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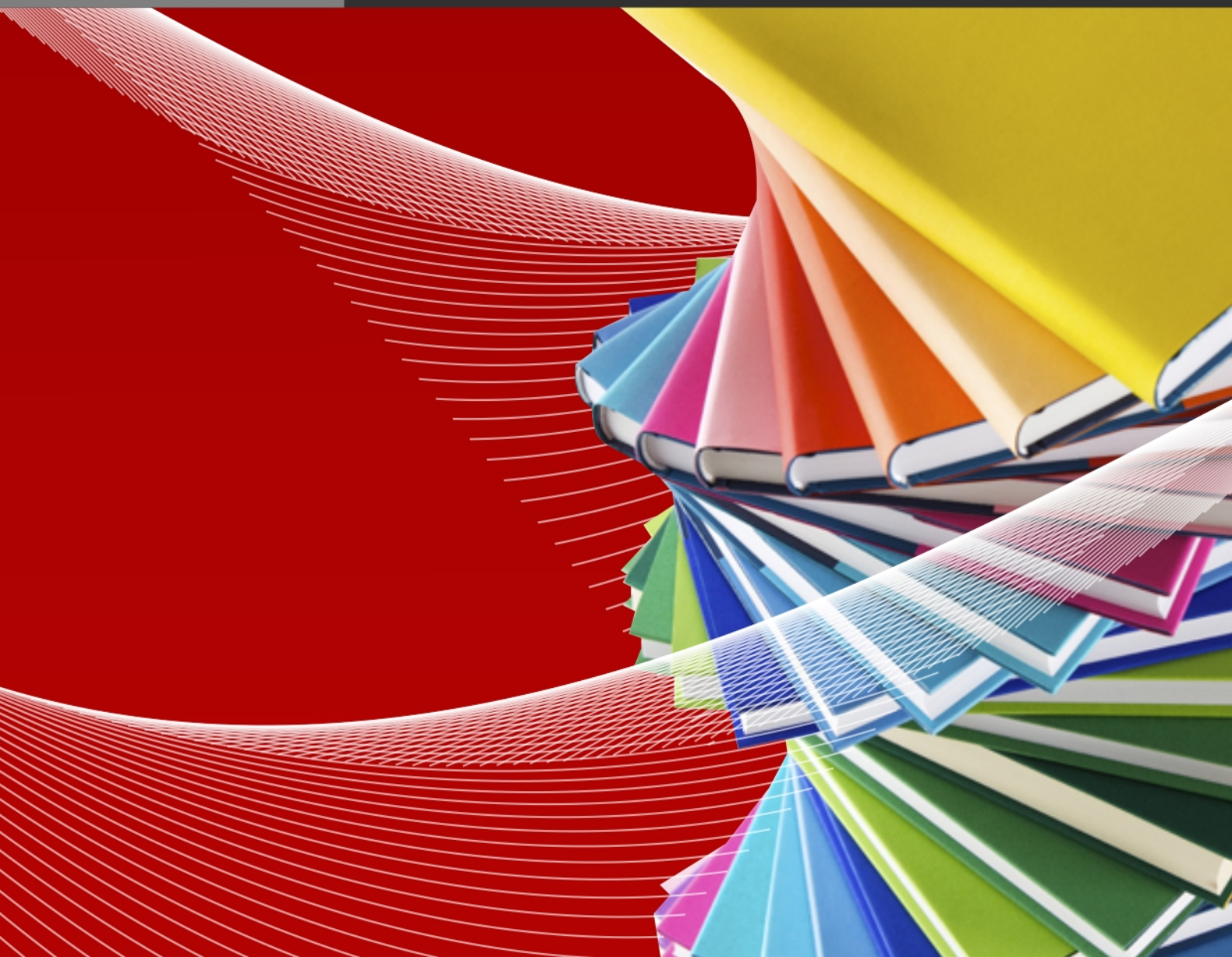

A Survey of Organization Structures for Construction Site Offices in Macau

by

YAO YI

Final Year Project Report submitted in partial fulfillment
of the requirement of the Degree of

Bachelor of Science in Civil Engineering

2014/2015

Faculty of Science and Technology
University of Macau

DECLARATION

I declare that the project report here submitted is original except for the source materials explicitly acknowledged and that this report as a whole, or any part of this report has not been previously and concurrently submitted for any other degree or award at the University of Macau or other institutions.

I also acknowledge that I am aware of the Rules on Handling Student Academic Dishonesty and the Regulations of the Student Discipline of the University of Macau.

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APPROVAL FOR SUBMISSION

This project report entitled "**A Survey of Organization Structures for Construction Site Offices in Macau**" was prepared by YAO YI in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering at the University of Macau.

Endorsed by,

Signature : _____

Supervisor : Dr. AO IEONG Tai Man

ABSTRACT

Organization structure is the outcome of building up a system that make effective and systematic utilization of all resources and provide the perspective that how task allocation, coordination and supervision are directed to the accomplishment of organizational goals (Pugh 1990). Therefore it becomes an evaluation standard for management system of contractors and also projects. The aims of this study are to identify the organization structure type in construction site office and to find out the opinions to the influencing factors and expectations towards it in Macau. It is found that there is no significant disparities among the three types of organization structure and the nature of a project such as project size, project length and project type are critical factors, while project size is considered as most critical. The vital expectations to the organization structure in the site office are "*simple and clear lines of duties and responsibilities"*, "*fast decision making"*, "*effective order delivery"* as well as "*better human resources arrangement"* because of their close ties with work efficiency. A management tool is proposed for the selection of organization structure in the site office. Organization structures of contractors which are involved in casino project are investigated. Also organization structures for head offices of contractors in Macau are looked into through interviews.

ACKNOWLEDGMENT

I would like to express my gratitude to the contractors which gave me unyielding support on my academic research including filling out the questionnaires and accepting my face-to-face interviews. Without their opinions and kind suggestion, the report would lack of valuable information.

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CHAPTER ONE

1. INTRODUCTION

1.1 Background of Macau Construction

Macau has experienced an economic boom since the last decade. The construction industry has contributed to the high GDP of Macau. According to the Construction Statistics 2012 provided by the Statistics and Census Service, the average price per square meter of usable area of residential units raised by 38.4% year-on-year (DSEC 2012). And it was also indicated that the number of new incorporated construction companies went up from 317 in 2009 to 445 in 2012. As for Casino, in 2013, Macau earned nearly 361 billion Macau patacas gambling revenue, which was a great increase compared with 22.2 billion in 2002, leading to its high ride one New Round of Casino Construction (Wassener 2014). Moreover, leisure and business activities captures the attention of Macau government, which contributes to the underway construction of new heavy infrastructures and the redevelopment projects of downtown.

Those statistics and situation seem to present Macau as the fast-growing city in respect to construction. Nevertheless, international construction contractors, mainly from Hong Kong and Mainland China, still take a relatively large portion of the construction in Macau, especially in the complex projects. To some degree, it reflects the weaknesses for the Macau local construction companies. Lack of professionals

and analogous construction experience, Macau local contractors are expected to make progress to gain capability of competitiveness under the explosive development of construction.

1.2 Organization Structure for Construction Site Office

Organization Structure, also called organizational structure, for construction site office can be defined as the structure in the site office with different groups of people who must coordinate their activities in order to meet the organizational objectives during the construction project (Elkassas *et al*. 2013). It offers the perspective that how task allocation, coordination and supervision are directed to the accomplishment of organizational goals (Pugh 1990). Organization structure is the outcome of building up a system that makes effective and systematic utilization of all resources. It is the organization structure that helps to form the stable and scientific management system and therefore, appropriate organization structure is of great benefit to ensure the efficient run of construction.

In general, organization structure is classified into three different types, consisting of Project Organization, Functional (Departmental) Organization, and Matrix Organization. In a Departmental Organization Structure, work is divided according to function. A branch within the organization is given responsibility for a particular function. Work is delegated from top to bottom within the branch to personnel who specialize in the function. In a Project Organization Structure, all members are teamed together to complete the project without functional or status hierarchy. (i.e.

Senior members and junior members are in the same status). When it comes to Matrix Organization Structure, there is a functional hierarchy just like Departmental Organization Structure, but a horizontal cross-functional structure (led by project manager) is superimposed on the functional hierarchy (Pyzdek &Keller 2013). Because various types of structure exist and organization structure for projects should be selected based on the project condition and environment itself. Nowadays designing and selecting organization structure for each project is becoming the significant procedure at the planning phase for the project. Typical organization structure types are shown in Figure 1.1, Figure 1.2 and Figure 1.3.

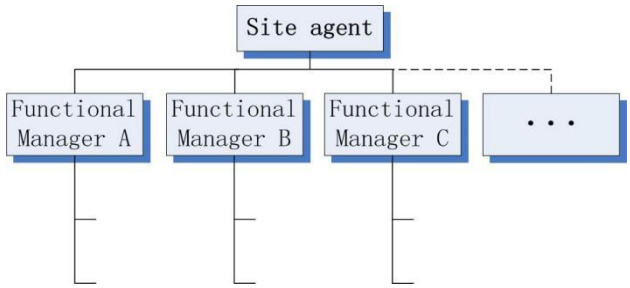

Figure 1.1 Typical organization chart for departmental organization structure

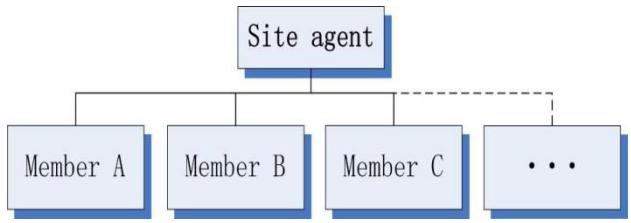

Figure 1.2 Typical organization chart for project organization structure

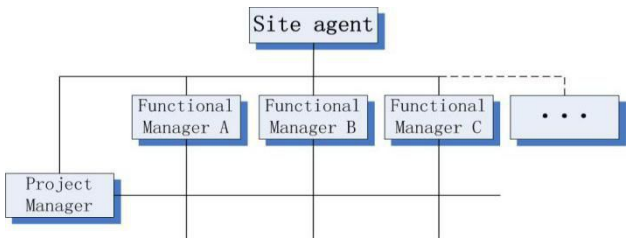

Figure 1.3 Typical organization chart for matrix organization structure

1.3 Considerations for Designing and Selecting Organization Structure

Selecting a structure and the explicit systems of communication, division of labor, coordination, control, authority and responsibility needed to attain the organizational achievement is the primary element for designing and selecting organization structure. Several general considerations and ingredients must be raised during the design phase. Such as the relevance between the organizing process and planning process, clear definition of authority, responsibility, command and span of management, as well as proper division of human resource and department (Verma 1995). In addition, feasibility regarding the operating project environment shall not be ignored, either.

However, some special considerations are required for selecting organization structure for construction project. As every time a new project is about to be carried out, a new location, new but maybe similar patterns or specifications will be used, more focus shall be put on the actual practice, more specifically, the construction site. Contractors are thus become the most authoritative ones to decide the organization structure owing to their experience and professional field. Organizational bureaucracy that hinders rapid communication between office and field and delays vital decisions by management will then be avoided (Ricketts *et al*. 2004).

1.4 Objectives and Scope of Study

The study focuses on the identification of the organization structure for construction site offices in Macau. The validity test of the management tool of selecting

organization by Elkassas (2013) will be conducted regarding the Macau projects. (Detailed information about Elkassas's study will be included in chapter two *Literature Review*). General organization structures for different types of projects will be forecast by a new management tool proposed in this study.

In order to collect the basic information of construction projects in Macau, a Questionnaire about Organization Structure for construction site offices in Macau will be sent to project (general) managers from preselected active contractors. Future trend in developments for contractors and their attitude to the modification of current organization structure will be evaluated. Expectations and outcomes of current organization structure in the site office will be investigated as well. Contractors' opinions to the major factors affecting the choice of organization structure for site office will also be collected, and comments will be made on those factors. Based on the project information collected, the validity test of the management tool of selecting organization by Elkassas (2013) will be conducted and see if it is applicable to the Macau projects. Casino projects will be raised as special cases in Macau and the selection of organization structure will be discussed as the comparison of other construction projects. Finally, general organization structures for different types of projects will be forecast by a new management tool proposed in this study.

CHAPTER TWO

2. LITERATURE REVIEW

Organization structure is so important to the performance outcome of construction that abounding academic researches were conducted to study different aspects of organization structure. The classification (including the advantages and disadvantages of each type), the relationship between organization structure and project success, affecting factors importance ranking as well as the selection of it were favorable topics for researchers. In most cases, the information and opinions were attained by doing surveys in the practical field and discussions and conclusions were made on the foundations of data analysis and comparison.

When it comes to the organization structure for project, Larson (2007) mentioned that there had been obstacles when many companies tried to build up a system to efficiently implement projects. A primary restriction relates to the inconsistency between projects and underlying design principles of traditional organizations. Specifically, organizations are mostly devised to carry out projects efficiently by completing each simplified section composing an entire complicated task, yet most projects are unrepeatable distinctive processes, which cannot be accomplished by routine. The very nature of projects and that of organizations contradicts with each other, thus engendering difficulties for organizations to figure out a standardized system for implementing various projects. It is also suitable for the construction projects in Macau, and instead of adopting a completely same structure for all

projects, attention shall be paid to the nature of the project to make adjustment on the organization structure for each construction site office.

Detailed descriptions about the 3 types of organization structure mentioned above were written in the book *PROJECT MANAGEMENT IN PRACTICE* (Meredith *et al*. 2014). In Project Organization Structure, diverse specialists group together to complete the project. The resources just arrived when they are required (in ideal situation) to do the work, complete the project and disperse. There's no doubt that it is effective and efficient for large projects while it is costly to adopt for small projects. Besides, finite technological depth will appear because of wide range of specialists. As for Functional Organization Structure, contrary to Project Organization Structure, it has in-depth access to the needed technologies and it reduces the personnel costs by assigning people to the project on part-time basis. However, communications among departments might be below the expectation. There is no timely basis for assistance requirement across department boundaries. In terms of Matrix Organization Structure, it combines characteristics of Project Organization Structure and Functional Organization Structure, and can overcome the shortcomings from the two organization by choosing "strong" or "weak" matrix. "Strong" matrix refers to the matrix project closely resembles the Project Organization while "weak" matrix refers to which functional departments assign resource capacity to the project instead of people. Flexibility is the major strength for Matrix Organization Structure. Nevertheless, with all of its merit, Matrix Organization Structure has disadvantages too. The staff in the site office are always under two leaders, which means there are probably conflict orders between project manager and functional manager. Although

intra-team conflict is a normal component for construction project, Matrix Organization Structure enlarges the possibility significantly.

