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**COMPETING MANAGEMENT ACCOUNTING
INFORMATION SYSTEM AT THE ROAD CONSTRUCTION
CORPORATION OF VIETNAM**

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PREAMBLE

1. The urgency of thesis

Current international economic integration brings Vietnamese enterprises any opportunities and challenges. Enterprises have to face competitive pressure from domestic and foreign enterprises in the same industry. Enterprises need to effectively active promote with available resources and take the most advantages from the effects of the State's supportive policies to improve economic competitiveness in the development process. Management accounting information system (MAIS) plays an important role in enterprises' management and administration. Management accounting is an effective tool, an essential part of corporate governance in achieving management objectives. MAIS provides practical, timely and comprehensive information for managers, is the basis for improving competitiveness, creating value for enterprises through controlling and use resources most efficiently.

In Vietnam's developing process, the infrastructure construction industry, especially the transportation infrastructure, needs to be one step ahead to create the morden infrastructure to meet the needs of deeper integration of Vietnamese economy. Integration increases the demand for transprot construction for the development. Road construction enterprises are increasing, especially foreign enterprises when we are gradually removing tariff and administrative barriers... This development makes the level of competition in road construction field more and more fierce.

From 2015 up to now, the Ministry of Transport has divested 100% of the state capital in all Road Construction Corporations. The full divestment will help enterprises take full initiative, increase publicity and transparency in seizing business opportunities, be more proactive in production plans and be able to participate in bidding for big projects. Equitization of road construction corporations is an inevitable in the increasingly competitive market economy, opportunities and challenges always go hand in hand, in order to integrate with that development, the Road Construction Corporation must make changes in the management and organization activities to reach out to foreign markets. For the Road construction corporations in Vietnam, they are unique and complex characteristics, has large number of different sizes and diverse fields members, require an quality MAIS to become stronger and more developed. However, the managemen accounting information system at the road construction corporations in Vietnam still has many shortcomings and does not best meet the information needs of managers at all levels.

Experiencing the research process on the approaches to the MAIS expressed in domestic and foreign studies, the author found that the category of this issue still has gaps that need to be further researched, perfected and improved as theory of MAIS in the context of technology application in 4.0 era, and MAIS providing information for managers at strategic, tactical and operational levels.

From the urgency in theory and practice, the PhD student chooses the topic "*Completing the management accounting information system at the road construction corporations of Vietnam*" as economic doctoral thesis

2. Literature review

There can be seen that the number of in-depth domestic and foreign researches about accounting information systems is diversified in both theory and practice with different aspects. However, the number of in-depth studies on the MAIS is not much, while the role of management accounting for enterprises is increasingly confirmed.

Up to now, there has not been any in-depth research on MAISs at the road construction corporations of Vietnam. There has not been any research on the MAIS with the process-based approach of the information system at the road construction corporations. Therefore, it is necessary to have a study on the current state of MAISs in Vietnam's road construction corporations.

3. The objectives of thesis

The main objective of the thesis is to develop appropriate solutions to improve the MAIS at road construction corporations in Vietnam in the current period to provide quality information which meet the information needs of senior managers. To achieve that central goal, the author has determined to have the following specific goals:

Theoretical aspect: Systematize and analyze the theoretical basis of the MAIS in enterprises towards the process approach including input data acquisition, input data processing, provision and reporting output information report; the internal control system and information technology infrastructure focus on applying 4.0 technology in the MAIS to serve the information needs of corporate managers.

Practical aspect: Surveying the current status of MAIS in Vietnam's road construction corporation in recent years, thereby assessing the achievements and limitations of their MAIS. Based on theoretical basis, the existing limitations, the thesis outlines the orientations, principles, requirements and proposes solutions to improve the MAIS at the road construction corporations of Vietnam towards meeting the information needs of corporate managers in the current period; and propose the conditions for implementing the solution.

4. The Object and Scope

Research object: The thesis focuses on studying the theoretical basis of the MAIS in enterprises and the current situation of the MAIS in Vietnamese road construction corporations (VRCC).

Research scope: The MAIS is researched and presented in a logical manner from the theoretical side, the current situation to the solutions

+ *Research space:* The thesis is researched at 6 VRCC which are Road construction corporation 1, 4, 5, 6, 8 and Thang Long (including offices, branches, subsidiaries etc.). These corporations have the common characteristic that they all

operate in traffic construction field, but have their own characteristics of operating in a certain area and having a specific management apparatus.

+ Research content: The thesis studies the MAIS according to the process approach of the information system: Input data, input data processing process, output information supply and reporting; internal control activities and information technology infrastructure, mainly applying the 4.0 technology platform in the MAIS.

+ Research period: The thesis studies and evaluates the current state of MAIS in VRCC from 2016 to 2020.

5. Methodology

The thesis uses dialectical materialism and historical materialism to study problems and phenomena in a dynamic state, ensuring logic, comprehensiveness and practicality. On that basis, the thesis has used basic research methods in the economic field such as: document search method, survey method by questionnaire, interview method, observation method, analytical synthesis...

6. The new contributions

Firstly, based on the theory of systems and information systems, the thesis has comprehensively and synchronously studied the contents of the MAIS. Since then affirming the importance of MAIS in providing information for corporate governance to implement management objectives.

Secondly, the thesis has generalized the current state of MAIS in VRCC with the contents reflecting the current situation presented clearly and scientifically. From there, draw conclusions and evaluate the achieved results, limitations and causes leading to limitations in the MAIS at the VRCC.

Thirdly, the thesis proposes solutions to improve the MAIS at VRCC specifically and feasibly. The thesis also highlights the problems that VRCC currently are facing in perfecting the MAIS, improving operational efficiency, and enhancing competitiveness. The thesis is a useful document for managers, especially for road construction enterprises in researching and perfecting the MAIS to serve the objectives of corporate governance.

