

Implementation of ISO 14001 Environmental Management System in the Macau Construction Industry

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Abstract

Macau, a colony of Portugal for over 400 years, has been developing at an amazing pace since the opening up of the gaming industry in 2001. This economic growth resulted in a long period of booming in the local construction industry. Though the ISO 14001 environmental management system standard has been adopted in many parts of the world since early 2000s, its adoption in the Macau construction industry is still slow. It is estimated that only around 10% of the local contractors have implemented the system. In order to explore the contractors' attitude towards the implementation of ISO 14001, a questionnaire survey was conducted together with interviews with contractors with and without registration to ISO 14001. The results indicated that the majority of contractors do not plan to implement the standard because there is a lack of incentive and motivation from the government. Extra financial burden is also one of the main obstacles as most local contractors are small-scaled. Due to high operating costs, those contractors certified to ISO 14001 have perceived a reduction in competitiveness as most clients do not include the standard as a criterion for tendering.

Keywords

Environmental management system (EMS), ISO 14001, construction contractors, Macau

1. Introduction

In 1996, ISO 14001, ISO 14004 (an EMS guidance document) and three environmental auditing guidelines (ISO 14010, ISO 14011 and ISO 14012) were published by the technical committee TC 207 of the International Organization for Standardization (ISO). Other related standards and guidelines in the ISO 14000 family were also published in the following years. Together they provide a guideline for organizations to minimize harmful effects on the environment caused by their activities and to achieve continual improvement in its environmental performance. Since then, an increasing number of construction contractors have been certified to this international standard ISO 14001, which specifies the requirements and procedures for the implementation of an EMS. The development of this series of standards has been well documented by Tan *et al.* (1998). According to the annual survey conducted by ISO in 2011, it is estimated that 267,457 companies worldwide have achieved ISO 14001 certification, around 12.7% of them belonging to the construction sector (ISO, 2011). The survey results have also indicated that East Asia and the Pacific have the largest share of certifications, accounting for 51.3% of the total. After Macao became a special administrative region of China in 1999, the opening of its

borders to Chinese citizens and the liberalization of the gaming industry in 2001 have turned Macau into the world's largest casino market. As a result, gaming accounts for 50 percent of GDP, 84 percent of fiscal revenues and around 21 percent of the workforce. Given Macao's semi-autonomous status inside China and the large gaming industry and relaxed tax laws, it has become a base for wealthy investors, especially for those from Mainland China. As a result, the GDP of Macau rose 5.7 times from USD6.08 billion in 1999 to USD34.59 billion in 2011. This rapid development has attracted large foreign investments and large-scale construction projects such as casinos, hotel resorts, commercial developments and major infrastructures resulting in an unprecedented boom in the Macau construction industry. Though local contractors in Macau have reaped the benefits from this economic boom, most of them have missed the opportunity to improve their management systems, particularly in the area relating to the environment. As a result, most large-scale construction projects have been lost to reputable international contractors that have adopted effective quality and environmental management systems. Local contractors unfortunately have become the "sub-contractors" of those giants in mega-projects. The adoption of ISO 14001 in the Macau Construction Industry is still very slow. It is estimated that only around 10% of the local contractors have implemented the system. Up to the year 2010, among 34 local companies certified to ISO 14001, only 6 are related to construction (CPTTM, 2010). This paper aims to explore the contractors' attitude towards the implementation of ISO 14001, the focus being on the awareness of ISO 14001, on the expected benefits and obstacles encountered in implementation and on the effective measures to promote implementation.

2. Methodology

A questionnaire survey was conducted in 2010 with the local construction contractors. Different questionnaires were sent to two groups of sampled contractors. The first targeted group included those contractors who were not certified to ISO 14001 and the second included those certified to ISO 14001. All contractors are members of the Macau Construction Council and contractors certified to ISO 14001 were singled out to receive a different version of the questionnaire. A total of 49 questionnaires were distributed of which 45 were to the first group and 4 to the second. The first part of the questionnaire aims to collect basic company background information. The second part covered the expected benefits from the implementation of ISO 14001. Questions in this part were slightly modified for those contractors certified to ISO 14001. The last part covered ways to promote the awareness of ISO 14001. Of the 49 questionnaires sent to local contractors, 15 were completed and returned, a response rate of 30%. As for the four questionnaires sent to contractors certified to ISO 14001, all were completed and returned. Among the respondents, 4 contractors have a staff number ranging from 20 to 30 while another 4 having more than 50. All respondents were also invited for interviews so as to further clarify their views. 4 respondents in each group indicated their interest in the interview.