In the business field, there are some studies looking into the issues concerning the determinants of organization structure selection. Among the most widely-studied aspects of organization structure, centralization is the one that relates to vertical structure, referring to the extent to which responsibility and authority is concentrated at the top of the organization (Hollenbeck 2000). Menon and Varadarajan (1992) also pointed out that centralization promotes a hierarchic organization structure, within which decision-making and power is not accessible to lower levels, but resides at the top of the organization. In relation to firms' competitive behavior, Vroom argued that firms may be able to implicitly collude and reach the perfect outcome of collusion via simultaneous decision of organization structure and compensation systems. However, according to Hsu *et al*. (1983), centralization does not necessarily have connection with organization structure. Instead, researchers found that the organizational size exerts an influence on the structure through functional specialization, and that technological automaticity contributes to organization structure in terms of knowledge complexity fostered along.

Particularly, some factors influencing the selection of organization structure in construction industry was raised by Elkassas (Elkassas *et al*.2013). It concluded that the experience of planners and managers was the dominant factor affecting the selection based on the opinions of Egyptian experts. It also suggested that organization type selection should depend on four criteria, project type, project size,

project length, and budget percentage to mother company included. Moreover, procedure of choosing organization structure was summarized, and a management tool of selecting organization structure in Egyptian Construction Market was brought forward.

The method of bringing forward the four criteria is of valuable reference. The author processed a literature review and pointed out that forty three factors which affected the organization structure selection were surveyed during his study. To present the whole management structure of construction industry in Egypt, experts with different job titles in the related field were chosen to be surveyed. The aim of this method in Elkassas's survey (2013) was to calculate and ranked the importance index of each factor, which was processed by PARITO form. According to the ranking result, the top ten with largest importance index contained six subjective factors of decision makers to the project, and the remaining four factors, which were mentioned above, would also be the reference factors in this report. The proposed tool was presented as the table form (Figure 2.1), and it was prepared by surveying fifty three people working for contractors, consultants and design companies. Four underway construction project examples were shown in the journal for testing the validity of the proposed tool.

What is the project size?	Small	Medium		Large	Extra large
	CFM/CPM/F	CPM/CFM/F		P/CPM/M	P/CPM
What is the project type?	Marin work	Building	Sanitary sys	Residentional	Roads
	M/P/CPM	CPM/CFM	F/CFM	CFM/CPM	F/CFM
What is the project Size with relation to other work in mother company?	0.1-5	5-9	10-30	30-50	50-100
	CPM/CFM/F	CPM/CFM	CFM/CPM/P	M/CPM/CFM	P/CPM
What is the project length?	Very Short	Short	Medium	Long	Extra long
	CPM/CFM/F	CFM/CPM	CPM/P/CFM	P/CPM/CFM	CPM/ P/CFM

Where:
F Functional organization
P The Project Organization
M The Matrix Organization
C The Composite Organization:
CFM The Composite Organization between F & M
CPM The Composite Organization between P & M

Figure 2.1 Proposed tool for organization structure selection in Elkassas's study

As it was mentioned by Elkassas (2013), the table displayed the choice tool including the questions to be asked and the answers indicated top two or top three probabilities of organization structure selection, and the most selected probability combining overall four questions was the choice of the Egyptian experts.

In Elkassas's study (2013), four underway construction projects were raised as examples to test the validity of the proposed management tool for organization structure selection (Figure 2.1). However, referring to the result of test, it seemed to be lacking in persuasiveness. As it can be seen from the study, only two construction projects adopted the same organization structure type as the tool predicted. Clearly, 50% validity of the tool was not convincing enough and even not very meaningful for further academic research concerning the relative topics. It was claimed that 44 projects executed by four construction companies were studied, but only four projects were used to test the validity of the tool, which was not quite rigorous. Although, in discussion and conclusion parts, planners' and managers' experience and choice were pointed out as the main factors affecting the selection, which occupied 60% of the factor selected, the theory and the statistic were not proven by enough specifications. The summary (Figure 2.2) about the steps of selecting organization structure seemed to have some conflicts between the choices of decision makers and the proposed selection tool.

As it can be seen from the Figure 2.2, preference of planners and managers come before the organization structure selection tool. In other words, once the decision makers designed an organization structure that they think was suitable for the project, the proposed tool was not going to have any effect even on the adjustment to the structure. Therefore, there was contradiction logically.

Besides, the project success factor was calculated based on the project length success and project cost success factor, which was a creative and acceptable method.

However, no substantial connections could be figured out between the organization structure selection and the project success factor according to the journal.

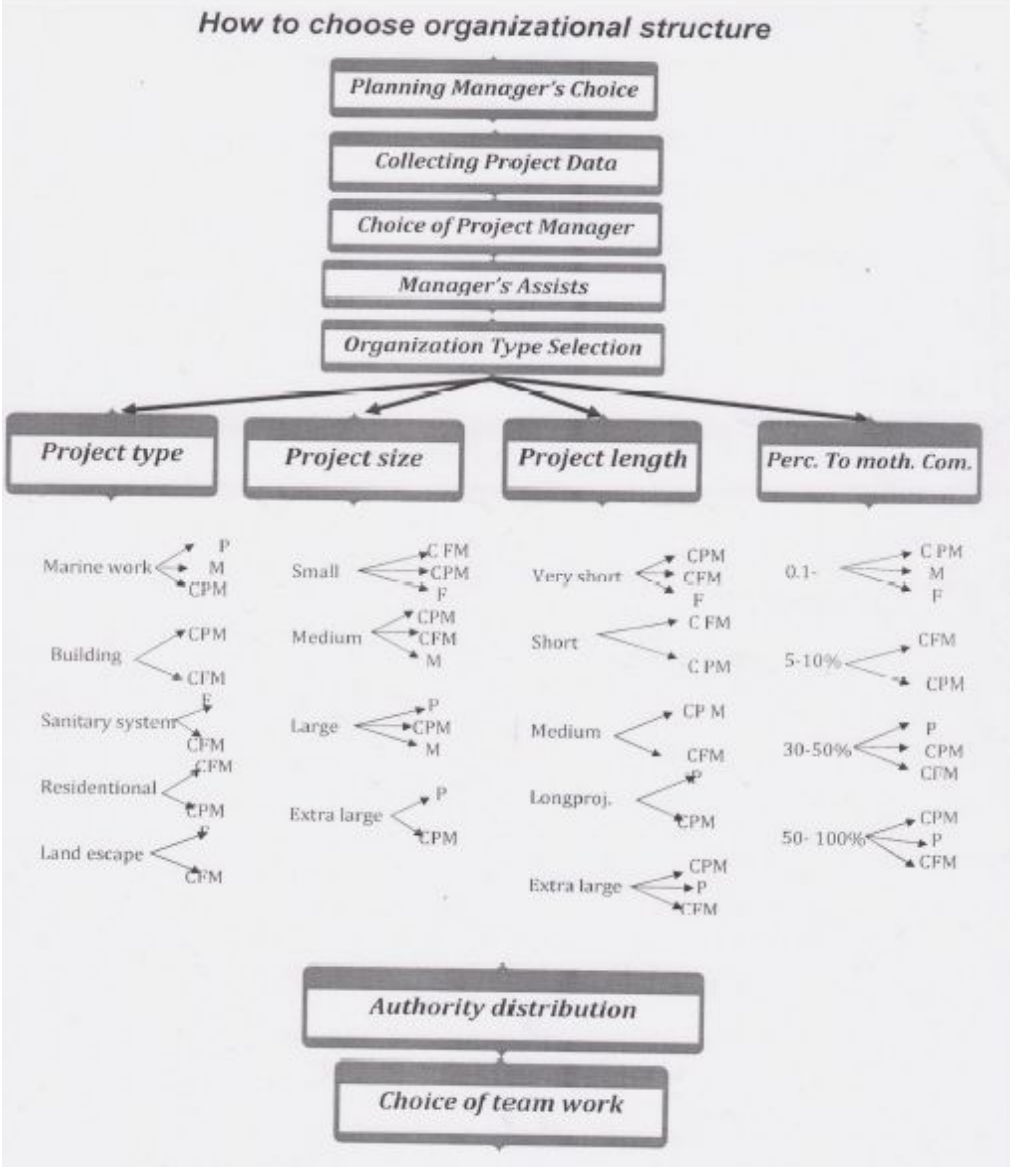

Figure 2.2 Organization structure selection steps mentioned in Elkassas's study

In spite of those flaws, the study made a favorable example for researches to do future research on the organization structure selection. The blemishes, as the reminders,

were very helpful for studying the organization structure for construction site offices in Macau, and also, they were minimized in this report.

CHAPTER THREE

3. METHODOLOGY

After literature review, not many studies focus on the influencing factors to the organization type and there was no survey mentioning the criteria for that in Macau construction industry. Yet it is still convincing that different regions share similar criteria of selecting organization structure, because construction projects in Macau with limited buildable area, are in relatively small scale and less diverse in types compared with other international regions. Referring to Elkassas's study (2013), the very nature of a project affect the organization structure significantly. Project type, project size, project length, size of the contractor and the resources put into the project are considered as primary common criteria for selection. What's more, these factors are not equally significant on the influences of the selection towards different construction projects. So in this report, these four kinds of information will be the main focuses as the selection criteria. In order to figure out whether they are also the parameters for construction industry in Macau when selecting organization structure and how they are relevant to the selections, the questionnaire respondents are required to answer some questions to provide some basic information about the Macau construction projects which can be representative for the corresponding contractors.

In order to find out the differences about the selection practice between the different sizes of companies as well as local and non-local companies, questionnaires will also

be the method to collect the background information of the companies which will help a lot to sort the sizes of them.

From the statements above, questionnaire is apparently the crucial information acquisition way. Several stages are included from searching the target companies to data collection. A work flow presenting these stages is shown in Figure 3.1.

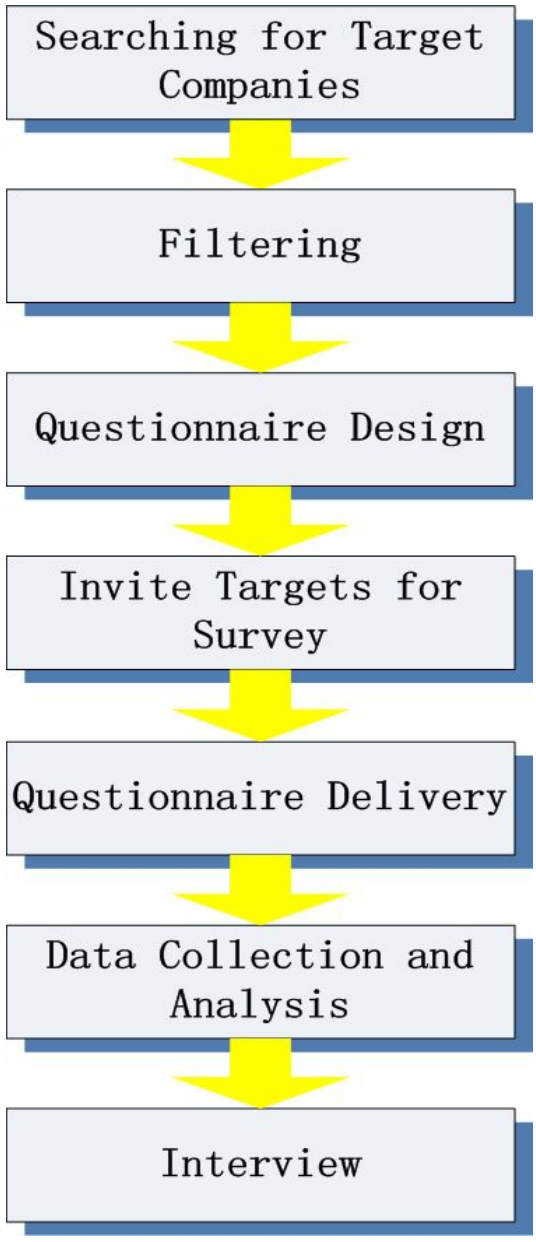

Figure 3.1 Work flow chart for questionnaire survey

3.1 Searching for Target Companies

Since there are various views towards the selection criteria and the construction sites from different parties. In order to identify the organization structures for different construction site offices, the best target should be the parties that know the projects and the sites well. Contractor is the non-substitutable target.

In order to increase the accuracy of the survey result, the total survey samples are supposed to be as large as possible. Thus, all contractors in Macau construction industry should be the data base. As for this survey, filtrating is based on two resources. One is Macau Construction Association, and the other one is the government department DSSOPT (Direcção dos Serviços de Solos, Obras Públicas e Transportes).

3.2 Filtering

3.2.1 First Round of Filtering

As the result accuracy depends on the work's nature of the companies and their activeness in construction market, it is imperative to get rid of those inactive companies or those companies which do not specialize in construction work (e.g. Interior works companies and electricity companies) from the Macau Construction Association list. According to the list, there are 69 registered companies in the construction field.

When it comes to the DSSOPT website, there is no specific list showing the contractors which are active. Therefore, searching for the project bidding documents from 2012 to 2014 becomes the alternative way to find the active companies. For each bidding document, several contractors are listed participating in the tendering process for the construction project with their bidding price. The total number of companies which have participated in tendering government construction or civil engineering project is 53.

3.2.2 Second Round of Filtering

Since the registered members from Macau Construction Association may not be active in the recent years, for example, from 2012 to 2014, the second round of filtering is essential. Besides, the 53 companies that participated in tendering were not all active, because 40 of them didn't win any tender and thus couldn't prove that they had projects recently. Hence, directly contacting the companies for inquiry on their work's nature and recent engagement in construction is the solution for double checking. However, there are some overlaps between the two lists, and some companies on the lists are well-known with their undertaking projects. Not all the contractors obtained from the first round of filtering should be contacted. After eliminating, 74 companies that there is no clue to indicate their activeness from the both lists are required to contact. The contact information, such as telephone number, company address, email address and facsimile number, is obtained through Macau Construction Association website and commercial yellow page. After making phone calls with the 74 companies, 63 companies satisfy the two conditions and thus they

are the final targets for the questionnaire survey invitation. The targets are listed in the appendix: *List of Companies Surveyed*.

3.3 Questionnaire Design

The questionnaire is divided into 5 parts according to the function of the content.

Part 1 is personal information. In this part, personal information of the questionnaire respondent such as the contractor's name he/she is serving, position and contacts can be obtained in case that the respondent requires a copy of this report.

Part 2 is background of the contractor. In this part, seven questions about the basic information of the contractor are asked. They are mainly used for classifying the base regions of the contractors and the sizes of the companies. Therefore, average annual revenue, departments and number of staff are main concerns in this part.