7. The structure

Beside the introduction, conclusion, references and appendix, the main content of the thesis is structured into 3 chapters:

Chapter 1: Basis theory of management accounting information system in enterprises.

Chapter 2: Current situation of management accounting information systems in road construction corporations in Vietnam.

Chapter 3: Solution to complete the management accounting information system in Vietnamese's road construction corporations.

Chapter 1

BASIC THEORY OF MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN ENTERPRISES

1.1. BASIC THEORY OF MANAGEMENT ACCOUNTING INFORMATION SYSTEM

1.1.1. Definition and Objective of information system

There have been many scientists who have given definition about system such as: The encyclopedia states that "A system is a collection of elements that are related to each other, influencing each other according to the laws of the system to become a whole". Theory about systems is a scientific approach that contributes to finding a solution, what to do and how to achieve that goal. Information is a particularly important resource in an organization. Managers need information to plan, control all processes in the organization and help the organization survive and develop in its operating environment.

Information system

Accounting Information System by James A.Hall (7th) Cengage Learning, an information system is defined as "a set of formal procedures by which data is collected, processed into information, and distributed to users. ". With this approach, information system is understood as the system's process from input data, processing process and output information to information users.

According to Ho Tien Dung, "An information system is a system consisting of people, data, processes and information technology that interact with each other to collect, process, store and provide the necessary information in the output to support a system". The scientists' views on information systems have specifically mentioned its elements such as people, facilities, data, processes, etc., and processes of information systems include data collection, data processing, data storage and information distribution

Purpose of information system

Each organization must tailor its information system to its users' needs. Therefore, the specific goals of an information system may differ from one enterprise to another. However, three basic goals are common to all systems: supporting the management function of managers; supporting managers to make management decisions, supporting enterprise's operations.

1.1.2. Definition and Role of management accounting information system

1.1.2.1. Definition of Accounting information system (AIS)

AIS is a system that collects, records, stores and processes data to generate information for decision makers. It includes people, procedures and instructions, data, software, IT infrastructure, internal security and controls. AIS can be a manual system, a complex system using the latest IT, or a combination of manual and IT.

These six components enable AIS to perform three important functions: (1) to collect and store data about an organization's activities, resources, and personnel; (2) to transform data into information for manager can make decision, plan, execute, control, and evaluate activities, resources and personnel (3) to provide appropriate controls to protect the organization's assets and data.

AIS is divided into two sub-systems: the financial information system (FIS) and the management accounting information system (MAIS). The approach of MAIS also comes from the approach of AIS, however, it is suitable with the management requirements and users' needs about information.

1.1.2.2. Definitions and functions of management accounting

Definition

“Management accounting is a process and technique that help an organization use its resources efficiently; collect, process and communicate financial and non-financial information about the organization's business activities to managers to develop and realize the strategic goals of the business, to ensure the increase of customer value and enterprise value”

Function

The basic function of management accounting is to assist managers in performing their functions effectively. Management accounting provides economic and financial information of the organization for managers. The functions of management are planning, organising, directing and controlling. Management accounting plays an important role in step 4 of the decision-making process. The management accounting system provides useful information to predict the results of different business and production options. Management accounting can assist managers in systematizing all information related to the plan, proposing alternative solutions and showing the effectiveness of the options specifically and understandable. Management accountants should include qualitative information in their reports to help managers better perform their decision-making functions while collecting and processing information for decision-making purposes.

1.1.2.3. Definition and Role of management accounting information system (MAIS)

From the view of the information system, as well as the nature of the management accounting system, there are two main views about MAIS:

Firstly, MAIS is from process approached including: input data, data processing process, data storage and output information provision. Output information of MAIS is used by managers inside enterprise to perform the management functions such as: planning, organizing, controlling and making decisions.

Second, MAIS is from elements approaches including: (1) People, (2) The procedures and instructions used to collect, process and store data, (3) Data about organization and its business activities, (4) Software, (5) Information technology infrastructure, including computers, external devices and network communication

equipment used in the IT system, (6) Internal controls and security measures to protect the information system data.

The author finds that the two approaches are not separate from each other, but contain overlapping contents. Each approach has implications in theory and practice. Therefore, the author gives a perspective on MAIS to clarify the relationship and impact its elements in each stage of the information system process. Approaching the MAIS according to the process of the information system including: input data collection, data processing process, output information supply and reporting; internal control system; at the same time, clarify the IT application of the 4.0 era in MAIS.

1.2. MANAGEMENT ACCOUNTING INFORMATION SYSTEM APPROACHING PROCESS BASE ON INFORMATION TECHNOLOGY APPLICATION

1.2.1. Input data collection process

The data concept refers to raw records of unprocessed data. These data needs to be processed to become information. Data collection is the first operational step of the information supply process of the MAIS. Timely, complete, and accurate data collecting will determine effectiveness and quality of output information. A database is a structured collection of stored data that can simultaneously satisfy the information needs of many users. This data system is not yet the management accounting. After processing, the data is converted into management accounting information, presented on the management accounting reporting system.

To build an input data system, it is necessary to define the following contents:

1. Which content of data is collected?
2. Where is the source? How is data stored?
3. What is the data collection method?
4. How to control the quality of collected data?

1.2.1.1. Collected data

Collected data includes:

- Plan data: It is data about the production and business planning system, the system of consumption norms, price norms. Plan data is used to make budget estimates, which is the basis for controlling and evaluating the performance of the planned work, from which, managers make management decisions to improve operational efficiency business activities.