3. Analysis of results

3.1 Survey results of contractors not certified

Reasons for not certifying to ISO 14001. Of all eleven respondents, 6 (55%) ranked "Not required by government" as the main reason for not certifying. 27% of respondents believed that "ISO 14001 could not bring any benefit to the company" and 18% of respondents chose "Not necessary to certify" and "Difficult to maintain" as their main reasons (see Figure 1). Another reason for not certifying was due to a lack of publicity for the implementation of ISO 14001 in the industry. Only 3 out of 11 (27%) respondents indicated that there was publicity for the standard in the industry.

Expected benefits from ISO 14001 implementation. Among the list of expected benefits, 45% of respondents ranked "Increase in competitiveness" and "Easier adaptation to Government environmental

policy” as their most expected benefits after the implementation of ISO 14001. Figure 2 presents the degree of expectation of other expected benefits. In general, contractors’ view on various expected benefits were fairly consistent.

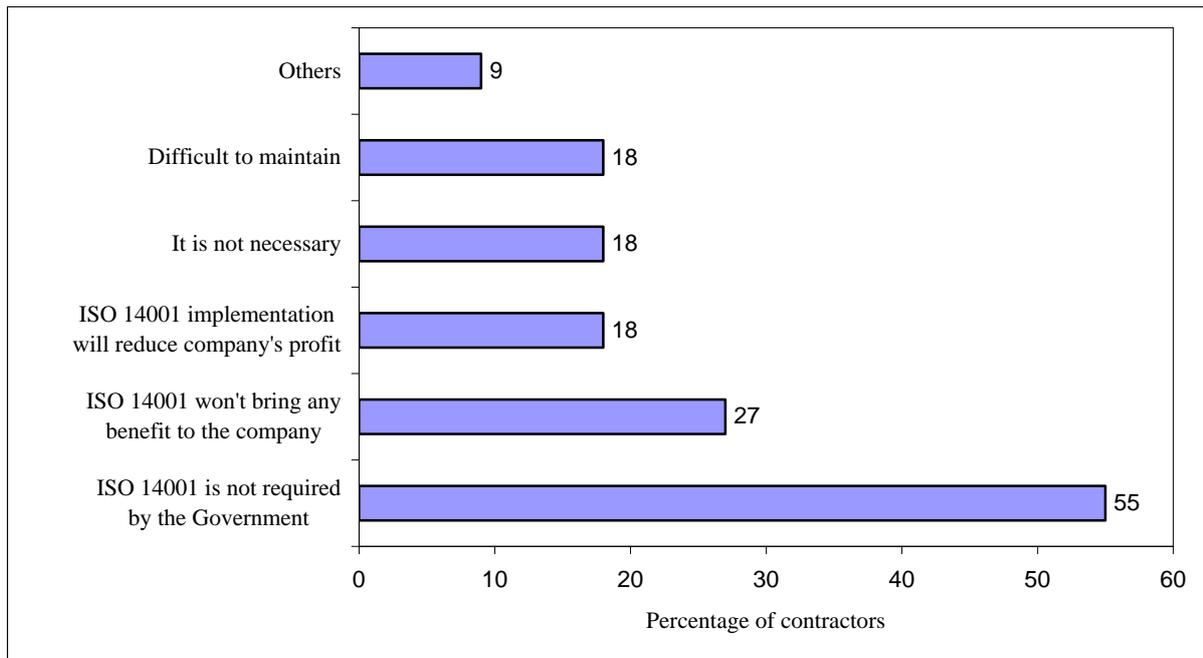
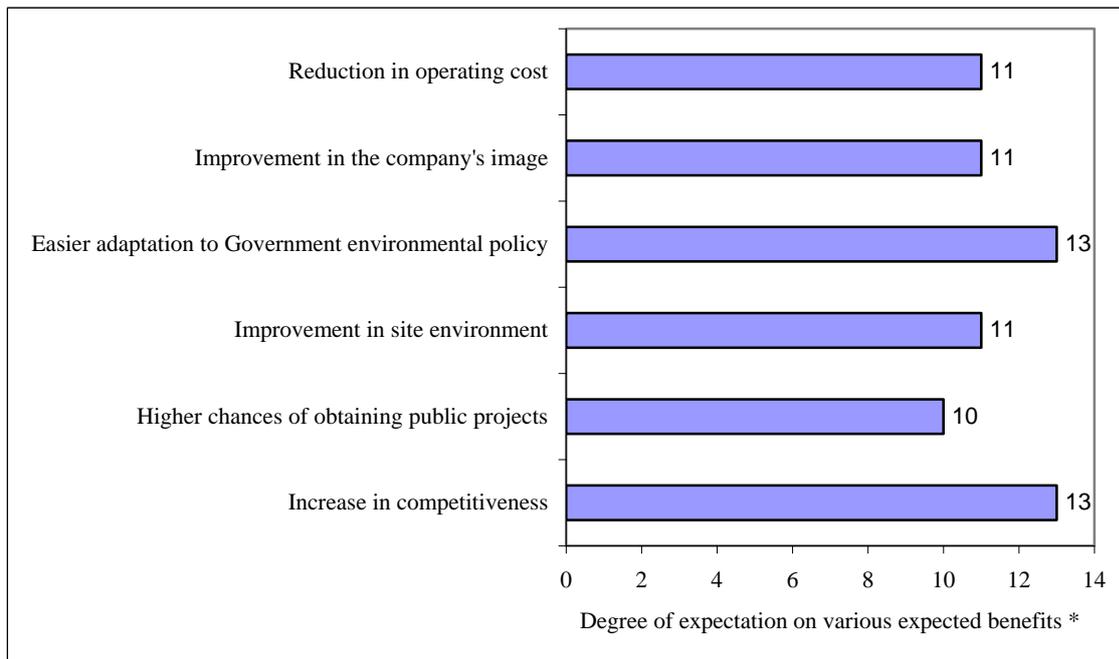