Part 3 is personal opinion to the factors affecting the choice of organization structures for construction site offices. In this part, project type, project size, project length, size of company, resources that the contractor put into the project are listed in the questions and respondents are required to select those factors that affect the choice of organization structures for construction site offices according to their own opinion, and meanwhile, they should rank the importance of their selection.

Part 4 is basic information of the project. In this part, respondent should raise a construction project that is representative for the contractor as example, answering the questions related to the project type, size, length, resources (all the factors included in part 3). Besides, 3 types of organization structure are shown and respondents should select one of them matching the project they raised. Expectations and outcomes of the selected organization structure are also required to answer in order to show the whole perspective towards the organization structure from contractors.

Part 5 is other information. In this part, respondents are asked to state their opinions and comments regarding the organization structures for construction site offices in Macau. In addition, they are asked for the permission for a short interview.

Because of the heavy work load of the staff in contractors during the survey period (before the lunar new year holiday), the questionnaires are designed in both Chinese and English format as cross reference, which can help them to understand the questions and save the respondents' time. Besides, the questionnaire survey from university student is not compulsory for contractors. On the other hand, some staff may not consider the survey as a productive work for them. The return rate is likely to be very low based on the data from other academic studies. Therefore, easing the concerns in order to encourage the contractors to help with the survey is essential. So in front of the fundamental contents, it is clearly stated that the survey result will only be used for analysis in the academic project report and all information, opinions and comments filled in this questionnaire will be kept confidential and will not be disclosed. To further diminish their concerns, the final report will be offered if they

require. Therefore, the sensitive information, such as annual revenue and project information will no longer be the worries. In the meanwhile, the accuracy of the answers increases significantly. A complete version of questionnaire is shown in the appendix: *Original Questionnaire*.

3.4 Invite Targets for Survey

Invitation for this questionnaire survey was carried out through phone calls to all the 63 companies on the target list. With the help of the alumni from Civil Engineering department and under the sincere request for academic research, the targets were all willing to accept the survey invitation.

3.5 Questionnaire Delivery

The questionnaires with total 10 pages in both English and Chinese format were sent to the targets in person. It took 3 days of delivery within office hours in total. During the delivery, receptionists were requested to hand it over to the relevant colleagues, for example, project managers or general managers. Researchers collected the questionnaires approximate one week after they were delivered, so that the respondents were given sufficient time to complete the questionnaires. For convenience in resolving possible confusion on the questions, researchers' contact information was delivered to the receptionists as well. However, some address from the Internet was incorrect or ineffective and some questionnaires were rejected by the

companies occasionally after they went through the content. Finally, 50 questionnaires were delivered successfully.

3.6 Data Collection and Analysis

19 questionnaires in total were finally collected. As 63 companies were set as the target for this survey, the response rate was 30.2%, which was high enough to be considered as a reasonably successful result. A brief description of the results for the questionnaire is given in Table 4.1 and Table 4.2 in chapter four *Results and Discussion*.

3.7 Interview

After viewing the feedback of the 19 questionnaires, overall 2 respondents were willing to participate in a face-to-face interview to help look deeper into the project. Besides, through personal contact, another 5 companies would like to do one favor to accept the interview. The content of this 20-minute interview covered the organization structure for the head office, the management system between head office and site office and the personal assessments of the Macau construction industry as well as the special issues regarding to casino projects. The whole process of the interview was recorded by asking permission in advance. The origins of the 7 companies in different scales interviewed vary from Hong Kong, Macau and Mainland China, and thus the diversity reasonably promises the validity and persuasiveness of the collected opinions and information. Moreover, the interviewees

not only explained their opinions in exhaustive detail, but also gave plenty of suggestions and comments on the questionnaire and the research. All the data collected through the interviews will be supportive evidence for the questionnaires and be discussed in the next chapter and throughout the report. Interview questions are shown in the appendix: *Interview Questions Sample*.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

Table 4.1 and Table 4.2 show the complete results of the 19 returned questionnaires.

Table 4.1 Questionnaire result part 1

No.	Question	Results of the Questionnaires																				
		Options and results																				
1	Location of the base company	Macau			Hong Kong					Mainland China					Foreign coutry or others							
	Percentage of selection (%)	78.9			10.5					10.5					0							
2	Number or staffs in the company	0-20	21-40	41-60	61-80	81-100	>100															
	Percentage of selection (%)	21.1	10.5	26.3	0	5.3	36.8															
3	Number of years of establishment	0-5	6-10	11-20	21-30	31-40	>40															
	Percentage of selection (%)	0	21.1	52.6	10.5	5.3	10.5															
4	Conscruction projects in progress in 2014	Yes		No																		
	Percentage of selection (%)	100		0																		
5	Existing departments	Estimating	Quantity Surveying	Planning	Engineering Support	Plant	Purchases	Human Resources	Safety	Financial	Contracting	Administration	None	Others								
	Percentage of selection (%)	36.8	68.4	47.4	63.2	47.4	73.7	68.4	47.4	78.9	52.6	68.4	21.1	5.3								
6	Average annual revenue for the recent five years (million MOP)	<50	50-100	100-500	500-1,000	1,000-3,000	3,000-5,000	>5,000	No selection													
	Percentage of selection (%)	15.8	31.6	21.1	10.5	0	0	15.8	5.3													
7	Possible trend(s) in the coming 5 years	Adding departments		Increasing manpower		Increasing financial investments		Increasing equipment		Increasing annual revenue												
	Percentage of selection (%)	11.8		70.6		0		41.2		70.6												
8	Factors affecting organization structures for site offices	Project type		Project size		Project length		Size of contractor		Resources		Others										
	Percentage of selection (%)	63.2		78.9		63.2		57.9		31.6		5.3										
9	Importance of factors selected in Question 8	Percentage of levels selected (%)																				
		0 (unselected)	1	2	3	4	5															
	Project type	36.8	0	10.5	15.8	21.1	15.8															
	Project size	21.1	5.3	0	10.5	21.1	42.1															
	Project length	36.8	5.3	5.3	15.8	15.8	21.1															
	Size of contractor company	42.1	5.3	0	15.8	26.3	10.5															
	Resources put into the project	68.4	5.3	0	5.3	5.3	15.8															
	Others	94.7	0	5.3	0	0	0															
10	Type of the project	Residential building	Road construction	Commercial building	Tunnel Construction	Rehabilitation work	Bridge construction	Railway construction	Casino/ hotel	Sanitary system	Others											
	Percentage of selection (%)	42.1	5.3	5.3	0	0	10.5	0	31.6	0	5.3											
11	Approximate project length (days)	<100	100-200	201-300	301-400	401-500	501-600	601-700	>700													
	Percentage of selection (%)	0	21.1	21.1	10.5	10.5	10.5	5.3	21.1													
12	Approximate total budget of the project (million MOP)	<10	10-50	50-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1,000	>1,000	No selection							
	Percentage of selection (%)	5.3	26.3	15.8	5.3	15.8	5.3	5.3	5.3	0	5.3	0	0	5.3	5.3							

Table 4.2 Questionnaire result part 2

13	Approximate percentage the project budget taking in total budg	<20%	20%-40%	40%-60%	60%-80%	>80%	No selection	
	Percentage of selection (%)	10.5	36.8	26.3	5.3	15.8	5.3	
14	Labor forces put into the project (construction site)	< 10 people	10-20 people	20-30 people	30-40 people	40-50 people	>50 people	
	Percentage of selection (%)	5.3	31.6	5.3	10.5	5.3	42.1	
15	Approximate percentage the project manpower taking in total manpow	<20%	20%-40%	40%-60%	60%-80%	>80%	No selection	
	Percentage of selection (%)	10.5	57.9	5.3	10.5	10.5	5.3	
16	Organization structure used for the project construction site offi	Departmental organization	Project organization	Matrix organization				
	Percentage of selection (%)	26.3	36.8	36.8				
17	Expectations for contractor towards the organization structure	Percentage of levels selected (%)						
		0 (unselected)	1	2	3	4	5	
	Better human resource arrangement	5.3	0	15.8	10.5	21.1	47.4	
	Effective order delivery	5.3	0	0	15.8	47.4	31.6	
	Clear communication between staff	0	10.5	0	21.1	26.3	42.1	
	Simple and clear lines of duties and responsibilities	0	0	5.3	10.5	52.6	31.6	
	Fast decision making	0	0	0	15.8	47.4	36.8	
	Avoid bureaucracy	5.3	0	5.3	36.8	26.3	26.3	
	Innovative solutions	10.5	5.3	10.5	36.8	21.1	15.8	
	Full utilization of resources	0	0	5.3	31.6	31.6	31.6	
	Chances for developing special knowledge or skills	15.8	0	15.8	36.8	21.1	10.5	
	Others	100	0	0	0	0	0	
18	Fulfillments of expectations selected in Question 17	Percentage of levels selected (%)						
		0 (unselected)	1	2	3	4	5	
	Better human resource arrangement	5.3	5.3	5.3	21.1	42.1	21.1	
	Effective order delivery	5.3	5.3	5.3	26.3	52.6	5.3	
	Clear communication between staff	0	0	15.8	36.8	31.6	15.8	
	Simple and clear lines of duties and responsibilities	5.3	0	0	47.4	42.1	5.3	
	Fast decision making	5.3	5.3	10.5	31.6	42.1	5.3	
	Avoid bureaucracy	5.3	10.5	10.5	42.1	21.1	10.5	
	Innovative solutions	10.5	15.8	21.1	26.3	21.1	5.3	
	Full utilization of resources	0	0	15.8	47.4	31.6	5.3	
	Chances for developing special knowledge or skills	21.1	0	26.3	31.6	21.1	0	
	Others	100	0	0	0	0	0	
19	Opinions on contractor making adjustment on organization structure	Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
	Percentage of selection (%)	10.5	5.3	47.4	31.6	5.3		
21	Participation in any casino or hotel construction project	Yes	No					
	Percentage of selection (%)	78.9	21.1					

In this questionnaire survey, 4 out of 19 respondents are non-local contractors (foreign-based contractors). For the discussion in this chapter, most of them will be separated into two groups to make comparison according to the respondents' base company.

4.1 Departments for Contractors

Departments are the essential constitutions of an organization structure. Investigation on the departments of a contractor is helpful to look deeper into its organization structure.

Table 4.3 Questionnaire result for existing departments in contractors

Departments	Number of respondents chosen		Total Percent of Cases (Local + Non-local)
	Local company	Non-local company	
Estimating	4	3	36.8%
Quantity Surveying	9	4	68.4%
Planning	5	4	47.4%
Engineering Support	8	4	63.2%
Plant	5	4	47.4%
Purchase	10	4	73.7%
Human Resources	9	4	68.4%
Safety	5	4	47.4%
Financial	11	4	78.9%
Contracting	6	4	52.6%
Administration	9	4	68.4%
None	4	0	21.1%
Others	0	1	5.3%

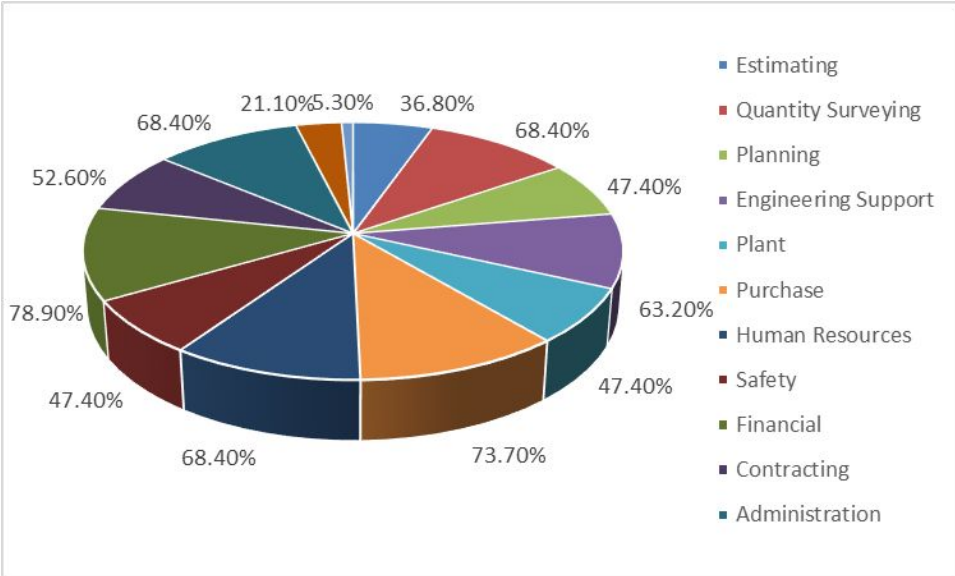

Figure 4.1 Result for existing departments in contractors (in percentage)

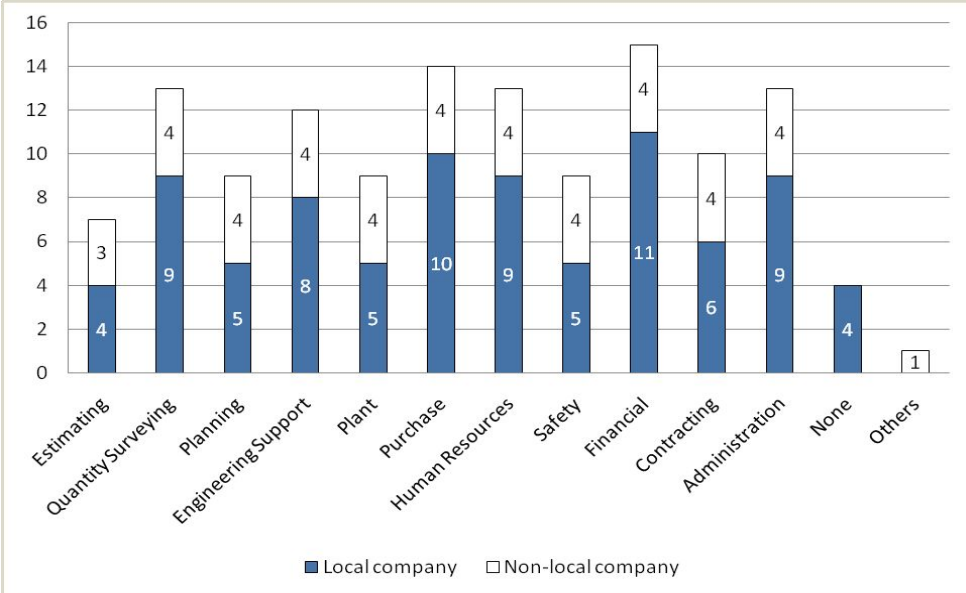

Figure 4.2 Result for existing departments in contractors (in number)

Table 4.3, Figure 4.1 and Figure 4.2 are the results from the survey questionnaire regarding the departments. It can be seen in Table 4.3 from column "Percent of Cases", financial department is the most critical department for contractors with 78.9% selection. It also shows that over 70% of the respondents have purchase department. It implies that a company's finance is the top issue for a company and

therefore an independent division shall be established to control the cash flow. However, estimating department involved in tendering and to some degree money, seems to be not very important for contractors in Macau. From Figure 4.2 only 7 out of 19 respondents have this department. Nevertheless, some respondents claim that their contracting or financial department has the function as estimating department, which means that the department division in Macau may not be specific as other religions, but they are competent to accomplish all relative required jobs.

