes once established.

2.3 Company C: Low quality on management decision-making purposes

In Company C, for P&C purposes, information with high intrinsic quality is used. Highly accurate actual cost information shows each major machine and process in the factory, which is useful for reviewing the production plan and analyzing results. Furthermore, the reports of the heads of business units and executives are similar to those of Company A and B.

However, for the purpose of management decision making, they use cost information with low intrinsic quality based on the system called "individual product cost system." In this system, the breakdown of individual product costs is estimated annually through a discussion among the production control department, operating divisions, and the information system

department, using material and actual costs per process information provided by the accounting department. Since the accuracy and objectivity are low, they are encouraged to check any changes in the situation with respect to material and mold costs when using this information. Additionally, when plants invest in equipment or changes in processing procedures, the structure of cost generation changes significantly, and these costs may deviate from costs at the time of development.

Intrinsic quality decreases for management decision-making purposes, due to the uncertain decision-making environment and the balance with the accessibility quality dimension. For example, if a salesperson wants to check the profitability of a specific product when making a price decision, it is difficult to manipulate the actual cost with high intrinsic quality because of large fluctuations from time to time in the uncertain environment. Moreover, actual cost information with high intrinsic quality is aggregated for each product group. Therefore, it is difficult to extract the cost data related to a specific product, and the ease of operation and accessibility is low.

“In our company, the actual costs for financial accounting (, which is highly accurate,) are aggregated for several product groups. When we talk about the profitability of more detailed individual products, though fabrication processes and materials are different, they are grouped and buried in the cost information, so they are not useful for making decisions on individual products. It is not possible to extract the breakdown data. (...). When we

want to improve the accuracy of each product cost, it is not easy for us to calculate the cost data of all products every month. And for the sales department or operating divisions, it is inconvenient to use highly accurate cost information, which changes every month, because they do not know which cost data to use to make a decision, and their decisions may change. So, we use cost information based on estimates.
 “ (Company C, Accounting Manager.)

3. Accessibility quality dimension (ease of access and ease of operation)

Accessibility quality dimension is required for management decision-making purposes in all companies. As the following interviewee said, this purpose requires cost information that is easy to obtain and operate because other departments use it on an ad hoc basis.

“When a decision must be made on problems, there is no time to look for past cost information, so they need the (cost) information that can be handled immediately when needed. Salespeople and people in the division are busy, so they do not take time and effort to search information. They feel reluctant to check it.” (Company B, Accounting Manager)

Therefore, all companies use information with high accessibility quality for management decision-making purposes. For instance, Company A uses the above-mentioned "budgetary cost." By giving it at the beginning of the year, users have the cost information whenever they need it. In addition, since noise in the cost is eliminated in budgetary cost information, it is easy to extract the appropriate values and is easy to operate. Company C uses the cost information based on the "Individual Costing System," which is easy to operate and obtain. The user can get the cost information of individual products together with the breakdown of material, processing, and transportation costs. This allows sales staff to calculate cost and contribution profit of individual products at any time. It is

useful in price negotiations to decrease price by reducing the number of times rollers are applied.

4. Representational quality dimension (understandability and conciseness)

Representational quality dimension is required for P&C purposes in all companies. To efficiently execute the PDCA (Plan-Do-Check-Action) cycle, cost fluctuations and their causes must be expressed in an easy-to-understand format.

“In the technical sense, the cost figures are almost the same whoever calculate them. What the company is looking for is how we can find the problem and teach them in easy-to-understand ways, when there is something wrong with the figures. If they say, ‘We have no idea what the accounting department talking about,’ we’re out of a job.” (Company B, Accounting Manager.)

“In fact, we spend a lot of effort to have people in our company understand the meaning of cost information. The improvement will not be achieved unless they accept it.” (Company C, Accounting Manager.)

Therefore, all companies use information with high representational quality for P&C purposes. For example, in the report to executives of Company A, the change in cost of each product group and its factors are briefly outlined. In executive management meetings, cost information needs to be reported in a concise and easy-to-understand format, since they need discuss improvement measures for the next period based on various information, such as sales and production. Moreover, Companies B and C use graphs to visualize cost trends and add explanatory notes about variable factors, making cost information easier to understand.

5. Contextual quality dimension (relevance, completeness, and timeliness)

The contextual quality dimension is required for all purposes of use in all

companies. The implications of the sub-characteristics vary depending on the purpose of use. For example, with respect to relevance and completeness, for P&C purposes in Company A's factory, it is useful to report the costs in the factory in detail. It is helpful in reviewing the production plan by reporting the cost of materials input and losses due to yield in detail. However, executive reports only report integrated trends of each product group. Quick and frequent reporting is appropriate for P&C purposes, whereas for management decision-making purposes, the frequency of reporting is annual, and quick reporting is not required.

Therefore, each company uses cost information with high contextual quality by reporting according to the user's task.