Figure 1: Contractors’ reasons for not seeking ISO 14001 certification



* Five-point scale (most expected to least expected converted into values from +2 to -2, most expected & expected are included in the analysis.)

Figure 2: Expected benefits after the implementation of ISO 14001

Future plans for implementation. 5 out of 11 respondents (45%) indicated that they did not plan to implement ISO 14001 in the near future and no respondents planned to certify within the coming 2 years. Only 2 of them (18%) indicated that they would seek implementation within 5 years. Typical reasons for this lack of motivation can be found in the responses to the previous question. Basically, contractors wanted to wait and see whether or not there would be changes in the environment policy proposed by the newly developed bureau.

Government's measures towards certification. When the respondents were asked whether the government should make certification a mandatory requirement for all contractors in Macau, the responses from contractors were divided. While 6 out of 11 respondents preferred it to be a mandatory requirement, the rest chose optional. For those who agreed, their further comment was that a buffer period of two to three years was necessary because there was a lack of related managerial staff and a lack of awareness of ISO 14001 in Macau. When the respondents were asked whether the government should make certification a mandatory requirement only for those contractors bidding for public projects, the responses from contractors were again split. For those who agreed, their further comment was that an extra buffer time and incentives from the government would be necessary. Those who didn't agree simply commented that the industry was not ready for it yet.

3.2 Survey results of certified contractors

Motivation to certify to ISO 14001. Typical motivating factors to certify to the standard were: to improve the image of the company (3 out of 4 respondents); to improve the environment of construction sites, to improve the company's management system and to adapt to government policies in the future (2 out of 4). Only 1 out of 4 respondents chose "requirement from clients" as the motivation and none for "cost reduction" (See Figure 3).