As the Table 4.3 indicates, almost half of the respondents have established safety department, which signifies that the organization structure for contractors in Macau is keeping pace with the international trends and thus contractors can gain more reputation from it.

In the 19 respondents, 4 of them are non-local contractors. When focusing on the non-local contractors, the data shown in Table 4.3 indicates that 3 non-local respondents have established all the departments listed in the questionnaire. The remaining one have all the departments except estimating departments. According to the proportion, it is clear that foreign-based contractors tend to develop organization structures with diverse and comprehensive departments. The reason may be that for non-local contractors, competiveness is the dominant factors to root into Macau construction industry and diverse departments may help them to show extensive functional advantages.

It can be seen from the Table.4.3 that one of the respondents gives the information about other departments. As it is mentioned, logistics, QA/QC, architectural design, interior design and document control departments are also established in his company. In addition, 4 respondents with relatively small company size claim that they just work as a team and have not yet established any department.

4.2 Opinions to the Factors that Affects the choice of Organization Structure for Site Office

In the questionnaire, six factors are listed as the selection criteria of organization structure for site office. Respondents can make a multiple selection on this question and shows their opinions to these factors. For example, opinions like whether these factors are relevant to selection and how important they are during the selection process were collected.

Table 4.4 Questionnaire result for factors affecting the choice of organization structures for site office

Factors affecting organization structure for project	Number of respondents chosen		Total Percent of Cases (Local + Non-local)
	Local company	Non-local company	
Project type	9	3	63.2%
Project size	11	4	78.9%
Project length	8	4	63.2%
Size of contractor	8	3	57.9%
Resources	4	2	31.6%
Others	0	1	5.3%

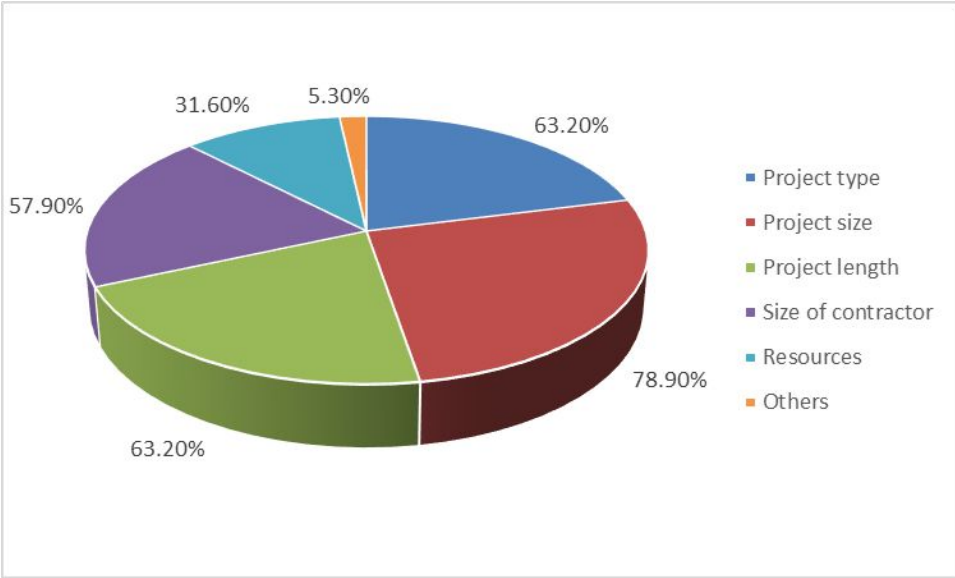

Figure.4.3 Result for factors affecting organization structures for site office (in percentage)

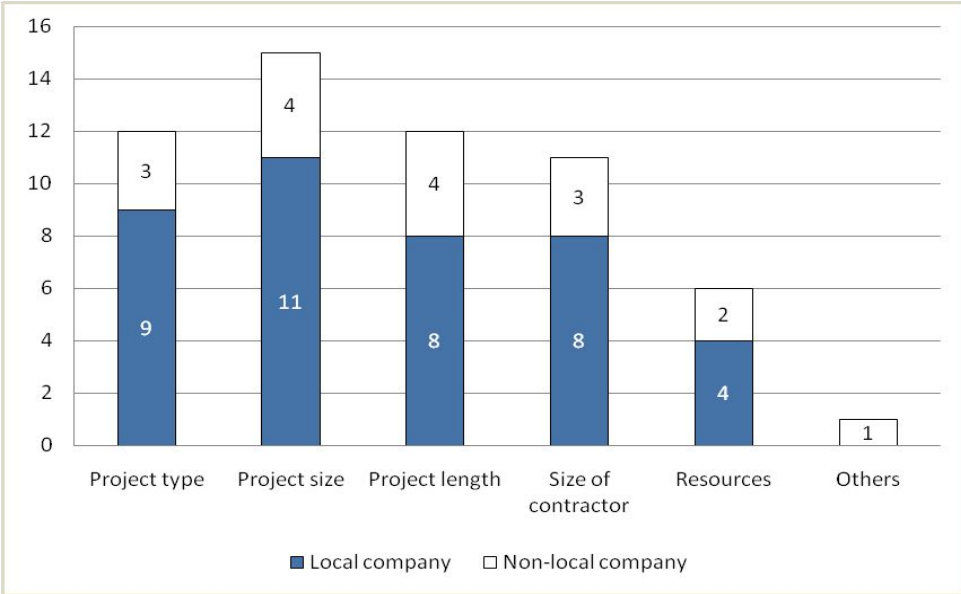

Figure 4.4 Result for factors affecting organization structures for site office (in number)

In Figure 4.3 and Figure.4.4, project size accounts for the leading percentage among the selection of the respondents, which means that 15 (78.9%) respondents think that project size influences the selection of organization structure. Project type and project

length share the same rate of selection, which is 63.2%. And the result indicates that they may also be very important in deciding the organization structure in site office. The remaining listed factors also seem to have some effects on the selection. The proportion of size of contractor and resources are 57.9% and 31.6% respectively.

It is comprehensible that usually a contractor will adopt the same type of organization structure for all projects, however, the labor force in the site relies on the size of the project. In other words, the project size directly contributes to the number of staff required to stay in the site, and thus, there is no doubt that project size is the most chosen factor influencing the organization structure. What's more, project type and project length are related to the construction method, procedure and planning of a project, which to some degree affects the staff and department arrangement in the site. Concerning the size of contractor, it has indirect but distinct impact on the project size and project type, which leads to 11 selection. This idea will be further discussed in section 4.3.1 *Relation between Company Size and Organization Structure.* Resource that a contractor put into the project shows the weight that the contractor gives to the project and it also makes different to the arrangement of staff number. But, apparently, it also depends on the project size. Hence, it may be relevant but not very important.

Comparing the selection of local contractors and non-local contractors, there is no obvious difference. Project size is the most chosen factor in accordance with the two groups' perspectives. However, more proportion of selection in project length is shown among non-local contractors. The reason for that may be non-local contractors

have to pay more attention to the allocation of human resources. The longer a project lasts, the more considerations shall be carried on the assigning staff to the site in Macau.

Some other factors are raised by a respondent. It is mentioned that the company background and past practices play an important role in organization structure in the site as well. Specifically, they are the actual proof of reputation of a contractor, which have impact on awarding construction contracts. Therefore, implicit relation between these two factors and the nature of the project can be seen and they can conservatively influence the organization structure without doubt.

As a matter of fact, according to the questionnaire, after selecting the factors, respondents are required to rank the importance of each factor they selected. Importance degree was designed from least important, less important, neutral, important to most important. Table 4.5 shows the exact questionnaire result data collected.

Table 4.5 Questionnaire result for importance of factors selected

Importance of factors selected in Question 8	Importance Level(%)					
	unselected	Least important	Less important	Neutral	Important	Most important
Project type	36.8	0	10.5	15.8	21.1	15.8

Project size	21.1	5.3	0	10.5	21.1	42.1
Project length	36.8	5.3	5.3	15.8	15.8	21.1
Size of contractor company	42.1	5.3	0	15.8	26.3	10.5
Resources put into the project	68.4	5.3	0	5.3	5.3	15.8
Others	94.7	0	5.3	0	0	0

Table 4.6 Questionnaire result for importance of factors selected (regrouped)

Importance of factors selected in Question 8	Importance Level(%)		
	unselected	Important	Decisive
Project type	36.8	26.3	36.9
Project size	21.1	15.8	63.2
Project length	36.8	26.4	36.9
Size of contractor company	42.1	21.1	36.8
Resources put into the project	68.4	10.6	21.1
Others	94.7	5.3	0

Table 4.5 and Table 4.6 summarize the opinion to the important index of each factor. Table 4.5 is the exact result of the question 9 in the survey questionnaire, and Table 4.6 is a result after statistically analyzing of Table 4.5. The column “unselected” shows the percentage of the respondents who think the corresponding factor is irrelevant to the organization structure arrangement. The column “Important” in Table 4.6 is the sum of the columns “least important”, “less important” and “neutral” in Table 4.5. And the column “Decisive” is the sum of the remaining columns in Table 4.5. Project size accounts for the greatest proportion of the degree “most important” as well as “decisive”, which is further evidence to prove it a dominant factor influencing the organization structure selection.

As project size increases, the complexity of the project will often increase as well. Financial and human resources involved, number and size of deliverables to be produced and timeframes involved in delivery are all should be planned before a project based on the project size. As different scales of project require different operations in each stage such as planning, execution and closure, under no circumstance should it be ignored when considering the organization structure arrangement. Project length, however, is kind of dependent variable of project size, and therefore respondents may think it is not as decisive as project size. Moreover, compared with other regions, the construction project in Macau has relatively less types because of its restriction of area. Contractors can only handle some similar types of project, for example, residential and commercial buildings. Hence they usually adopt the similar organization structure to those job, leading to the result that project type is less decisive than project size.

4.3 Organization Structure for Site Office in Macau

In the questionnaire, after filling out the basic information of a representative project, respondents are requested to select the most similar organization type of that project. Three types mentioned in chapter two *Literature Review* including departmental organization, project organization and matrix organization are listed as options. Table 4.7 shows the result of the organization type selection.

Table 4.7 Questionnaire result for organization structure used for construction site office

Organization structure for projects	Number of respondents chosen		Total Percent (Local + Non-local)
	Local company	Non-local company	
Departmental organization	4	1	26.3
Project organization	6	1	36.8
Matrix organization	5	2	36.8
Total	15	4	100.0

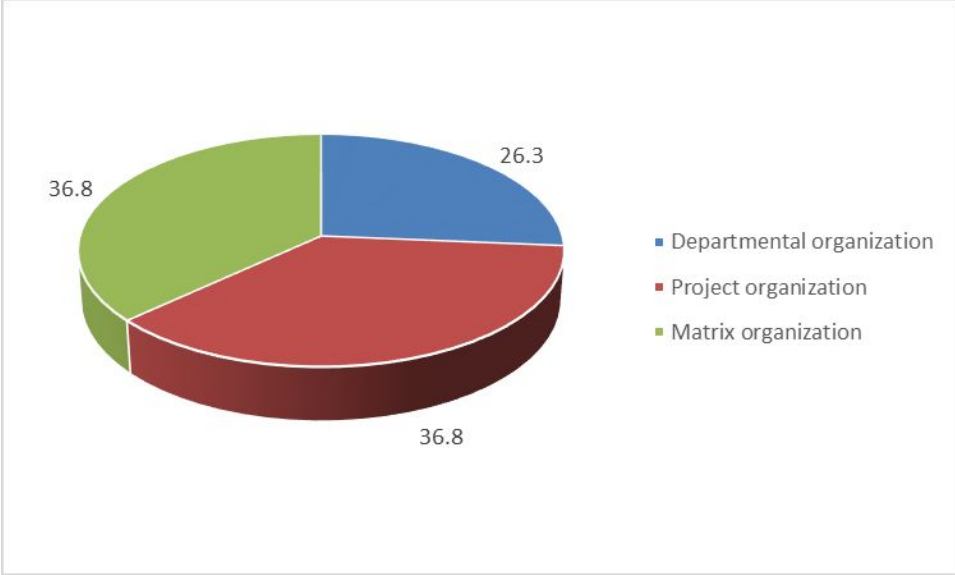

Figure 4.5 Result for organization structure used for construction site office (in percentage)

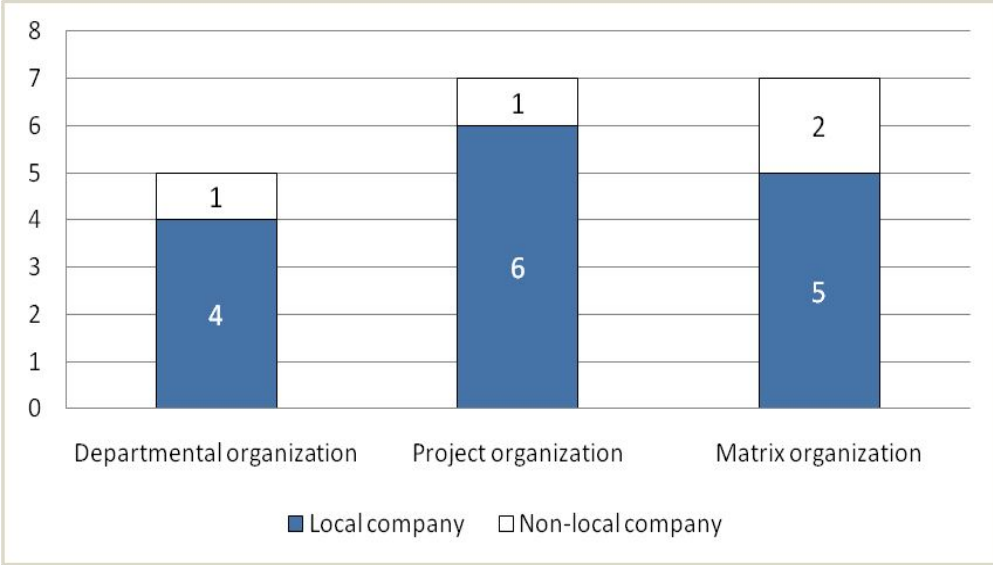

Figure 4.6 Result for organization structure used for construction site office (in number)

As it can be seen from the results, there is no significant disparities among the three types of organization structure for construction projects. 5 respondents suggest that they adopt a departmental organization structure in their familiar projects. An equal

proportion of project organization and matrix organization is shown, which has a frequency of 7 selections.