Performed data: Data on actual transactions performed, which are accounted through accounting system, vouchers, books, etc. (for example: assets, liabilities, expenses, revenue). The data collected here is mainly shown on the documents reflecting the consumption of resources. Performance data is collected and processed by management accounting into information to help managers grasp the business performance of enterprises in the past period. From there, compare with the original plan, consider the difference, determine the cause of the difference and propose appropriate solutions.

Future data (forecast): predictive data, predicting the impact of changes in business and production conditions in the future on resources and operational efficiency of enterprises. Future data is recorded through functional parts of the enterprise such as market demand for models, output, product quality, product prices, competitors, production technology trends and changes in government policy...

1.2.1.2. Data collection source

- *From outside enterprise:* includes data about customers, competitors, suppliers, professional associations, analysis reports of experts, state management agencies, Websites, forums....

- *From internal parts of the enterprise:* includes two main parts: accounting records and production data. Accounting records are the primary source of inside information. They detail the business's past transactions, which can be used as a basis for planning for the future (For example, preparing financial budgets or forecasts). The detailed and general accounting books provide financial information for managers. However, accounting records can also provide non-financial information.

Currently, with the development of 4.0 era technologies, the application of big data technologies (Big Data), Internet of Things (IoT), cloud computing (Cloud)... will help businesses set up a diverse, complete and quality data system, as well as extremely convenient in sharing data in our enterprises.

1.2.1.3. Data collection methods

Accounting data can be collected in the following ways: (1) word of mouth, (2) through a document system (3), through automatic data collection devices.

The method of collecting accounting data is the determination of the accountant to make and receive documents from subordinate departments and units manually or with the support of accounting software, management software or enterprise resource planning software (ERP). Currently, enterprises are computerizing accounting work. Enterprises organize accounting software independently or integratedly with the subordinate departments and units software. Source documents generated or received in departments, subordinate units all perform and update on integrated software. Data system is stored on accounting software.

In addition to collecting data methods from the document system stored in the functional departments of the enterprise, stored on the software system, management accountants can also collect data through observations, interviews, surveys and statistics at the same time, make a system of tables, comparison charts, and analysis on Word and Excel...

1.2.1.4. Data storage system

Digitizing data storage is the best solution for an electronic office with many benefits such as: reducing storage space; avoiding the loss and crumple documents during storage; permanent document storage and management; reducing time of searching document; quickly information sharing; enhancing information security

capabilities; improving work efficiency by gathering information quickly and timely; low and efficient operation and management costs.

1.2.2. Process of processing input data

Data processing process is the process of arranging, analyzing, and collecting collected data base on specific criteria scientifically and accurately towards the purpose of creating relevant and timely information for managers. By using system of technical and professional methods of management accounting, management accountants will analyze the original raw data system, synthesize and provide information through management accounting reports. From the management accounting reporting system, business managers use that information to perform the functions and contents of corporate governance, to run the business and production activities of the enterprise. Management accounting information is the result of the data processing process. Therefore, the quality of management accounting information also depends a lot on the media system and data processing techniques.

1.2.2.1. Data processing facilities

Currently, there are two types of application software: business processing and decision support software. Most business processing software automate processes and procedures that were previously done manually. Means of data processing in the current period are mainly technical and management software systems. Accounting software is a system of computer programs used to automatically process accounting information on computers, starting from the stage of making documents, classifying documents, recording books, processing information on documents, books according to the process of the accounting regime to the stage of printing accounting books, financial statements, management accounting reports and other reports.

1.2.2.2. Data processing techniques

**** Processing data to serve the planning function of the administrator***

Standard Cost

Standards are metrics or benchmarks against which performance is measured. Quantitative and cost standards are developed for each inputs such as raw materials and labor time. Quantity standards specify how much input is needed to be used to make a product. Standards Cost specify how much to pay per unit of input. Actual quantities and actual cost of input materials are compared with these standards. If either the input quantity or cost is significantly different from the standard, the manager team looks at this difference to find the cause of the problem and fix it.

Estimation techniques

Estimation is a tool to help determine enterprises' business operation goals in the coming time. At the same time, the estimatione is also a tool to help control enterprises' business activitie. Estimation helps managers determine expected revenue, the costs that will arise in the coming period, thereby determining the resources the business needs to prepare.

Estimations and plans are closely linked. Estimation provide feedback for managers to review and refine their plans and strategies. There are two basic methods of estimation: top-down (imperative) and bottom-up (participatory estimating). The estimation includes: Consumption estimate, production estimate, direct material costs estimate, direct labor costs estimate, costs estimate, general production cost estimate, sale and business management costs estimate, cash budget, income statement estimate, balance sheet estimate. There are two specific methods of estimating techniques: Fixed and flexible estimates. Fixed estimation are prepared at the beginning of the estimation period and are valid for a certain level of activity. Flexible estimation will identify costs incurred at a different level of activity compare with plans.

*** *Processing data to serve the performance function of the administrator***

Data processing to provide performance information is demonstrated through a number of specific methods as follows:

Document method

The accounting document method is the first method used in the system of accounting methods to obtain information about arising economic and financial transactions.

Account method

Accounting account is a tool and means for accountants to reflect and track changes in accounting objects (assets, capital sources, revenue and cost), each of which is tracked on an account. In management accounting, accounts are detailed into level 2 and 3 accounts, which will help enterprise track in detail dependent objects of management requirements of managers. The more detailed management requirements are for the objects, the more detailed the accounting accounts will be opened.

Identifying and classifying cost method

Classifying costs according to operational functions: Costs are divided into two types, which are production costs and non-production costs.

Classifying costs according to the relationship with activity level: Costs are divided into 2 types, variable costs and fixed costs.

Classifying costs by subject: Costs are classified into direct costs and indirect costs.