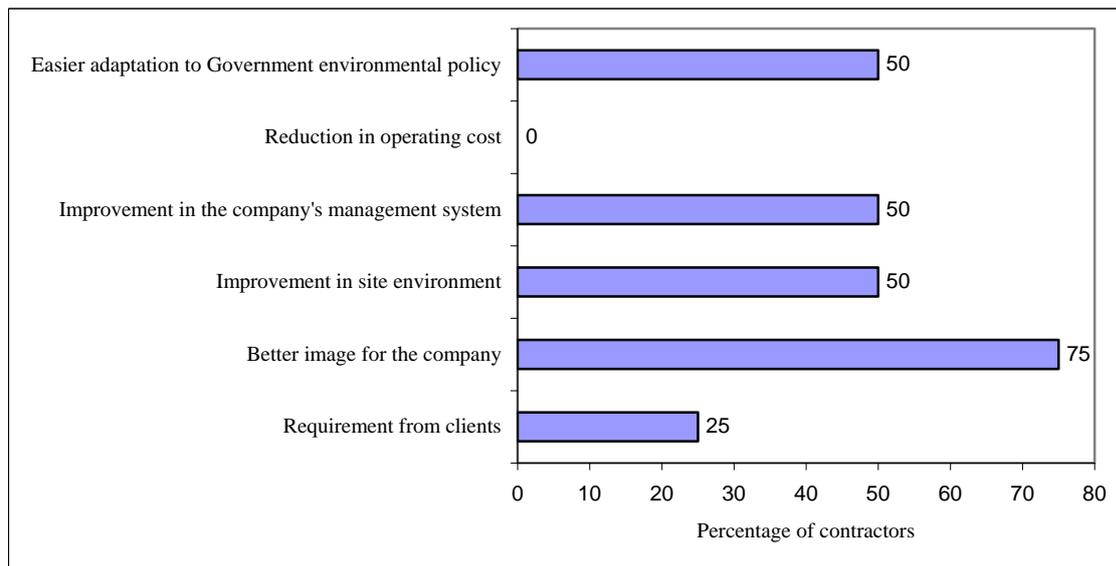


Figure 3: Contractors' motivation in seeking ISO 14001 certification

Obstacles encountered during the implementation process. The main obstacles encountered by the certified contractors included a lack of understanding of the company staff and a lack of support from the Government (3 out of 4 respondents). Figure 4 presents the rest of the obstacles encountered. The results obtained indicated that more promotion should be conducted and more support should be provided by the

government. Most respondents (3 out of 4) also commented that communication with employees should be continually improved.

Expected benefits and benefits reaped from ISO 14001 implementation. The most expected benefit chosen was “Increase in competitiveness and revenue” (3 out of 4 respondents) while the least expected benefit chosen was “reduction in operation cost” (3 out of 4). As for the benefits actually reaped, all respondents chose “increase in competitiveness and revenue” and “improvement in the company’s image”. Table 1 presents a comparison between benefits expected and benefits reaped expressed by the respondents. The results indicated that the benefits reaped matched the expected ones quite well, except in the area of “higher chances of obtaining public projects”.

Government’s measures towards certification. Similar to the last question in the previous section, respondents were asked whether the government should make certification a mandatory requirement for all contractors in Macau. The majority agreed as expected (3 out of 4). Similar comments regarding buffering time and reasons were also received. When the respondents were asked whether the government should only make certification a mandatory requirement for those contractors bidding for public projects, 3 out of 4 agreed and further commented that extra buffer time and incentives from the government would be necessary. One respondent didn’t respond to this question.