“For example, the perspectives of management and factory production are completely different, so it is difficult to observe them all in a uniform manner. We do it while making good arrangements according to the phases.” (Company A, Accounting Manager)

(5) DISCUSSION

The research question, "How are the four quality dimensions that constitute cost information quality affected by the decision-making environment and the purpose of use?" is examined based on the field study.

1. Purpose of use and cost information quality

For management decision-making purposes, intrinsic quality (accuracy and objectivity), accessibility quality (ease of access and ease of operation), and contextual quality (relevance, completeness, and timeliness) dimensions are required, while for P&C purposes, intrinsic quality, representational quality (ease of understanding and brevity), and contextual quality dimensions are required.

The intrinsic quality dimension is required for both purposes. In this study, as indicated in previous studies, accuracy and objectivity are important to make correct

decisions. In some cases, intrinsic quality is low for various reasons; however, this is a practical problem. Therefore, the deterioration of intrinsic quality may lead to wrong decisions.

The accessibility dimension is required only for management decision-making purposes, where information is easy to access and operate. Though for P&C purposes, the accessibility dimension is not required. Since cost information for P&C purposes is provided in periodic (i.e., monthly) reports, it does not need to be easily obtained. As it is not necessary to extract specific data from cost information, ease of operation is not important.

The representation quality dimension is required only for P&C purposes. To implement the PDCA cycle, users must understand and accept the meaning of cost information to take actions. It is difficult to understand the meaning of accounting information only by numerical data, thus it is essential to enhance the understandability and conciseness so that managers know the background factors and events, which affected costs. However, for the purpose of managerial decision-making with a specific intention to read the cost information, there is little need to convey the factors and events behind the figures.

The contextual quality dimension is required for both purposes of use. As the maxim "different costs for different purposes" suggests, the required cost range, level of detail, and timing vary depending on the users' department or position. It is useless unless it provides cost information of appropriate scope, level of detail and timing for the user's task. Therefore, relevance, completeness, and timeliness are required.

2. Decision-making environment and cost information quality

The decision-making environment makes it difficult to meet requirements by forcing trade-offs between quality dimensions. First, high environmental uncertainty creates a trade-off between accessibility and intrinsic quality. When the environmental uncertainty is high, it is

difficult to predict demand, and changes in production plans occur often, leading to fluctuations in utilization rates and inventories and increased noise in costs. Hence, if the intrinsic quality is increased, cost information including noise will be provided, which may lead to poor operability and wrong decisions. If the accessibility quality is increased, the intrinsic quality will decrease, leading to use information that deviates from the actual management situation, which may lead to erroneous decisions.

Second, a complex decision-making environment creates a trade-off between contextual and intrinsic quality. With respect to relevance, if the decision-making environment is complex, a problem of indirect cost allocation may occur in aggregating the narrow area costs, such as per product, thus reducing intrinsic quality. However, in aggregating costs over a wide area, such as per business, it is difficult to accurately and objectively aggregate costs across the entire production process (Yasui, 2012) because of difficulty of intervening transfer prices and of headquarters' costs allocation. Conversely, if the intrinsic quality dimension is prioritized, it becomes difficult to provide cost information that is compatible with the user's task, decreasing the contextual quality.

(6) CONCLUSION

This study clarifies and deciphers characteristics required for cost information. Various properties of cost information were assumed based on Wang and Strong's (1996) information quality model. The importance of the characteristics was confirmed through field studies. This study showed that the required characteristics of cost information differed depending on the purpose of use, and the level of these characteristics differed depending on the decision-making environment.

The main contribution of this study is to show the existence of a variety of characteristics required for cost information, using a more extending concept. These findings give a new perspective to research

on costing. This study confirmed that accuracy intentionally reduced to ensure usefulness of the information because of a trade-off with other characteristics. Hence, accuracy is one of many characteristics required of cost information. Therefore, for utilization at various levels, it is important to provide high quality cost information that considers various characteristics.

Additionally, this study contributes to research that focused on characteristics other than accuracy. Using knowledge of management information, this study summarized the characteristics indicated in various previous studies and showed that the requirements for these characteristics vary depending on the purpose of use, including where the decision-making environment of an organization forces the sacrifice of characteristics. Furthermore, this study demonstrated the importance of characteristics, such as ease of access and operation, which were overlooked in previous studies.

This study has some limitations. Access to information users was insufficient. Assuming that middle managers in the accounting department were most suitable, they were chosen as the focus. Yet, further findings may have been obtained by surveying the users of information more widely. In addition, a limitation stemming from narrowing the determinants. Although this study focused on the uncertainty and complexity of the decision-making environment, in which previous research suggested a close relationship, other important contextual factors may exist. Moreover, we could not find case with low uncertainty as a research site. We would like to investigate the case, if possible, and include it in the discussion.