Classifying costs for decision making: The decisions of managers related to production and business activities are aimed at selecting options. Cost is classified into arbitrage, sunk and opportunistic costs.

Classifying costs according to controlling costs: Costs are classified into controllable and uncontrollable CP.

Determining costs method

With the specificity of construction and installation enterprises, the author only presents 3 methods of determining cost: determining cost by order/job, determining

cost by target cost (Target - Costing) and determining cost by activity (Activity - Based Costing).

Determining cost by order/job

According to this method, the collection object of production cost is each order/job. Each order has a production cost for the order. "The cost sheet for an order records the cost of materials, labor and production costs for that order".

Determining cost by activity (Activity - Based Costing)

“Activity-Based Cost (ABC) is a method of determining cost designed to provide costs information for strategic and other decisions that have the potential to affect performance and thus affects fixed as well as variable costs.

Determining Cost by Target (Target - Costing)

Target - Costing method is a collection of management methods and tools that allow to achieve cost goals and operational goals at the design and planning stage of new products.

**** Processing data for the control function of the administrator***

Responsible accounting

Each division or unit has a manager who is empowered to make decisions and is responsible for the specific financial results. Such a unit or division is called a responsibility center. The responsibility accounting system identifies, measures, and reports on the performance of those managers in responsibility center. There can be four types of responsibility centers, based on a manager's decision-making authority, control, and financial responsibility for cost, revenue, profit, and invested capital.

**** Processing data to serve the decision-making function of the administrator***

Cost-volume-profit (CVP) analysis

The essence of CVP analysis is to determine the change of profit when there is a fluctuation of the original plan. From the relationship:

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

$$\text{Profit} = \text{Selling Price} \times \text{Output} - (\text{Variable Costs} + \text{Fixed Costs})$$

Relevant information for long-term capital investment decisions - Investment performance benchmarking technique

To choose a long-term investment option, managers can use the following methods: net present value NPV, internal rate of return IRR, payback period method.

Information relevant to decision making

Every decision a manager makes is usually a choice between at least two options. To ensure correct decision making, managers need to have appropriate tools to help them distinguish appropriate and inappropriate information. Appropriate information for decision making must meet the following two criteria: Must be related to the future and there must be a difference between the options under consideration.

1.2.3. Process of providing and reporting management accounting information

Information is often what gives a company a competitive advantage and creates the possibility of increased profits. Management at different levels perform specific functions but all are geared towards achieving the common goals of the enterprise. The top level deals with strategy, the middle level deals with tactical issues and the lower level deals with operational issues.

Expressing output information mean of MAIS is the management accounting report system. Various management accounting reports help administrators to prepare appropriate management reports, based on their forecasts to make important business decisions. They provide managers with accurate and reliable statistical and financial information. The management accounting reporting system includes: (1) Budget statement, (2) Accounts receivable and payable report, (3) Work cost report, (4) Detailed revenue report, (5) Performance report, (6) Cost, volume, profit relationship analysis report, (7) Risk or business opportunity report, (8) Report appropriate information analysis.

1.2.4. Internal control system

According to The Committee of Sponsoring Organizations of the Treadway Commission (COSO) - COSO Internal Control - Integrated Framework (2013), internal control is a process undertaken by an entity's board of directors, other personnel, designed to provide reasonable assurance about the achievement of operational objectives, reporting and compliance”

1.2.5. Information Technology Infrastructure

From FPT's view on digital transformation in an organization/ a business is the process of changing from a traditional model to a digital enterprise by applying new technologies such as Big data (Big Data), Internet of Things (IoT), Cloud... changing operating methods, leadership, working processes, and company culture.

1.3. FACTORS AFFECTING MANAGEMENT ACCOUNTING INFORMATION SYSTEM

1.3.1. Internal factors

The group of internal factors includes human resources, knowledge and commitment of managers, information technology, enterprise size, organizational structure and level of management decentralization of the enterprise.

1.3.2. External factors

The group of external factors includes: Legal document system, Consultant, Training institution/professional association, Competition level.

Chapter 2

CURRENT STATUS OF MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

2.1. OVERVIEW OF VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

2.1.1. The process of formation and development of road construction corporations in Vietnam

During the war against America, the Ministry of Transport established the Departments of Works and Construction Boards, which are the predecessors of the current Vietnam's Road Construction Corporations (CCs) such as the Department of Construction II in 1964 (CC 1), Department of Construction I in 1962 (CC 4), Construction Committee 67 in 1967 (CC5), Construction Board 64 in 1964 (CC8). During the period of peace and construction of the country, the Ministry of Transport established the 6th Road Construction Corporation (1974), Thang Long Corporation (1973). Road construction corporations (CCs) are leading in the field of traffic infrastructure construction and are increasingly asserting their qualifications and prestige in the country as well as in other countries in the region.

CCs have continuously invested in innovating in construction machinery and equipment, improving management skills, improving working conditions in order to improve product quality, protect the environment and enhance the position of Vietnamese enterprises in the international arena. In 2014, the CCs held the first general meeting of shareholders and officially switched to the joint stock company model (CC I in April, 2014; CC4 in May, 2014; Thang Long Corporation May 2014; CC 6 June 2014; CC 8 June, 2014; CC 5 June, 2014). After the equitization, CCs have initial change, gradually affirming their prestige in the field of traffic infrastructure construction, which was recognized by prestigious domestic and international organizations for their achievements and quality of works. CCs have invested in new, advanced and modern construction technology, gradually improving construction capacity and quality of works.