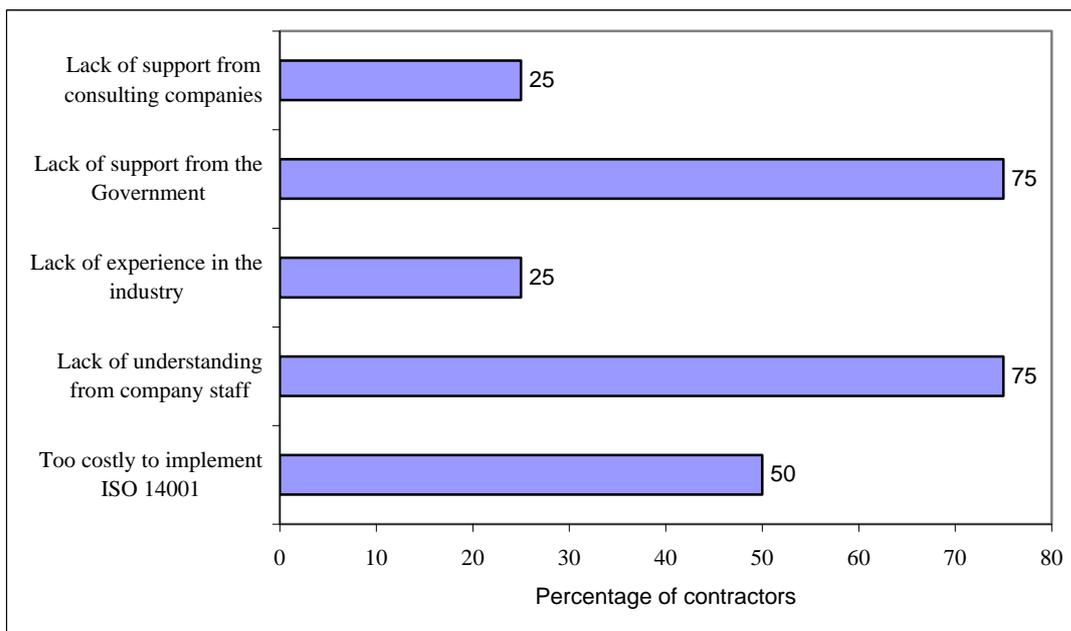


Figure 4: Obstacles encountered during ISO 14001 implementation

Table 1: Comparison of expected benefits and benefits reaped

| | Expected benefits | Benefits reaped |
|---|-------------------|-----------------|
| Increase in competitiveness and revenue | 3 | 4 |
| Higher chances of obtaining public projects | 2 | 1 |
| Improvement in site environment | 1 | 3 |
| Improvement in the company's image | 2 | 4 |
| Reduction in operating cost | 0 | 0 |

3.3 Interview results of contractors not certified

Among the 11 contractors who completed and returned the questionnaire, 4 accepted further interview. The purpose of the interview was to allow the interviewees to express their attitudes freely and, hopefully, to obtain additional information. All interviewees expressed unanimously that it was not necessary or there was no urgency to seek ISO 14001 certification because it wasn't required by the government. Two interviewees indicated that they would adopt ISO 14001 only if there was a push from the government together with certain financial support. Typical difficulties they foresaw in implementing ISO 14001 were the lack of extra human and financial resources. One interviewee expressed that it would be fairer if the government included ISO 14001 as a pre-tender criteria when bidding for public projects. As a result, all contractors who would like to bid for public projects would be able to compete on the same basis.

All 4 contractors who had been certified to ISO 14001 accepted the invitation for interview. One contractor expressed that the reasons for the implementation of ISO 14001 were because it was the global trend and because of a sense of social responsibility. 3 out of 4 contractors indicated that client's requirement was the driving force for them to obtain the certification. If their clients insisted on incorporating ISO 14001 as one of the bidding requirements, they could not afford to lose the business and had no choice but to obtain the standard. Since there is a lack of awareness of the importance of environmental protection in the industry, as one interviewee has expressed, it is rather difficult to communicate with the staff of the company causing difficulties in the maintenance of the system. Since contractors certified to the standard remain a minority, 2 interviewees has expressed that high maintenance cost can result in less competitiveness in the market when competing with those without certification.