In terms of the comparison between local and non-local company, relatively larger proportion of non-local company chose the matrix organization structure. However, the most chosen (6 out of 15) organization type for local contractor is project organization. It implies that non-local company may develop a more mature management system than local company does. Because matrix organization have clear functional hierarchy as well as the parallel management.

4.3.1 Relation between Company Size and Organization Structure

It is claimed in the previous section that the size of contractor is a factor that influences the organization structure arrangement in the site. Initially, the questionnaire was designed to obtain two criteria for company size. One is the number of staff and the other one is the average annual revenue in recent 5 years. Compared with the staff number, average annual revenue seems not that apparent to a respondent. In addition, it is a sensitive information for a company. Therefore, statistically analysis in performed on the average annual revenue based on the collected data. It is clear that the location of base company, years of establishment of a company as well as the number of staff in the company are relevant to the annual revenue. Besides, it is a continuous variable, a regression analysis is required.

Table 4.8 Model summary for regression analysis

Model Summary									
					Change Statistics				
Model	R	**R Square**	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.798[a]	.637	.565	1.364	.637	8.791	3	15	.001

Table 4.8 is prepared by SPSS, and it shows that when the location of base company, years of establishment of a company and the number of staff in the company serve as predictors and the average annual revenue acts as the dependent variable, R square value is 0.637 and Sig. F Change value is 0.001. In the field of statistics, when R

square is larger than 0.5 and Sig. F Change is smaller than 0.05, the model is effective and most of the changes of dependent variable can be predicted by this model. And the model is specified by Table 4.9.

Table 4.9 Coefficients for regression model

Coefficients										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-1.613	.985		-1.638	.122	-3.711	.486		
	the location of base company	1.427	.554	.463	2.574	.021	.246	2.609	.746	1.340
	the number of staff in the company	.093	.174	.093	.534	.601	-.278	.465	.804	1.244
	years of establishment of a company	.705	.323	.411	2.181	.046	.016	1.395	.681	1.468

According to the Table 4.9, it can be seen from the "Unstandardized Coefficients" column, the regression model is:

Average annual revenue = 1.427 × the location of base company + 0.093 × the number of staff in the company + 0.705 × years of establishment of a company-1.613.

It indicates that the effects of the number of staff is the smallest to the annual revenue, which doesn't quite make sense. Moreover, when checking the column "Sig.", it shows that the value of the number of staff in the company is 0.601 which is much greater than 0.05. It means that there is no significant relation between these two variables. Since the result goes totally against the general common sense, it would be better if considering the data of revenue as non-serious results. Therefore, the only criterion to classify the company size will be the number of staff in company.

Table 4.10 Questionnaire result for number or staffs in the company

number of staff in company	Departmental organization	Project organization	Matrix organization	Total
0-20	1	1	2	4
21-40	0	2	0	2
41-60	1	3	1	5
61-80	0	0	0	0
81-100	0	0	1	1
>100	3	1	3	7
Total	5	7	7	19

Table 4.11 Questionnaire result for number or staffs in the company according to new company size classification

number of staff in company	Departmental organization	Project organization	Matrix organization	Total
Small Company(0-40)	1	3	2	6
Medium Company(41-80)	1	3	1	5
Large company(>80)	3	1	4	8
Total	5	7	7	19

In this report, contractor is divided into three sizes.

Small size companies refer to those with less than 40 staff.

Medium size companies refer to those with staff number at between 41 and 80.

Large size companies refer to those with over 80 staff.

Table 4.10 is the original data collected by questionnaire and Table 4.11 is prepared according to the company size classification. As the size of company becomes lager, the departmental and matrix organization structure is more popular (with 3 and 4 selections respectively) in construction site office. The reason could be the size of company is a standard of the competence and capability for a company, and therefore, it is a major factor considering awarding a contract. Large companies tend to win the bid of complex construction projects which require a more ordered and better organized structure. Departmental and matrix organization meet the requirement better than project organization and therefore, these two sorts of organization structure are favorable for large companies.

On the other hand, during a project, small companies spend a lot of concentration on the cost. Concerning small projects, departmental and matrix organization in some way lower the efficiency of order delivery and lead to higher cost. Since small companies have less technical and budget competence, they will usually handle small projects. So project organization structure is more favorable for them.

4.3.2 Adjustment to Current Adopted Organization Structure

In the questionnaire, a question is designed to ask whether the respondents would agree to make adjustment to the current organization structure for the site office. Figure 4.7 and 4.8 show the intuitive results.

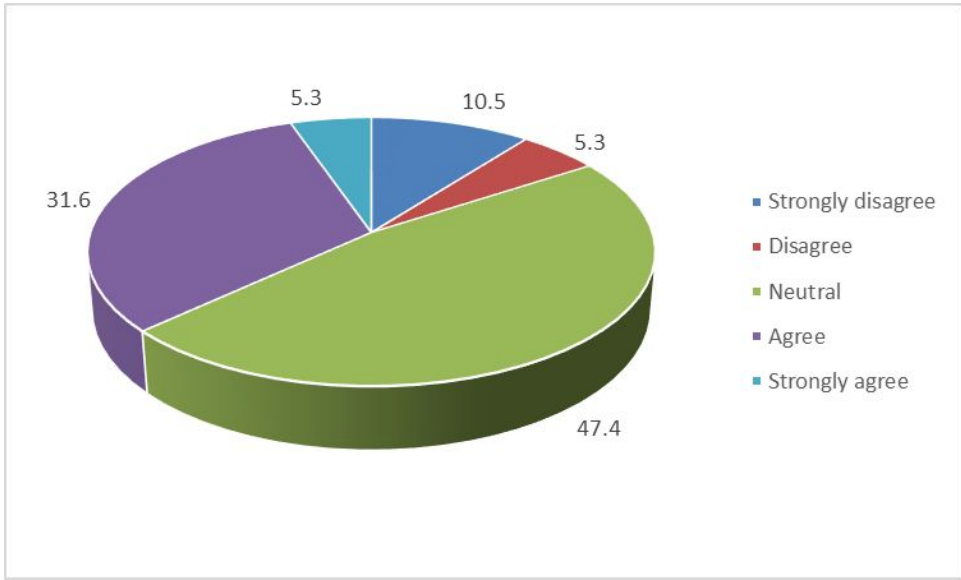

Figure 4.7 Result for making adjustment to organization structure (in percentage)

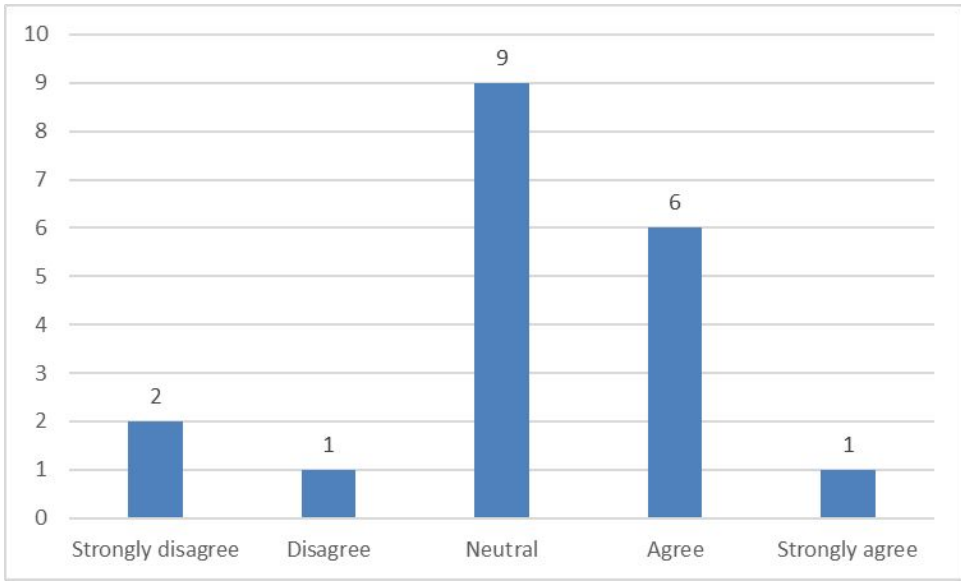

Figure 4.8 Result for making adjustment to organization structure (in number)

At the end of the questionnaire, respondents were requested to select their attitudes towards current organization structure in the site office. The results above show that nearly half of the respondents hold the neutral opinion to the adjustment. And it is noticeable that the proportion of “agree to make adjustment” is 31.6%, which is surprisingly large than expected. Less than 16% of respondents hold the idea that the current organization structure is acceptable and are against the adjustment of it. The main reason may be the outcome of the organization structure is not desirable enough. The outcome and fulfillment of the structure will be further discussed in the section 4.4 *Expectations and fulfillment to the organization structure for site office.*

4.3.3 Organization Structure for Contractors involved in Casino/Hotel Project

At the end of the questionnaire, respondents are requested to select whether they have participated in any casino or hotel construction project. The result is shown in Table 4.12.

Table 4.12 Questionnaire result for participation in any casino/hotel construction project

Participation in any casino or hotel construction project	Number of respondents chosen	Percent
Yes	15	78.9
No	4	21.1
Total	19	100.0

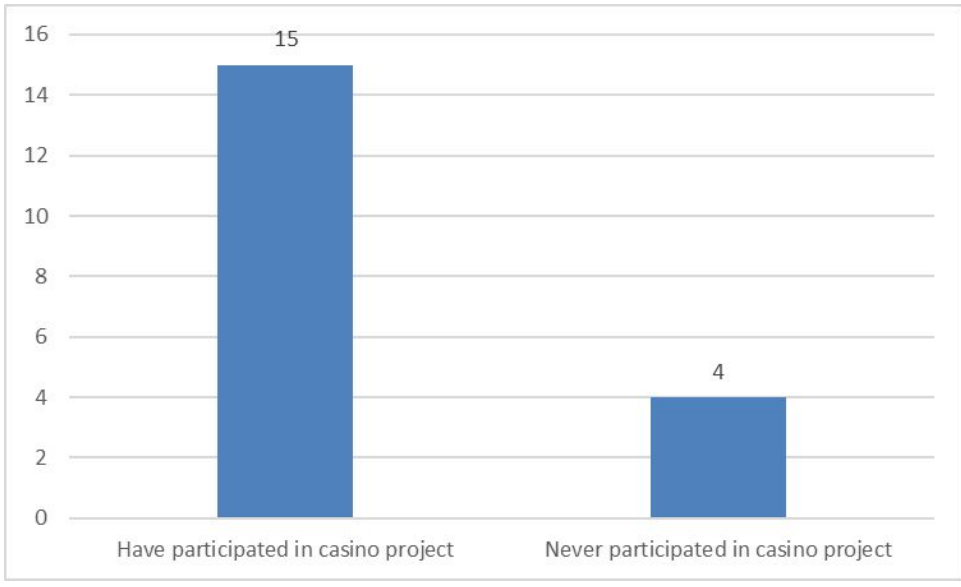

Figure 4.9 Result for participation in any casino/hotel construction project

From Table 4.12 and Figure 4.9, it can be easily found that 78.9% of respondent contractor have the experience participating in casino projects. However, it is obvious that not all of them can be qualified to act as the main contractor in that kind of large-scale construction project with high complexity. In fact, only several of them whose base company are outside Macau have ever been the main contractor for casino projects. More discussion will be presented in the section 4.7.2 *Interview Results of Non-Local Contractors*.

4.4 Expectations and Fulfillment to the Organization Structure for Site Office

Each contractor has its own expectations toward the organization structure in the site, but not all of them can be fulfilled as they are expected. In the questionnaire, 9 expectations covering most benefits caused by organization structure directly or indirectly are listed to be chosen. The results are shown in Table 4.13.

Table 4.13 Questionnaire result for Expectations towards the organization structure

Expectations	Importance level (%)					
	unselected	Least important	Less important	Neutral	Important	Most important
Better human resource arrangement	5.3	0	15.8	10.5	21.1	47.4
Effective order delivery	5.3	0	0	15.8	47.4	31.6
Clear communication between staff	0	10.5	0	21.1	26.3	42.1
Simple and clear lines of duties and responsibilities	0	0	5.3	10.5	52.6	31.6
Fast decision making	0	0	0	15.8	47.4	36.8
Avoid bureaucracy	5.3	0	5.3	36.8	26.3	26.3
Innovative solutions	10.5	5.3	10.5	36.8	21.1	15.8
Full utilization of resources	0	0	5.3	31.6	31.6	31.6
Chances for developing special knowledge or skills	15.8	0	15.8	36.8	21.1	10.5

It is clear from the table above that almost half of the respondents think that *"better human resources management"* is one of the most important expectations. "*Clear communication"* also accounts for big amount for this degree, which is 42.1% of selections. Besides, "*fast decision making*, *effective order delivery"*, "*simple and clear lines of duties and responsibilities"* and "*full utilization of resources"* have over 30% percentage. When grouping the selection of "important" and "most important", "*simple and clear lines of duties and responsibilities"* and "*fast decision making"* have the greatest proportion (84.2%) while "*effective order delivery"* makes up 79%. Moreover, "*better human resources management"* has the fourth greatest percentage which is 68.5%. These four expectations can be leveled as vital for contractors. They are all related to the high work efficiency of a company, which conforms to the modern trends of international business management.

However, "*chances for developing special knowledge and skills"* which have the highest unselected rate are less cared. The phenomenon is likely to reduce the possibility of the cultivation of special professional talents, which hinders the technical development of the construction industry in Macau.

Table 4.14 Questionnaire result for Fulfillment of expectations selected

Expectations	Fulfilled level (%)					
	unselected	Least fulfilled	Less fulfilled	Neutral	fulfilled	Most fulfilled
Better human resource arrangement	5.3	5.3	5.3	21.1	42.1	21.1
Effective order delivery	5.3	5.3	5.3	26.3	52.6	5.3
Clear communication between staff	0	0	15.8	36.8	31.6	15.8
Simple and clear lines of duties and responsibilities	5.3	0	0	47.4	42.1	5.3
Fast decision making	5.3	5.3	10.5	31.6	42.1	5.3
Avoid bureaucracy	5.3	10.5	10.5	42.1	21.1	10.5
Innovative solutions	10.5	15.8	21.1	26.3	21.1	5.3
Full utilization of resources	0	0	15.8	47.4	31.6	5.3
Chances for developing special knowledge or skills	21.1	0	26.3	31.6	21.1	0

Table 4.14 shows the fulfillment level of each expectation. As for the vital expectations discussed above, only 5.3% of respondents consider "*simple and clear lines of duties and responsibilities", "fast decision making"* and "*effective order delivery"* as most fulfilled. "*Better human resources arrangement"* seems easier to accomplish, which has 21.1% regarding most fulfilled. Most selections of each expectation are centralized in neutral and fulfilled level, which indicates the outcome

may not be as satisfying as expected, but it is somewhat within the range of acceptance. What's more, over 40% of respondents define the four vital expectations have been fulfilled.