2.1.2. Characteristics of business activities at Vietnam's road construction corporations

2.1.2.1. Features of business operations

In the general development trend of society, in order to take advantage of business advantages and diversify products, beside main business of construction, CCs are gradually expanding their business activities in many other fields such as: real estate investment, import and export, material production, transportation business, tourism... The main business activities of traffic construction corporations include: traffic (road) construction, infrastructure and industrial construction, exploiting and processing construction materials, producing precast concrete components, investment in traffic works by BOT...

2.1.2.2. Characteristics of business activities affecting the management accounting information system

The characteristics of business activities in construction field have had a significant influence on MAIS, from data collection, data processing techniques and management accounting information reporting applied at corporations. The following effects can be seen:

Group 1: Impact on data collection

Group 2: Impact on techniques for data processing and reporting of management accounting information

2.1.3. Organizational characteristics of the management apparatus

CCs are organized as the model of the General Meeting of Shareholders, the Board of Directors, the Supervisory Board, the General Director, the Deputy General Directors and the functional departments of the Corporation. CCs has subsidiaries and associates subsidiaries which have two types dependent accounting and independent accounting.

2.2. CURRENT SITUATION OF MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

2.2.1. Current status of input data collection process

2.2.1.1. Collected data

According to the survey results, 100% of the surveying units of CCs have collected implementation data, planning data, and forecast data. In addition, financial data is collected at 100% of survey units, but non-financial data is collected by only 40% of units (Appendix 04C).

2.2.1.2. Data collection source

The data source for the MAIS at the CCs is collected from outside the enterprise and inside the enterprise. 100% of the survey units collect data from inside the enterprise and only 40% of the units collect data from outside the enterprise. 100% of units collect data inside the enterprise at the accounting department and other parts of the enterprise. (Appendix 04C).

Data sources outside enterprises are obtained from state management agencies, customers, suppliers, competitors, professional associations and analysis reports of experts.

2.2.1.3. Data collection methods

100% of the surveyed units of CCs apply the accounting document method. Accounting documents show the content of economic and financial transactions arising at the enterprise. Accounting documents provide performance data, planning data and forecast data for accountants. 77% of surveyed units apply additional methods of observation, investigation, and interview.

2.2.1.4. Data storage system

Survey results (Appendix 04C) show that currently the data systems in enterprises are stored in the form of paper documents or files on computers. Through

interviews with subjects (Appendix 3B), data related to each department will be stored in paper documents, arranged into files according to each monitored object, time,... and according to subjective will of staffs in the filing cabinets in the departments of the enterprise.

The survey results (Appendix 4A) show that 52% of enterprises have not issued regulations on internal document storage. The archiving documents, especially for accounting documents, is complying with the provisions of the law, there are also enterprises that do not have specific regulations applicable to the enterprise itself on the storage of documents scientifically and reasonably. The survey results (Appendix 4C) show that only 13% of enterprises think that the regulations on data storage and sharing are very clear, scientific, detailed and strict; 27% of enterprises said that these regulations are not detailed, clear and strict.

2.2.2. Current status of input data processing

2.2.2.1. Data processing facilities

Currently, 100% of CCs apply software to process collected data. However, 100% of CCs only use accounting software, have not used management software, or software that integrates both accounting and management.

2.2.2.2. Data processing techniques

**** Processing data to serve the planning function of the administrator***

Standard cost

Besides the system of construction economic and technical norms issued by the Ministry of Construction according to Circular 10/2019/TT-BXD on “Survey norms; build; installation; machine & equipment installation; experimental estimates; repair and maintenance works; use of building materials”. Enterprises of the CCs also build an internal system of norms.

Budget Estimation

The survey results (Appendix 4C) show that 100% (30/30) of surveyed units have made budget estimates. 100% (30/30) budgets are prepared from the bottom up, usually by the accounting and sales departments. However, 83% (25/30) of units had the estimate made by the sales department, 17% (5/30) of the units had the estimate made by the accounting department.

**** Processing data to serve the organization's performance function of the administrator***

Document method

CCs all apply the original accounting document system in accordance with the provisions of Circular 200/2014/TT-BTC. The accounting document system has received and provided information on arising economic transactions for financial accounting. 100% (30/30) units have an internal document system.

Detailed account method

The survey results show that all CCs apply the account system according to Circular 200/2014/TT-BTC. Detailed accounts are opened for each bridge and road

works to record and continuously reflect the situation and fluctuations of costs as the basis for cost accounting and product costing.

Identifying and classifying cost method

The survey results showed that 100% of survey units classified cost according to its function. The costs arising at the CCs are gathered according to the object of costs collection, namely the project works.

Determining cost method

100% (30/30) survey units (Appendix 04C) determine cost by job. Costs are collected for each specific project and work item. At Joint Stock Company 422, costgatherers for projects such as: Mai Dich - Nam Thang Long, Cua Hoi Bridge, Yen Xa Waterworks, Package 10-11 Ky Anh - Ha Tinh, Repair package at Vinh airprt stag 3. 23% (7/30) of surveyed units have defined costs according to target cost model.

** Processing data for the control function of the administrator*

Responsibility Center

87% (26/30) of surveying units did not prepare management responsibility assessment reports, 13% (4/30) survey units made management responsibility assessment reports.

** Processing data to serve the decision-making function of the administrator*

Investment project evaluation method

100% (30/30) surveying units have evaluated investment projects. The evaluation of investment projects is carried out at the CCs for BOT investment projects.

Analyzing relevant information for decision making

100% (30/30) of units conduct appropriate information analysis for managers to use information to make decisions. The management decisions in enterprises of CCs can be: deciding on the contract prices for construction teams and factories.

2.2.3. Current status of providing and reporting management accounting information process

100% (30/30) units use management accounting journals to provide information to the Board of Directors, Board of Directors and departmental managers.