Despite these limitations, the perspective of "cost information quality" provides important suggestions for the research on cost information with respect to the existence of a variety of characteristics. Future research should elucidate the impact of cost information quality and develop an excellent practical theory to enhance each quality dimension.

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Reference

- Abernethy, M.A., Lillis, A.M., Brownell, P., and P. Carter. (2001) Product diversity and costing system design choice: Field study evidence. *Management Accounting Research* 12 (3), pp.261–279.
- Al-Omiri, M. and C. Drury. (2007) A survey of factors influencing the choice of product costing systems in UK organizations. *Management Accounting Research* 18 (4), pp.399–424.
- Arai, K., Kato, Y., Sakaguchi, J., and M. Tanaka (2010) The design of product costing: An exploratory study. *The Journal of Management Accounting, Japan* 18 (1), pp.49-69.
- Brierley, J.A. (2008) Toward an understanding of the sophistication of product costing systems. *Journal of Management Accounting Research* 20, pp.61–78.
- Cardinaels, E. (2008) The interplay between cost accounting knowledge and presentation formats in cost-based decision-making. *Accounting, Organizations & Society*, 33 (6), pp.582–602.
- Chenhall, R.H. and D. Morris. (1986) The impact of structure, environment, and interdependence on the perceived usefulness of management accounting systems. *The Accounting Review* 61 (1), pp.16-35.
- Chewning, E.G. and A.M. Harrell. (1990) The effect of information load on decision makers' cue utilization levels and decision quality in a financial distress decision task. *Accounting, Organizations and Society* 15 (6), pp.527–542.
- Datar, S. and M. Gupta. (1994) Aggregation, specification and measurement errors in product costing. *The Accounting Review* 69 (4), pp.567-591.
- Drury, C. (2015) *Cost and Management Accounting 8th Edition*. Cengage Learning EMEA.
- Gosselin, M. (2006) A review of Activity-Based Costing: Technique, implementation, and consequences. *Handbooks of Management Accounting Research* 2, pp.641–671.
- Gullberg, C. (2016) What makes accounting information timely? *Qualitative Research in Accounting & Management* 13 (2), pp.189–215.
- Hiromoto, T. (1988) Another hidden edge: Japanese management accounting. *Harvard Business Review* 66 (4), pp.22–26.
- Horngren T.H., Datar, S.M., and M.V. Rajan. (2015) *Cost Accounting: A Managerial Emphasis 15th Edition*. Prentice-Hall.
- Kataoka, H. (2011) *Seihingenkakeisanron (Product Costing Theory)*. Tokyo: Moriyamashoten.
- Lee, Y.W., Strong, D.M., Kahn, B.K. and R.Y. Wang. (2002) AIMQ: A methodology for information quality assessment. *Information and Management* 40 (2), pp.133–146.
- Merchant, K.A. and M.D. Shields. (1993) When and why to measure costs less accurately to improve decision making. *Accounting Horizons* 7 (2), pp.76–83.
- Mia, L. and R.H. Chenhall. (1994) The usefulness of management accounting systems, functional differentiation and managerial effectiveness. *Accounting, Organizations and Society* 19 (1), pp.1–13.
- Myers, N., Starliper, M.W., Summers S.L., and D.A. Wood. (2017) The impact of shadow IT systems on perceived information credibility and managerial decision making. *Accounting Horizons* 31(3), pp.105-123.
- Petter, S., DeLone, W.H. and E.R. McLean. (2013) Information systems success: The

- quest for the independent variables. *Journal of Management Information Systems* 29 (4), pp.7–62.
- Pizzini, M.J. (2006) The relation between cost-system design, managers' evaluations of the relevance and usefulness of cost data, and financial performance: An empirical study of US hospitals. *Accounting, Organizations and Society* 31 (2), pp.179–210.
- Schoute, M. (2009) The relationship between cost system complexity, purposes of use, and cost system effectiveness. *British Accounting Review* 41 (4), pp.208–226.
- Sekiguchi, K. (2013) *Johouhinsitsu (Information quality)*. Tokyo: Nihonkikakukyokai.
- Tani, T., Okano, H., Shimizu, N., Iwabuchi, Y., Fukusa, J., and C. Shiran (1993) A survey of the reality of target costing: Contingency theory of target costing. *Kigyō Kaikei* 45 (4), pp.75-81.
- Wang, R. Y., and D.M. Strong. (1996) Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems* 12 (4), pp.5–33.
- Watanabe T. (2000) An empirical study on the suitability of manufacturing indirect cost allocation system. *The Journal of Cost Accounting Research* 24 (1), pp.19-31.
- Yakuwa, Y. (2010) From information technology to information quality. *Journal of Information and Management* 31 (1), pp.81-92.
- Yasui, N. (2012) Global genkakanri no kouchiku no sikata (How to Establish Global Cost Control) *Junkan Keiri Jouhou* 1329, pp.9-26.
- Yin, R. K. (2002) *Case Study Research: Design and Method, Third edition*. Sage Publications.

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