The fulfillment of an expectation relies on many uncontrollable factors. The comprehension of staff, synergy between superiors and subordinates, manpower shift are all relevant to the outcome. A stable and flexible management system can ensure a strong organization structure and in return, outcomes will be increasingly satisfying. Moreover, the results above only represent the subjective opinions of the respondents which may not be that objective to reflect the whole construction market in Macau.

4.5 Validity Test of the Management Tool Proposed by Elkassas

As it is mentioned in chapter two *Literature Review*, a management tool of selecting organization structure for contractors in Egypt was proposed in a previous study (Elkassas *et al*.2013). However, it is not very convincing because its low testing samples and validity in Egyptian construction market. In this section, this tool will be used based on the project information collected by the survey and check its validity to Macau construction industry. Similar process will be implemented. Specifically, answer the four questions raised in the tool and then find out the highest possibility of organization type. In fact, the range of the options set in questionnaire is not exactly the same as the Elkassas's study about the budget amount, budget percentage as well as the project length. For example, concerning budget percentage, there is some overlaps between the option "40% to 60%" in this questionnaire and the classification "50% to 100%" in Elkassas's study. So only two questionnaire results are fitted to be performed the test.

Table 4.15 Validity test for management tool of Elkassas's study

Company number	Project type	Project size	Project length	Project budget taking in total budget	Test result	Actual organization structure	Validity
1	Building	Extra large	M	50-100	P	F	No
2	Residential	Extra large	S	50-100	P	P	Yes

The meanings for following letters were mentioned in Elkassas's study:

Extra large= budget more than 200 EGP millions (around 210.6 million mop)

M = Medium (19-24 months)

S = Short (12-18 months)

P = project organization

F = functional organization

It has to be noticed that because the classification of the type of organization structure in the two researches is not exactly the same as well, the test result is already gotten rid of the types not covered in this study. From Table.4.15, only half of the results prove the tool valid. However, it cannot be concluded that the tool is not suitable for Macau construction market because the sample amount being tested is still too small and the inconsistent classification may lead to the inaccuracy of the result. But after all it is a model of selecting organization structure that can be referred to practically. Also, it provides a clue for the future study in relative field.

4.6 Tool of Selecting Organization Structure for Construction Project in Macau

Based on the questionnaire results and the foundation management tool of Elkassas's study, a new model which describes better the Macau construction industry is proposed in this study. The tool consists of 6 criteria related to the nature of the project and helps to figure out the optimum or most acceptable organization structure for site office in Macau. Table 4.16 to Table 21 are the crosstab results between organization structure type and project type, project length, budget of the project, approximate percentage the project budget taking in total budget, labor forces put into the project (construction site) and approximate percentage the project manpower taking in total manpower. They are the preparations for the tool. As some options are not selected by any respondent, they will be omitted in these tables.

Table 4.16 Crosstab between organization structure type and project type

organization structure type	project type						Total
	Residential building	Road construction	Commercial building	Bridge construction	Casino or hotel	Landscape work	
Departmental	0	0	1	0	3	1	5
Project	4	1	0	1	1	0	7
Matrix	4	0	0	1	2	0	7
Total	8	1	1	2	6	1	19

Table 4.17 Crosstab between organization structure type and project length

organization structure type	Project length (days)							Total
	100-200	201-300	301-400	401-500	501-600	601-100	>700	
Departmental	2	0	0	0	0	1	2	5
Project	2	2	0	1	1	0	1	7
Matrix	0	2	2	1	1	0	1	7
Total	4	4	2	2	2	1	4	19

Table 4.18 Crosstab between organization structure type and budget of the project

organization structure type	budget of the project (million Mop)											Total
	unselected	<10	10-50	50-100	100-200	200-300	300-400	400-500	500-600	700-800	>1000	
Departmental	0	0	1	1	0	1	1	0	1	0	0	5
Project	0	1	2	1	0	1	0	1	0	1	0	7
Matrix	1	0	2	1	1	1	0	0	0	0	1	7
Total	1	1	5	3	1	3	1	1	1	1	1	19

Table 4.19 Crosstab between organization structure type and budget %

organization structure type	Approximate percentage the project budget taking in total budget(%)						Total
	unselected	<20	20-40	40-60	60-80	>80	
Departmental	0	0	2	0	1	2	5
Project	0	2	3	1	0	1	7
Matrix	1	0	2	4	0	0	7
Total	1	2	7	5	1	3	19

Table 4.20 Crosstab between organization structure and labor forces put into the project

organization structure type	labor forces put into the project (construction site)						Total
	<10	10-20	20-30	30-40	40-50	>50	
Departmental	0	0	0	1	0	4	5
Project	0	5	0	0	0	2	7
Matrix	1	1	1	1	1	2	7
Total	1	6	1	2	1	8	19

Table 4.21 Crosstab between organization structure type and labor forces %

organization structure type	Approximate percentage the project manpower taking in total manpower(%)						Total
	unselected	<20	20-40	40-60	60-80	>80	
Departmental	0	1	2	0	1	1	5
Project	0	1	5	1	0	0	7
Matrix	1	0	4	0	1	1	7
Total	1	2	11	1	2	2	19

According to Table 4.16 to Table 4.21, a tool is proposed to select the organization structure for construction site office. Under each condition, the maximum possible choices in accordance with the surveyed contractors are listed. Commercial and casino/ hotel projects are grouped together as the building type. The tool is shown in Table 4.22. Nevertheless, since the surveyed samples are not large enough, the tool may not be fitted in the whole construction market in Macau. But compared with the management tool tested in last section, since more conditions are added to the tool, it is much more valuable for academic study as well as the actual practice.

Table 4.22 Proposed tool for selecting organization structure for projects in Macau

Project Type	Residential	Road	Building	Bridge			
	P/M	P	D/M	P/M			
Project Length	100-200	201-300	301-400	401-500	501-600	601-700	>700
	D/P	P/M	M	P/M	P/M	D	D
Budget (million)	< 10	10-50	50-100	100-200	200-300	300-400	
	P	P/M	D/P/M	M	D/P/M	D	
	400-500	500-600	600-700	700-800	>1000		
	P	D	P	P	M		
Budget %	<20	20-40	40-60	60-80	>80		
	P	P	M	D	D		
Labor Force	<10	10-20	20-30	30-40	40-50	>50	
	M	P	M	D/M	M	D	
Labor Force %	<20	20-40	40-60	60-80	>80		
	D/P	P	P	D/M	D/M		
D=Departmental organization P=Project organization M=Matrix organization							

Organization structure for construction site office in Macau can be conservatively forecast by using this tool. The procedure of forecasting is similar to Elkassas's tool. Firstly, match the information of the project in the 6 criteria according to the ranges. Secondly, read each row of highest possibility organization type. Thirdly, compare all

6 results of possibility and figure out the highest possible type, and that may be the forecast of organization structure type.

4.7 Interview Results

After collecting the questionnaire, 7 interviews were conducted with contractors. In this section, 7 interviewees were classified into 2 groups according to their company base. During the interviews, some questions related to the organization structure for head office and casino project were discussed. The sample of questions being asked during the interview are listed in the appendix: *Interview Questions Sample*.

4.7.1 Interview Results of Local Contractors

In this study, four interviewees (interviewee A, interviewee B, interviewee C and interviewee D) from different local contractors declared themselves actively.

Interviewee A gave a full description of the organization structure for head office. He believed that organization structure for head office should not be exactly the same as that is for the projects. He pointed out that the contractors viewed this issue in two aspects. One is the organization structure in head office, and the other one is project base organization structure. He clarified the major difference between them. Referring to the head office, the structure is expected to be functionally control the whole company including the in processing projects. Nevertheless, concerning project, once the contractor wins a bid and sets out to construct, the project base organization structure will be in the dominant place. In other words, for a particular project, the structure in head office is supposed to fit in the preparation of tendering while the project base structure should focus on the technical problem and provide estimating support to the head office before and during the project. Therefore in this contractor, the primary department in the head office is commercial department, which is divided into QS team, tendering team and procurement team. And for the project base, interviewee A indicated that it was led by project manager and site agent. It is similar to the matrix organization structure and under this structure, project manager is responsible for planning, coordination and arrangements, while site agent pledges to implement and deepen the plan. Of course, during the project, project manager is obligated to report the financial issue to the commercial department on a regular basis.

Interviewee B shared the similar view with interviewee A on this topic. He believed that close relation must exist between project base organization structure and organization structure for head office. In fact, at most of time, project base organization structure was attached to the organization structure for head office. He mentioned that departmental organization structure was adopted in both site office and head office. Therefore the staff in the site office are led by functional managers. And they should report at a regular basis to the site agent.

As for interviewee C, he indicated that project organization structure is adopted in the site office. However, a mature departmental organization structure is adopted in the head office. He implied that although the contractor he was serving has established for decades, it didn't often handle the large size of projects. Instead, medium and small size of projects are favorable for it. Therefore, project organization structure in site is the best choice. He mentioned that staff in each department were usually assigned to the site and most of the staff can get a chance to learn and experience in the construction site. Project manager will take charge of the whole project and all staff in the site.

Interviewee D didn't reveal the organization structure for head office and site office. But he suggested the factors that influence the formation of the organization structure for head office. It is believed that construction market, the focus of the company, size of the company, level of the technology, characteristics of the business and information management foundation play an important role in it. Moreover, he emphasized that the core competitiveness was the dominant factor in forming the

structure for head office. It was believed by all interviewees, when the contractors established, all of them had the same structure as they have now. The main difference is basically the size of the company. In other words, the contractors had a functional structure at the beginning and as contractors are getting increasing capabilities and reputations to handle more projects, more staff are required for the head office with the stable and consistent working pattern. In interviewee D's point of view, contractors will finally adopt the matrix type organization structure and have parallel management system between structure in head office and site office if they are well-developed and have abundant accumulation in terms of company funds and construction experience.

When asked about the opinion and comments on the current organization structure, all interviewees were convinced that the structures met with the business culture of their own companies. They said the functional hierarchy helped with the order delivery so that they could make efficient production with high quality. Despite some flaws, for example, the unsatisfying abilities of staff, the structures in some way run as the contractors expect. As they said, it was a long road to improve a system or a structure for a head office, however, regarding the work implementations and funds control, the organization structure right now was so far so good.

There is no doubt that most of the contractors handle more than one project in the same time. It is all agreed by all interviewees that the organization structure for the construction site office can be adjusted aiming at different projects. However, same type and pattern will be adopted at the most of the time. They all mentioned that

project manager had significant influence on deciding the organization structure for the construction site office, which was to some degree analogous to the Egyptian construction market. Project manager can participate in deciding the number of labor force in the site, and particular specialists to be hired depending on the project.

4.7.2 Interview Results of Non-Local Contractors

3 non-local contractors (interviewee E, interviewee F and interviewee G) were interviewed in this study. As the non-local contractors have more experience on casino project, therefore, the focus of the interview for them were casino projects. An entirely new perspective concerning the management system and organization structure was opened up.

According to interviewee E, because of the very nature of the casino project, clients would like to choose the contractors who are familiar with the special criteria and regulations in both contract and construction mode issues. In addition, it is better for them to have the capability to bear larger cash flow and investment risk and have well-known reputation and firm relationship with owner. Therefore, apparently, it requires the organization structure with more human resources than any other project in Macau. More specifically, the dominant characteristics of organization structure for casino project are the clear division of work and responsibility and the great input of labor force.

For the labor force, interviewee E raised an example that there were nearly 9000 labors working in the site and around 10% of them were from the main contractor. As for the division of work, in the casino project mentioned, it was basically divided into three functional departments, construction, commercial and project support services. He pictured me a detailed organization chart about the construction department. It showed that under the head of construction, there were a lot of project teams, for

instance, piling team, structure team, external and logistic team, tower team and so on. Each team with approximately 80 to 200 people, was equipped with a project leader and various different functional groups were under the leader such as safety, planning, QA/QC, administration, commercial and so on. He explained that competition of occupying resources and budget existed between different construction team, and thus these groups like commercial and administration group which may involve in decision and money issues shall reported regularly to the commercial department. It is this kind of connection between departments that makes the whole structure functionally and efficiently. What's more, unlike many other organization structure, a project manager was assigned independently to carry out the social and business work instead of taking charge in technical services or any construction team.

As for interviewee F and interviewee G, they raised some supplementary social issues related to the construction of casino. It was pointed out that the government should regulate casino owners to invest into infrastructure construction, for example, hospitals, within certain extent around the casino, so that social welfare of the relevant district can be optimized, economic growth enhanced.

4.8 Trends in developments for Contractors

In some way, possible trends in developments for contractors in coming years is the reflection to the current condition of the company. For instance, trends in particular aspects like department, manpower, investment, procurement and annual revenue can serve as the criteria for evaluating the organization structure.