Estimation Reports

At CCs in Vietnam, the types of estimate reports are direct material cost estimates, direct labor cost estimates, construction cost estimate, general production cost estimates and budget estimates. No unit has made the consumption estimate, production estimate, sale cost estimate, management cost estimate, economic balance sheet estimate, and business results estimate. Only 33% (10/30) of surveyed units have budget estimates. 77% (23/30) of surveying units make quarterly budget estimates, 23% (7/30) of surveying units make monthly budget estimates.

Debt report

100% (30/30) units of the surveyed have made debt reports. However, in the debt reports, only 13% (4/30) of the surveyed units have classified debts by overdue time, and 87% (26/30) the survey unit did not.

Performance Report

100% (30/30) units report revenue and cost for each job or work. At Cienco 4, the report on implementation of costs (Appendix 2.9) and revenue (Appendix 2.10) is made monthly for the works, reports the payment progress of the works (Appendix 2.11).

Effective performance report

Currently, according to the actual survey at CCs, effective performance reports are being carried out by comparing between the plan and the actual achievement. Compared items include cost, revenue, payment schedule. The actual construction volume of each month is compared with the plan, and at the same time determining the actual percentage achieved compared to the plan. In each month, CCs sets a revenue plan, and at the end of each month, CCs will determine the value and ratio of revenue achieved compared to the plan.

2.2.4. Current status of internal control system

There are supervisory boards at all CCs. Enterprises have relatively suitable ways to control production and business activities, avoiding possible damage to enterprises.

2.2.5. Current status of information technology infrastructure

Information technology systems of enterprises currently in use include server systems, personal computers, intranet systems and software systems. Each employee in the enterprise is equipped with a computer with internet connection for work. The software used at 100% of enterprises is accounting software.

2.3. STATUS ASSESSMENT OF MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

2.3.1. Achievements

Through surveying the current status of MAIS in CCs, some results have been obtained as follows:

Firstly, the input data system: The survey results on the current status of MAIS at CCs of Vietnam show that the accounting document system used in enterprises is quite diverse, designed to can receive implementation information, planning information.

Second, the input data processing process: Enterprises belonging to CCs have implemented a variety of management accounting techniques to handle the input data system well, in order to provide information to the managers completely timely and accuracy.

Third, the management accounting reporting system: Enterprises belonging to CCs have formed a number of management accounting reports, providing necessary information to serve the management function of the corporate governance. The management accounting reports that have been prepared include: performance report, budget estimate report, effective performance report (analysis of actual performance and estimated difference), payables and receivables reports.

2.3.2. Limitations

2.3.2.1. Input data collection process

About data collection and data collection source

Enterprises are mainly interested in internal information sources more than external information sources, focusing more on implementation information, planning information than forecasting information.

Data collection methods

Data collection methods are still manual and supported by accounting software. CCs have not applied management software, integrated accounting software and corporate governance.

2.3.2.2. Input data processing process

**** Data processing facilities***

CCs are completely applying only accounting software. Accounting software cannot be completely effective in data processing to create management accounting information for managers to use.

**** Data processing techniques***

(1) Processing data to serve the planning function of the administrator

+ Internal norm system: There still have some enterprises that have not yet built an internal norming system, completely using the economic and technical norms of the State.

+ Estimation technique: The proportion of enterprises making flexible estimates is very low, leading to difficulties in controlling, analyzing and forecasting financial indicators. Static estimates are not effective in controlling the cost of enterprises.

(2) Processing data to serve the functions of the administrator

+ Document method: Enterprises have not designed internal documents to collect and reflect information for management activities of enterprises.

+ Detailed account method: From analysing and processing data of MAIS, it has not played its best role, so there are accounts that are still not detailed according to the objects to be monitored.

+ Identifying and classifying Costs: Enterprises have almost not identified the cost from the perspective of management accounting, only identifying the cost from the perspective of financial accounting.

+ Determining cost method: Enterprises are mainly applying the traditional method of determining cost, which is determining cost by job/work, not by activity.

(3) Processing data to serve the control function of the administrator

+ Responsibility accounting: The percentage of enterprises interested in and implementing responsibility accounting is still low.

(4) Processing data for the decision-making function of the administrator

+ Cost - volume - profit analysis: The analysis technique of cost - volume - profit in enterprises is not clear.

+ Investment project evaluation techniques: The surveyed enterprises are applying the criteria for investment project evaluation separately, very few enterprises apply all three criteria NPV, IRR and PB at the same time to appraise investment projects.

+ Appropriate information analysis: Enterprises have conducted appropriate information analysis to serve decision making. However, analytical techniques have not been carried out synchronously on all decisions of business managers.

2.3.2.3. Providing and reporting management accounting information process

- + Debt report (receivables and payables)
- + Performance report (Job cost report)
- + Effective performance reports
- + Report on business opportunities and risks of enterprises
- + Report analysis of relevant information for decision making

2.3.2.4. Internal control system

In VRCC, only 6 corporations have a supervisory board, while the affiliated units do not establish an independent internal control committee. (Appendix 4A) This comes from the fact that enterprises are not aware of the importance of the internal control system, and are concerned about the operational costs of this department in the enterprise.

2.3.2.5. Information technology infrastructure

Enterprises are only using accounting software in a simple form, not yet promoting the role of providing management accounting information. The accounting form by combining both software and manual (word, excel) reduces the efficiency of the accountant's work.

2.3.3. Causes of limitations

2.3.3.1. Objective reasons

Firstly, the legal system for MAIS has not been completed, and it is necessary to have specific guiding documents.

Second, the state's macro policies related to the traffic construction industry also have a significant influence on the international economic information system in CCs.

Third, training institutions and professional associations are also one of the objective causes affecting the limitation of MAIS

2.3.3.2. Subjective reasons

Firstly, awareness about the role of MAIS and the need to use it in management and administration is not high.

Second, the accounting staff still lacks initiative in updating professional knowledge to serve their work.

Third, IT infrastructure is also one of the reasons leading to the limitation of the international accounting information system.

Fourth, the characteristics of the organizational structure and the level of management decentralization in the enterprises of CCs are also the causes hindering the effectiveness of the international accounting information system.

Chapter 3

SOLUTIONS TO COMPLETE MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATION

3.1. DEVELOPMENT ORIENTATION OF TRANSPORTATION INDUSTRY AND TRAFFIC CONSTRUCTION CORPORATIONS IN THE NEXT TIME

3.1.1. Development orientation of transportation industry to 2025, vision to 2030

According to the Prime Minister's Decision No. 326/QĐ-TTg, which approved the development planning of Vietnam's expressway network up to 2020 and orientation to 2030, with the following views: (1) national highway network plan in line with socio-economic development orientation, strategy and national transportation development planning to meet the country's long-term development requirements. (2) The expressway network includes the main axes with high traffic volume, links with the road system and infrastructure of other modes of transport in order to synchronously, proactively and effectively the traffic routes transportation services in economic development. (3) Promoting the application of scientific and technical advances, new technologies and new materials to the fields of consulting, construction, management and exploitation with the objective of limiting environmental pollution and saving energy. (4) Maximize the mobilization of all domestic and foreign resources to invest in developing the expressway network in various forms. (5) National highway network planning as a basis for determining investment capital, land fund and implementation progress of expressway projects from now to 2020, 2030 and the following years.

3.1.2. Development orientation of transportation construction corporations

After switching to the joint stock company model, the CCs will focus on the following objectives: (1) Promoting initiative, creativity, exploiting all potentials and advantages, focusing promote production and business activities, achieve high

efficiency, preserve and develop capital, constantly improve the operational efficiency of enterprises on the basis of business development, care to improve material and spiritual life for workers. (2) Building CCs, its member units, professional agencies at all levels clean and strong, promoting the role of socio-political organizations, building corporate culture, implementing democratic regulations, mobilize the strength of solidarity, build the CCs for stable development and sustainable growth, contributing to the industrialization and modernization of the country. (3) Linking strategic shareholders, strategic partners with potential in capital, technology, management capacity, products and markets. (4) Strong and steady growth, focusing on raising the brand name in research, implementation and development activities in new fields such as housing construction, urban areas, production of building materials, project investment, etc. in the form of BT, BOT.... (5) Step by step innovating construction technology, equipping with advanced equipment, creating increasingly competitive products, increasing quality, creating prices increased value.

3.2. PRINCIPLES TO COMPLETE MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

The principles of completing MAIS at CCs under the Ministry of Transport are as follows: the principle of conformity, the principle of inheritance, selection and promotion, the principle of feasibility, saving and efficiency.

3.3. REQUIREMENTS TO COMPLETE MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

To perfect MAIS in VRCC, it is necessary to ensure the following requirements: work well with information technology infrastructure, digital technology, internet; with the technological process, business characteristics of the VRCC, to meet the diverse information needs of managers.

3.4. SOLUTIONS TO COMPLETE MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATION

3.4.1. Completing the input data collection process

First, expand information sources and diversify input data types

- Define input data types: It is necessary to collect on all three types of input data including performance data; planning data and future data.

- Expanding data collection sources not only inside but also outside the enterprise

Second, modernize the methods of input data collection

Third, digitize the data system and apply data management software

3.4.2. Completing the input data processing process

3.4.2.1. Improve data processing techniques for planning functions

Internal Cost norms

- + Methods to build economic and technical norms
- + Norm factors: Labor norm, Main material norm, Tool norm, Equipment norm, General cost norm,

Estimation techniques

Make estimates includes: direct materials, direct labor cost estimate, manufacturing cost estimates, sale cost estimate and enterprise management cost, consumption (revenue) estimate, budget estimate....

3.4.2.2. Completing data processing techniques to serve organizational functions

* ***Completing document method***: Identify the types of documents for each activity, each type of transaction and each related department, each management responsibility center, and clearly define the functions of each department in processing document. Internal documents ensure scientific presentation, fully reflect the contents, and provide detailed information for managers to use.

* ***Completing accounting method***: The detailed accounting system needs to be supplemented to meet the needs of monitoring, reflecting and synthesizing accounting information provided to managers.

* ***Identifying and classifying cost from different perspective***, from the perspective of management accounting. Specifically, it is necessary to classify production costs according to the relationship with the level of activity, according to the relationship with the object of cost collection, according to the level of control, classifying costs for decision making besides classified according to economic content, according to the relationship with the object of cost collection and according to the function of the cost that the enterprise is performing.

* ***Completing determining cost method***: Currently, the CCs are applying the traditional method, which is only suitable for collecting reporting costs for entities outside the enterprise.

CCs need to rebuild criteria for allocation of fixed assets, and track fixed assets serving production and business activities in detail by machine shift for specific projects.

- + In the production cost of project works, formwork cost accounts for a large proportion, which cannot be distributed as currently is according to the ratio of the completed work value.

CCs need:

- (1) Determine the direct interest cost of each project base on the loan contract (Appendix 3.1).

(2) For common cost items: Cost of a unit includes enterprise management cost, office staff salaries, outsourced services, depreciation, office rent, stationary, taxes and fees, tools, reception cost, and other monetary expenses.

3.4.2.3. Completing data processing techniques for control function

The main task of each responsibility center is to control its cost. The better cost control, the higher the profit is. Based on the identified profits of each center to determine the responsibility center. Enterprises determine levels of reward, reprimand, and responsibility for appropriate managers. The responsibility center report can be designed as follows (Appendix 3.5). Each responsibility center is a project work, with many different construction items, which is tested and accepted in each stage, and CP revenue is recognized in each of those stages.