Table 4.23 Questionnaire result for possible trend(s) in the coming 5 years

Trends	Number of respondents chosen	Percent of Cases
Adding departments	2	11.8%
Increasing manpower	12	70.6%
Increasing financial investments	0	0
Increasing equipment	7	41.2%
Increasing annual revenue	12	70.6%

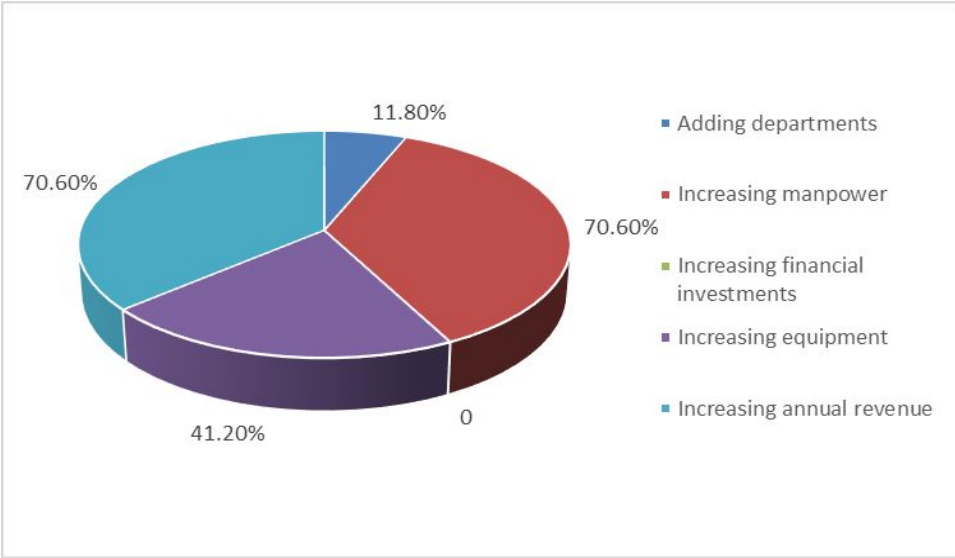

Figure 4.10 Result for possible trend(s) in the coming 5 years (in percentage)

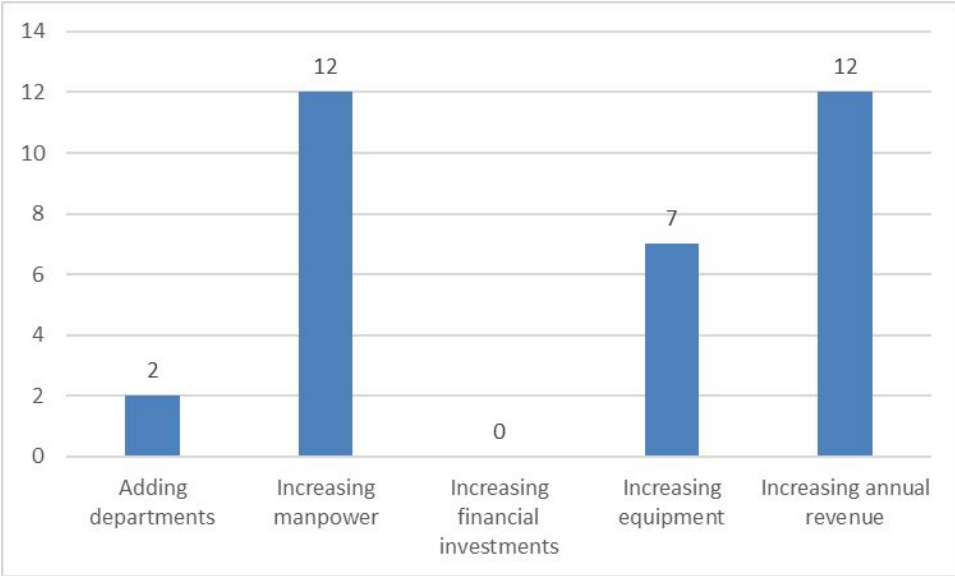

Figure 4.11 Result for possible trend(s) in the coming 5 years (in number)

For this question, 17 contractors gave their answers. The results above have already eliminated the 2 non serious data. According to Table 4.23, it is clear that increasing manpower and annual revenue are the main trends for the respondents with over 70% proportion. Besides, 7 out of 19 respondents tend to get more equipment procurement. It illustrates that most of the respondents are developing and expecting to enlarge

their company sizes and earn more profits. However, it is particularly noticeable that only a very small percentage group of respondents would like to add departments in the foreseeable future. The reason is that even at the establishment of a company, it had its own functional structure which contained all the departments required to handle the necessary work. So it is predictable that the 2 contractors which plan to add departments may have a great leap in company business. Last but not the least, it is clear from Figure.4.11, not any respondent circled the answer “increasing financial investment”. During the interviews, they explained that investment was totally relies on the projects in store, and therefore they cannot make comments on this issue.

CHAPTER FIVE

5. CONCLUSION

Macau construction industry today is thriving in the competitive environment. Since the construction projects in Macau is getting larger and more complex, so the production and quality of a project gain increasing focus recently. Organization structure for a construction project is now becoming more and more important because an organization chart as part of the bidding documents is always necessary. What's more, the efficiency and good performance of construction partially depend on the organization structure. In other words, organization structure becomes an indelible criterion to evaluate the competitiveness for a contractor as well as the quality of a project. Therefore a study of organization structure for construction site office is valuable for development of Macau construction industry.

Questionnaire survey is the primary method to obtain opinion to the affecting factors towards the organization structure and information of a particular project of each respondent. Organization structure type of that particular project is also the significant part to select in this questionnaire. The survey was conducted among the active preselected contractors in Macau. Total 63 questionnaires were sent to the target companies with 19 respondents returned. A respondent rate of 30.2% is reasonable to consider the survey as successful one compared with other similar researches.

The results and data analyses indicate that the departments involved in a company's finance such as financial department and purchase department are established by most

contractors surveyed. As for the opinions to the factors that affects the selection of organization structure for site office, the very nature of a project is the decisive factor. Specifically, project size, project length and project type are considered as the most significant factors and in the meanwhile, project size is a little more important than the other two factors. The reason is that it may play a critical role in human resource arrangement and operations in every stage of construction. In terms of project length, it sets timeframe for each project which will influence the schedule of every activity during construction. Since the transfer of human resources are quite related to the schedule, it may also greatly affect the organization structure. When it comes to project type, although it cannot be very diverse in Macau, some specialist and expert teams from different fields in accordance with the project type are still under the consideration when arranging organization structure. Moreover, size of contractor and resources that put into the project are also investigated in this research and proven not so decisive as the nature of the project.

There is no significant disparities among the three types of organization structure (departmental organization structure, project organization structure and matrix organization structure) for construction projects according to the results. In addition, contractors in different sizes prefer adopting different types of organization structure. Larger companies tend to adopt departmental and matrix organization structure while smaller ones usually use project organization structure. It may be due to the fact that the competence for larger companies will convince the clients to award them with larger and more complex projects.

Concerning the expectations towards the organization structure for site office, the

vital expectations are "*simple and clear lines of duties and responsibilities"*, "*fast decision making"*, "*effective order delivery"* as well as "*better human resources arrangement"* because of their close ties with work efficiency. However, there is no a very high fulfilled rate for these expectations. Some uncontrollable factors may decrease the degree of fulfillment. Therefore, quite a few respondents agree to make adjustment on the organization structure.

A validity test of the selecting tool from previous study (Elkassas's study) was conducted based on the data of the questionnaire. However, since the proper sample to be tested was not large enough, whether it was applicable for Macau construction industry or not cannot be concluded. Moreover, a new management tool of selecting organization structure for site office was raised by imitating Elkassas's study. The foundation of this new tool was the crosstab result between the information of the project and the organization structure type selection collected. Hence, general organization structure type of different project types in Macau can in some way be forecast by the tool. Although the tool cannot be perfectly applicable because of the limited survey samples, it can still be used as reference for further study.

Casino project is a unignorable construction type in Macau. Organization structure of contractors involved in it was investigated in this study. Because casino projects are always much larger than the normal projects in Macau, they may require more complex organization structure that can smooth the human resource arrangement. The dominant characteristics of organization structure for casino project are the clear division of work and responsibility and the great input of labor force.

As for the organization structure for head office of contractors in Macau, some opinions were collected during interviews. Construction market, the focus of the company, size of the company, level of the technology, characteristics of the business and information management foundation are claimed to have effect on the formation of an organization structure. Core competitiveness is the dominant factor. And the main difference between the organization structure in head office and site office is that the former is expected to functionally control the whole company including the in processing projects and the later should focus on particular construction work. Therefore, departments in the head office are more diverse and centralized, especially those related to the financial issues and company funds. Concerning the possible trends for contractors, most of the respondents are in favor of increasing manpower and annual revenue, which indicates that an increasing number of larger scale companies will be developed in the foreseeable future.

Due to the limited survey samples, the research findings may not be very accurate. Besides, the investigation was restricted to the region, and thus, the findings may not be applicable to regions outside Macau.

Recommendations for Future Research

In this study, the questionnaire was designed for the contractor with project in process. The aim of it is to collect the opinions to the factors influencing the organization structure in the site office and the information of a particular project. However, the main focuses of the parameters are related to the nature of the project. As it was mentioned in chapter two *Literature Review*, Elkassas claimed that the top ten

important factors affecting the selection of organization chosen by the Egyptian experts contained six subjective factors of decision makers to the project. Therefore, the subjective factors could be a good direction for future study. Besides, the respondents are not always the decision makers for the projects and their opinions may not reflect the most accurate results for Macau construction industry. Moreover, the respondents who have not participated in the work in the site may not have the overall information of projects and thus, it might lead to the biased result. In addition, there is a possibility that psychological effects during the process of answering the questionnaire such as the past experience and hearsay statements will decrease the accuracy of the result. In order to minimize the biased results, it is suggested that the researchers should manage to approach the suitable respondents which are capable to provide the proper and accurate information, and try to condense and simplify the questionnaire so that respondents can finish it in a short time with the help of researchers in person. Therefore, the respondents will have better understanding on the questions and the psychological effects will be lowered. The opinions to the criteria that affect the organization structure from this kind of survey will be more reliable.

When analyzing the data based on separate groups (local and non-local company), it is not valuable as expected because the number of non-local company sample is much smaller than that of local company. It is not adequately comparable by using 4 non-local company results. Therefore, it is suggested that more non-local respondents should be obtained in the future study. Also, among the 19 respondents in this study, 8 of them are large companies (with over 80 staff), which is a relatively large proportion. So the results may not represent the viewpoints of most small and

medium companies. More opinions of them regarding the organization are supposed to be collected in future research.

As it is mentioned in this report, the survey sample size is far from satisfaction. In spite of the limited contractors in Macau, there is still a lot can be done to enlarge the survey sample size. Targets for this survey were filtered through the resources from Macau construction association and DSSOPT, which ignored the contractors didn't register to Macau construction association or handle government projects. Besides, since the collected data are based on the initiative response of contractor, the survey sample size will be different even though the same survey was conducted again in Macau in the future. Moreover, the respondent rate will be larger if the sensitive questions such as annual revenue can be eliminated. Also, influence of the nature of project investigated on the organization structure in site office weren't proven quantitatively, therefore, it is suggested that researchers should conduct a number of case studies in the site (including the casino project sites and normal project sites) and achieve the accurate data collection. The connections regarding the actual operations between organization structure in head office and site office shall be looked deeper by case studies too. More interviews can be performed to clear the abnormal questionnaire data. Finally, the subject can be viewed by another perspective, the interview targets shall not be limited to the contractors, government officers in related field such as city planning and urban designer are also favorable targets to explain how the organization structure for a construction site is relevant to the success of a government project.

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APPENDIX

-List of Companies Surveyed

-List of Companies Interviewed

-Interview Questions Sample

-Original Questionnaire

List of Companies Surveyed

中德工程有限公司	中國建築工程(澳門)有限公司	禮頓建築(亞洲)有限公司
得寶建築集團有限公司	中國路橋工程有限責任公司	富域工程(澳門)有限公司
德發建業工程有限公司	中國土木工程(澳門)有限公司	新昌營造集團有限公司
美昌建築有限公司	上海建工集團(澳門)有限公司	保華建築營造有限公司
三友建築置業有限公司	振華海灣工程有限公司	瑞權工程有限公司
新興業工程有限公司	中鐵(澳門)有限公司	振耀建築有限公司
捷安建築置業有限公司	中基基礎工程有限公司	權暉建築工程有限公司
長江建築有限公司	博聯工程（澳門）有限公司	明信建築置業有限公司
利馬建築工程有限公司	精工工程(澳門)有限公司	李鎮成建築商
華建建築工程有限公司	南光工程有限公司	信誠工程
新基業工程有限公司	凱迪建築工程有限公司	偉成建築工程有限公司
大亞建築工程有限公司	珠光工程發展有限公司	敏達工程有限公司
建利工程有限公司	力寶威建築置業有限公司	新方盛建築工程有限公司
新力建設有限公司	鴻偉工程有限公司	司徒高建築工程有限公司
澳馬建築工程有限公司	吳淦記建築有限公司	華聯創基建築工程有限公司
德發建業工程有限公司	新科建築置業有限公司	通利建築置業工程有限公司
利豐建築工程有限公司	建南建築工程有限公司	利成建築工程有限公司
利榮建築工程有限公司	新鴻建工程有限公司	新紅太陽建築工程有限公司
友生建築工程有限公司	達昌建築工程有限公司	安穠建築工程有限公司
成龍工程有限公司	迪亞建築工程有限公司	海晖建築置業有限公司
新權暉建築工程有限公司	晉業拓展工程建設有限公司	建新建築工程(澳門)有限公司

List of Companies Interviewed

得寶建築集團有限公司	中國建築工程(澳門)有限公司	禮頓建築(亞洲)有限公司
新昌營造集團有限公司	瑞權工程有限公司	新方盛建築工程有限公司
三友建築置業有限公司		

Interview Questions Sample

For local contractors

Q1. Based on the questionnaire you filled out, it suggests that the organization structure for construction site office of a typical project that your company handled is similar to the departmental/project/matrix organization. (show the O-chart) I would like to ask whether all the projects handed by your company are adopting this kind of organization structure?

-If not, what can be the factors that will change the organization structure (Example: number of staff in the site, department for the site)? (Depends on the project size? Type?) Do the project managers and planning managers have the authority to decide the organization structure or can they participate in the decision making?

Q2. What about the organization structure for the head office in Macau? Also departmental/project/matrix? Can you explain a little bit more about the organization structure in the head office? If it is not the same type as site office, is there any problem caused by the difference? Regarding management system. Or how does the head office supervise the work in the site? (Financial issue, procurement issue and schedule, process; the link between head office and site office)

Q3. What do you think are the main factors that influence the organization structure for head offices? (Example: construction Market, the focus of the company, size of the company, level of the technology, characteristics of the business, information management foundation..)

Q4. Do you have any opinions to the current structure for the head office? (functional hierarchy, efficiency, order delivery, whether the duties of staff are clear and simple, can the resource be full utilized, can it stimulate the innovation solution for typical problem)

For non-local contractors

Q1. Can you provide more details about the organization structure for the casino construction site you are working in? (Such as total labor force, detailed work type division)

Q2. Please offer your opinion to the organization structure for the casino construction site in Macau. (Example: characteristics, social issues)

Original Questionnaire

Questionnaire about Organization Structures for Construction Site Offices in Macau

澳門建設現場辦公室架構調查問卷

Questionnaire Designed By YAO Yi, Andy
Supervisor: AO IEONG Tai Man, Raymond

This is a questionnaire from a fourth year student majoring in Civil Engineering at the University of Macau.
Please fill in this questionnaire in English or Chinese. The objective of the survey is to identify the organization structures for a typical construction project in Macau and to collect the opinion of the respondents working for contractor regarding the affecting factors towards the choice of organization structure. The result will only be used for analysis in my final year project report. All of your information, opinions and comments filled in this questionnaire will be kept confidential and will not be disclosed.