3.4.2.4. Completing data processing techniques for decision-making functions

(1) Cost - volume - profit analysis

Enterprise will determine the change of factors such as production volume, purchase unit price, and fixed cost changes will make profits change how much.

(2) Synchronous application of criteria to evaluate investment projects

In order to avoid the situation of ineffective investment projects, enterprises need to apply more synchronously the criteria for evaluating investment projects.

(3) Analyze relevant information for decision making

The types of decisions and appropriate information that need to be considered are recommended by the author as follows, based on the assessment and observation of the characteristics of business and production activities of enterprises: Decision to outsource or buy new fixed assets, Decision to self-execute contract or hire contract, Decide on bid price and set price

3.4.3. Completing providing and reporting management accounting information process

Management accounting information is shown on the management accounting reporting system. Managers use them to perform management functions including planning, organizing, monitoring and making decisions. Including: Estimate report, debt report, performance report, effective performance report, report on difference in general cost, report on difference in cost of raw materials and equipment, expense report, and risk report on production and business activities Report on opportunities for production and business activities.

3.4.4. Completing the internal control system

Based on the size of the enterprise, the characteristics of production and business activities, each enterprise chooses to establish an appropriate internal control system, ensuring a balance between the benefits obtained and the costs spent.

Firstly, enterprises need to quickly complete the system of internal regulations and financial regulations to ensure updating and closely matching the characteristics of production and business activities and management requirements of enterprises.

Secondly, internal documents about rules, processes and regulations related to finance, business activities, ethics and culture... of enterprises, need to be communicated and disseminated to each employee to ensure that each person grasps, understands and commits to comply with the regulations of the enterprise.

Third, promote the construction of corporate culture, ensuring that each employee is conscious and proactive in building corporate culture.

Fourth, for enterprises that have established control procedures such as inventory, cash inventory, reconciliation between documents and books, reconciliation between detailed and general books, between consolidation and reporting, reconciliation of liabilities, reconciliation of deposit details with bank statements, responsibilities of the parties in the review and approval of investment and procurement of assets, selection of quality assurance suppliers and suitable in terms of cost, comparison between planned and estimated data and actual implementation, etc., it is necessary to strengthen the application of these procedures more often.

Fifth, enterprises should be fully aware of the importance of the supervisory board in the enterprise, balance between benefits and costs to consider whether to establish a control department in their enterprise or not.

3.4.5. Improve information technology infrastructure

The process of digital transformation of enterprises is the process of updating and completing IT infrastructure for enterprises, including: hardware, software, applications of cloud computing technology, blockchain, and artificial intelligence appropriately

3.5. CONDITIONS FOR IMPLEMENTATION OF SOLUTION TO COMPLETE MANAGEMENT ACCOUNTING INFORMATION SYSTEM IN VIETNAM'S ROAD CONSTRUCTION CORPORATIONS

3.5.1. On the side of the state and authorities

Firstly, the State needs to develop and perfect the system of legal documents, standards and regimes of financial accounting as well as guiding documents on the State's orientation on the organization of management accounting.

Secondly, invest and develop information technology infrastructure in a synchronous and timely manner, meeting the development trend of the global digital system.

Third, there are preferential policies, supporting enterprises to train accounting and auditing human resources.

Fourth, continue to promote international cooperation.

3.5.2. On the side of Construction Corporations

Perfecting the financial mechanism, the contracting mechanism and other related mechanisms, thereby launching appropriate accounting regulations.

Organizing professional training and retraining, updating new policies, regimes and informatics knowledge for accountants on a regular basis.

Clearly define the responsibilities and powers of accounting staff, and the relationship between accounting departments and relevant functional departments.

3.5.3. On the side of professional organizations and training institutions

**** For professional organizations***

Professional organizations need to promote well their roles and responsibilities in training a team of accountants and auditors with professional certificates through capacity building, improvement and development activities.

**** For accounting training institutions***

Renovate training programs in line with market needs.

CONCLUSION

Within the scope of the thesis, the author has solved the following problems:

- The thesis has systematized the basic theories about MAIS
- The thesis has presented the results of research on the current status of MAIS in VRCCs with the contents organized in accordance with the stated theoretical point of view. The content of the current situation study which is summarized and demonstrated on the basis of detailed survey methods, directly and through survey sheets, is reliability. From the actual situation, the author has evaluated the pros and cons and analyzed the causes.

From the scientific and practical bases of the research problem, the thesis has analyzed the requirements, principles and directions for perfecting the MAIS for VRCCs. The thesis has proposed solutions to improve the management accounting information system in accordance with the requirements, perfection principles, meeting the goal of overcoming limitations and the causes of the limitations have been analyzed. At the same time, for the solution to be implemented synchronously and feasible, the thesis has set out conditions on the side of the State, professional associations and Corporations.

LIST OF RESEARCH PUBLICATIONS RELATED TO THE THESIS

1. Nguyen Thi Mai Le (2019), *Management accounting information system - Lessons for Vietnam*, Journal of Accounting and Auditing, June 2019, pages 61-63.
2. Nguyen Thi Mai Le (2020), *Contents and methods of input data collection of accounting information systems*, Journal of Accounting and Auditing, October 2020 pages 44-46.
3. Nguyen Thi Mai Le (2020), *Relationship between management accounting information system and corporate governance*, Journal of Financial, October 2020, pages 48-52.
4. Nguyen Thi Mai Le (2020), *Solutions to improve management accounting information systems in transportation construction corporations*, Journal of Accounting and Auditing, December 2020, page 73- 75.