此調查問卷是由澳門大學土木工程的大四學生所設計。請用中文或英文填寫。本調查的目的是確定澳門某個典型建設項目現場辦公室的架構。對於影響選擇架構的因素，此問卷收集了為承包商工作的受訪者意見。而最終的數據分析只用於本人畢業項目報告。請放心，您所填的信息，意見或評論均為保密，不作公開。

Part 1.Personal Information 個人信息

a. What's the name of the contractor you are working for? 您所服務的承包商是？

_____

b. What's your position in the contractor company? 您在承包商公司的職位是？

_____

c. If you want to have an e-copy of the final report, please leave your name and contact.
假如你想獲得研究報告的電子副本，請留下你的姓名和聯繫方式。

_____

(Please **circle** the number of your selections for questions in Part 2 - 4.)

（請**圈出**您對第 2 至第 4 部份題目的答案）

Part 2. Background of the Contractor 承包商背景

Q1. Where is the base company? 公司總部的位置在哪個地區？

1. Macau 澳門
2. Hong Kong 香港
3. Mainland China 中國大陸
4. Foreign country or others 外國或其他地區

Answers to the following questions(Q2-Q7) should be based on the information of the company **in Macau** rather than the base company abroad.

請基於你所服務的**澳門**承包商公司（而非其他地區的總公司）的基本信息回答 2-7 題。

Q2. How many staffs are there in the company? 公司有多少名職員？

1. 0-20
2. 21-40
3. 41-60
4. 61-80
5. 81-100
6. > 100

Q3. How long has the company been established? 公司成立多少年？

1. 0-5 years
2. 6-10 years
3. 11-20 years
4. 21-30 years
5. 31-40 years
6. > 40 years

Q4. Any construction projects in progress within 2014?

在 2014 年是否有任何在進行中的建設項目？

1. Yes 是
2. No 否

Q5. Which of the following departments exist in the company? *(Select all that apply)*

以下哪個部門在貴公司有設立？*（不定項選擇）*

1. Estimating department 估價部門
2. Quantity Surveying department 工程量測量估算部門
3. Planning department 計劃部門
4. Engineering Support department 工程服務部門
5. Plant department 設備部門
6. Purchase department 採購部門
7. Human Resources department 人力資源部門
8. Safety department 安全部門
9. Financial(Account) department 財政（會計）部門
10. Contracting department 合約部門

11. Administration office 行政辦公室

12. None, the whole company works as a team 沒有細分部門，整個公司組成團隊工作

13. Others 其他_____

Q6. What is the recent five years average annual revenue of the company?

公司的近五年的平均年營業額是多少？

1. <50 million MOP 低於五千萬澳門幣
2. 50 million – 100 million MOP 五千萬至一億澳門幣
3. 100 million – 500 million MOP 一億至五億澳門幣
4. 500 million – 1 billion MOP 五億至十億澳門幣
5. 1 billion – 3 billion MOP 十億至三十億澳門幣
6. 3 billion – 5 billion MOP 三十億至五十億澳門幣
7. >5 billion MOP 高於五十億澳門幣

Q7. In your opinion, which of the following trend(s) will happen to the company in the coming 5 years? *(Select all that apply)*

您認為未來 5 年里公司會趨向于發生什麼樣的變化？*（不定項選擇）*

1. Adding departments 增加部門
2. Increasing the manpower 增加人手
3. Increasing financial investments 增加金融投資
4. Increasing equipment/machines procurement 增加設備/機器採購量
5. Increasing annual revenue 增加年營業額

Part 3. Personal opinion to the factors affecting the choice of organization structures for construction site offices

關於影響建設現場辦公室架構因素的個人意見

Note: Organization structure for construction site office can be defined as the structure in the site office of different groups of people who must coordinate their activities in order to meet the organizational objectives during the construction project.**For the organization structure chart, please refer to Q16.**

註：建設現場辦公室架構可定義為在建設項目期間，各組現場辦公室人員協調自身活動去迎合組織性目標的一種架構。**架構框架圖請參考 Q16**。

Q8.Which of the following factors do you think affect the choice of organization structures for construction site offices in Macau? *(Select all that apply)*

您認為以下哪些因素會影響澳門建設工程現場辦公室的架構？*（不定項選擇）*

1. Project type　項目類型
2. Project size　項目大小
3. Project length　項目週期
4. Size of contractor company　承包商公司規模大小
5. Resources that the contractor put into the project　承包商投入項目的資源
6. Others　其他_____

Q9. Rank the importance of each factor you selected in Q8 when choosing an organization structure for a construction site office. Leave the blanks for the **unselected** factors.

請勾選出在問題 8 中你所選擇的每一個影響選擇項目建設現場辦公室架構的因素的重要程度。若是問題 8 中**沒有選擇**的因素，表格中請留白。

(Importance increases when the number increases. i.e. Degree 1 for the **least** important; Degree 5 for the **most** important. Please tick one for each factor.)

（數字越大，表示重要程度越高。如：1——**最不重要**；5——**最重要**。每一項影響因素只能選擇一個重要程度。）

	1	2	3	4	5
Project type　項目類型					
Project size　項目大小					
Project length　項目週期					
Size of contractor company 承包商公司規模大小					
Resources that the contractor put into the project 承包商投入項目的資源					
Others　其他_____					

Part 4. Basic information of the project　項目基本信息

Answers to the following questions (Q10~Q20) should be based on the information of a typical project which can be representative work for the contractor usually handles in Macau.
請基於承包商在澳具代表性的某一個典型項目信息，回答以下題目（10—20 題）。

Q10. What's the type of the project?　這個項目的類型是？

1. Residential building　住宅建築
2. Road Construction　道路建設
3. Commercial building　商業大樓
4. Tunnel Construction　隧道施工
5. Rehabilitation Work　修復項目
6. Bridge Construction　橋樑建設
7. Railway Construction　鐵路建設
8. Casino or Hotel　賭場或大酒店
9. Sanitary System　下水道系統
10. Others_____　其他

Q11. What's the approximate range of the project length?　項目的大致週期是？

1. <100 days　2. 100 - 200 days　3. 201 - 300 days　4. 301 - 400 days
5. 401 - 500 days　6. 501 - 600 days　7. 601 - 700 days　8. > 700 days

Q12. What's the approximate range of the total budget of the project?　項目的大致預算是？

1. < 10 million MOP 低於一千萬澳門幣
2. 10 million – 50 million MOP　一千萬至五千萬澳門幣
3. 50 million – 100 million MOP　五千萬至一億澳門幣
4. 100 million – 200 million MOP　一億澳門幣至二億澳門幣
5. 200 million – 300 million MOP　二億澳門幣至三億澳門幣
6. 300 million – 400 million MOP　三億澳門幣至四億澳門幣
7. 400 million – 500 million MOP　四億澳門幣至五億澳門幣
8. 500 million – 600 million MOP　五億澳門幣至六億澳門幣
9. 600 million – 700 million MOP　六億澳門幣至七億澳門幣
10. 700 million – 800 million MOP　七億澳門幣至八億澳門幣
11. 800 million – 900 million MOP　八億澳門幣至九億澳門幣
12. 900 million – 1 billion MOP　九億澳門幣至十億澳門幣
13. > 1 billion MOP　高於十億澳門幣

Q13. In your opinion, what's the approximate percentage the budget on this project accounts for in the total work budget of the contractor?

您認為此項目的預算比例約占承包商的總工作預算的多少？

1. < 20%　　2. 20% - 40%　　3. 40% - 60%

4. 60% - 80%　　5. > 80%

Q14. How many labor forces does the contractor put in this project (construction site)?

承包商所投入項目（建設現場）的人力是？

1. < 10 people　少於 10 人　　2. 10 - 20 people　10 – 20 人

3. 20-30 people　20 – 30 人　4. 30-40 people　30 – 40 人

5. 40-50 people　40 – 50 人　6. > 50 people　多於 50 人

Q15. In your opinion, what's the approximate percentage labor force on this project towards the total labor force of the contractor?

您認為此項目的人力比例約占承包商的總人力的多少？

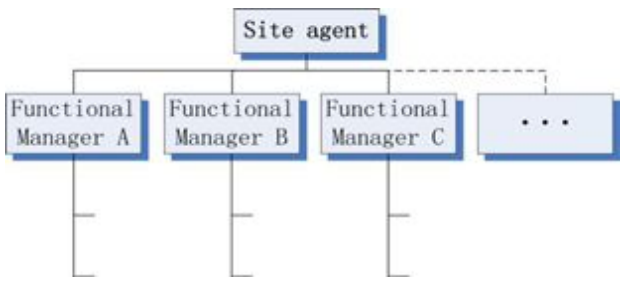
1. < 20%　　2. 20% - 40%　　3. 40% - 60%

4. 60% - 80%　　5. > 80%

Q16. Which of the following is the most similar organization structure being used for the construction site office of the project you described above?

以下哪個架構是最接近您上述所提及的項目的建設現场办公室呢？

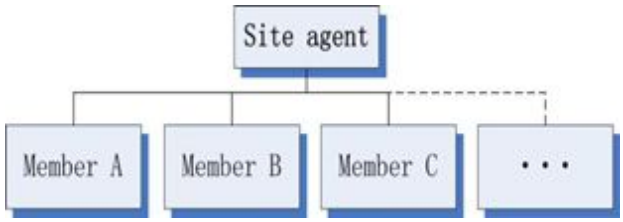
1. Departmental Organization Structure 職能性架構



Note: In a departmental organization structure, work is divided according to function. A branch within the organization is given responsibility for a particular function. Work is delegated from top to bottom within the branch to personnel who specialize in the function.

注：在職能性架構中，工作根據職能劃分。架構中的每個分支負責某項特定職能，在職能分支中，每項工作均由上至下安排至專人負責。

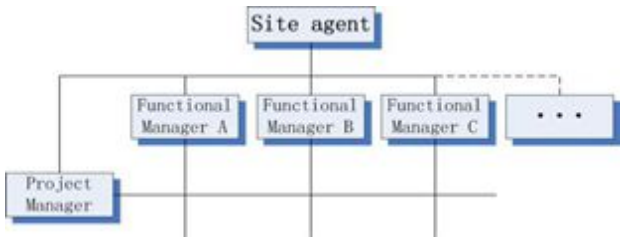
2. Project Organization Structure 項目性架構



Note: In a project organization structure, all members are teamed together to complete the project without functional or status hierarchy. E.g. Senior members and junior members are in the same status.

注：在項目性架構中，所有成員不分級別和職能，共同完成項目。例如，高級成員與初級員工居於同等地位。

3. Matrix Organization Structure 矩陣式架構



Note: In a matrix organization structure, there is a functional hierarchy just like functional organization structure, but a horizontal cross-functional structure (led by project manager) is superimposed on the functional hierarchy.

注：矩陣式架構與職能性架構類似，均由職能性等級結構組成；但矩陣式架構中，有基於職能分支之上的，由項目經理負責的跨職能結構統籌項目工作。

Q17. What are the expectations for contractor towards the organization structure you described? *(Select all that apply)* And rank the significance of each expectation you selected. Leave the blanks for the **unselected** ones.

承包商對你所描述的架構有什麼期望？*（不定項選擇）*並且勾選出你所選擇的每一個期望的重要程度。若是**不屬於**承包商對你所描的述架構的期望，則不需要勾選重要程度。

(Significance increases when the number increases. i.e. Degree 1 for the **least** significant;

Degree 5 for the **most** significant. Please tick one for each expectation.)

（數字越大，表示期望的重要程度越高。如：1——**最不重要**；5——**最重要**。每一項期望只能選擇一個重要程度。）

	1	2	3	4	5
1. Better human resource arrangement 更好的人力資源安排					
2. Effective order delivery 有效的命令傳達					
3. Clear communication between staff 員工間清楚有效的溝通					
4. Simple and clear lines of duties and responsibilities 簡單明了的職責與責任					
5. Fast decision making 高效的決策					
6. Avoid bureaucracy 避免官僚主義					
7. Innovative solutions 創新方案					
8. Full utilization of resources 充分利用資源					
9. Chances for developing special knowledge or skills 能發展某種特殊技能和知識的機會					
10. Others 其他_____					

Q18. After the organization structure was set up, which expectations **selected in Q17** are fulfilled during the project? *(Select all that apply)* And rank the degree of fulfillment of each expectation you selected. Leave the blanks for those which have **never been fulfilled**.

在確立組織結構后，在**問題 17** 里所選擇的哪個（些）期望在項目期間得以實現？*（不定項選擇）*並且勾選你所選的每一個期望被實現的程度。若是**從未被實現的**期望，則不需要勾選被實現的程度。

(Degree of fulfillment increases when the number increases. i.e. Degree 1 for the **least** fulfilled; Degree 5 for the **most** fulfilled. *Please tick one degree for each expectation.*)

（數字越大，表示期望被實現的程度越高。如：1——**幾乎未被實現**；5——**完全被實現**。 每一項期望只能選擇一個被實現的程度。）

	1	2	3	4	5
1. Better human resource arrangement 更好的人力資源安排					
2. Effective order delivery 有效的命令傳達					
3. Clear communication between staff 員工間清楚有效的溝通					
4. Simple and clear lines of duties and					

responsibilities 簡單明了的職責與責任					
5. Fast decision making 高效的決策					
6. Avoid bureaucracy 避免官僚主義					
7. Innovative solutions 創新方案					
8. Full utilization of resources 充分利用資源					
9. Chances for developing special knowledge or skills 能發展某種特殊技能和知識的機會					
10. Others 其他_____					

Q19. If possible, do you agree that the contractor should make adjustment on this organization structure for the construction site office?

如果有可能，您認同承包商應該對此項目的建設現場辦公室架構作出調整嗎？

1. Strongly disagree. 完全不認同
2. Disagree. 不認同
3. Neutral. 中立
4. Agree. 認同
5. Strongly agree. 完全認同

Q20. If there would be adjustment, would you please describe a little bit on how it will be changed? If no, please leave the blanks.

如果要調整該架構，請您簡單描述下它會如何轉變。若無，請留白。

_____

_____

Q21. Did the contractor ever participate in any casino or hotel construction project (including subcontracting and participating partially) in Macau?

承包商是否曾經參與澳門賭場或大酒店的項目（包括分包和部分參與）?

1. Yes 是 2. No 否

Part 5. Other information　其他信息

Q22. If you have any comments about the organization structures for construction site offices in Macau, please state here.

如果您有任何關於澳門建設項目現場辦公室架構的看法，請寫在下方空白處。

Q23. If a short interview about 15-30 minutes is requested, are you willing to spare your time and accept the request? If yes, please leave your contact information below.

請問您是否願意接受一個 15—30 分鐘的訪問呢？如果願意，請留下您的聯繫方式。

1. Yes　是_____
2. No　否

This is the end of the questionnaire. Thank you for your comments and cooperation.

問卷調查到此結束。十分感謝您的配合。