4. Discussion and conclusions

The survey results have indicated that the overall rate of ISO 14001 implementation in the Macau construction industry is low. Among the 49 local contractors on the survey target list, only 4 contractors (8%) are certified to the standard. Among the 11 respondents who haven't certified to the standard, none have plans to implement the standard within the coming two years and 5 have indicated that they do not plan to seek certification in the near future. The reasons for this lack of interest or urgency to seek certification may be multifold. However, similar to the findings obtained from Tse (2001), a lack of government pressure and a lack of client's requirement may be the major reason for such a passive attitude towards ISO 14001 certification in the industry. Other reasons include a lack of financial incentive and a lack of support from company staff. The study conducted by Zeng *et al.* (2003) and Chen *et al.* (2004) in Mainland China also presented similar findings. For those contractors certified to the standard, ISO 14001 might be considered as a strategic tool to enhance the company's image and future business. According to the background information received, 55% of the respondents were small in size with number of staff less than 40. It is not surprising to see that, though these contractors could foresee some benefits after obtaining the standard, the extra financial burden might discourage them from obtaining it. On the other hand, as a minority group, those contractors certified to the standard might lose the competitiveness for bidding new projects due to higher operating cost in maintaining the management system. In summary, in order to further promote the implementation of ISO 14001, the Government should impose pressure on the contractors forcing them to seek certification within their organizations.

Contractors certified to ISO 14001 typically encountered two obstacles during the implementation process: (1) a lack of support and incentives from the government and (2) a lack of financial and human resources. The study conducted by Tse (2001) and Ofori *et al.* (2000) in Hong Kong and Singapore respectively also presented similar findings. As more foreign contractors are taking over the large-scale project market in Macau and more and more local contractors are voicing their dissatisfaction, the

government can see further conflicts between these two groups and cannot afford to wait any longer. To be able to compete with foreign contractors, adaptation of the international management systems is essential. More campaigns together with free consultation and training should be conducted by the government so as to encourage more contractors to participate in the implementation of the standard. Since financial burden or budget limitation is inevitably a major hurdle for those who would like to certify, the government should consider extending financial incentives such as subsidies and low-interest loans.

As for the issue of including ISO 14001 as one of the criteria for tendering public projects, though the government's push is the major driving force in the promotion of any initiatives and the contractors are willing to take this step, the Macau construction industry might not be ready for such a move. Any hasty change in government policy will only jeopardize the whole initiative. As most local contractors are currently not certified to ISO 14001, for tendering public projects, a change for the tendering rule within a short period of time will result in the exclusion of local contractors. The government should allow a period of around three years as a transition period for the local contractors to implement the standard before making it a mandatory requirement.

The last but the most important element to be considered is the awareness of protecting the environment in the site level. The environmental management system and its principles must be built on a good environment culture. The commitment from the top management of contracting companies and the government to better protect the environment should be the prime motivation in seeking certification. In general, there is still a lack of awareness for protecting the environment in the construction industry. Typical measures such as categorization of construction and demolition waste, increase use of precast products and other environmental-friendly materials and re-use of construction waste are not commonly adopted in the industry because of financial and geographic constraints. Moreover, the government's policy on dumping of construction and demolition waste without charge will only discourage contractors heighten their sense of responsibility to the environment. Government, together with top management in the contracting companies, must have a proper attitude towards environment accompanied by behavior before employees can be transformed and are motivated to do the same. Otherwise, ISO 14001 could end up with just a certificate posted in the contractors' office.

5. References

- Chen, Z., Li, H., Shen, Q.P., and Xu, W. (2004). "An empirical model for decision-making on ISO 14000 acceptance in the Shanghai construction industry". *Construction Management and Economics*, Vol. 22, pp 55-73.
- International Organization for Standardization (ISO) (2011). "*The ISO Survey of Management System Standard Certifications ISO 14001*".
- Macau Productivity and Technology Transfer Center (CPTTM, 2010), "*List of Certified Organizations*", <http://cms.cpttm.org.mo:8080/>
- Ofori, G., Briffett, C., Gang, G. and Ranasinghe, M. (2000). "Impact of ISO 14000 on construction enterprises in Singapore". *Construction Management and Economics*, Vol. 18, pp 935-947.
- Tan, T.K., Ofori, G. and Briffett, C. (1998). "ISO 14000: Its relevance to the construction industry and its potential as the next industry milestone". *Construction Management and Economics*, Vol. 17, pp 449-461.
- Tse, R.Y.C. (2001). "The implementation of EMS in construction firms: case study in Hong Kong." *Journal of Environmental Assessment Policy Management*, Vol. 3(2), pp 177-194.
- Zeng, S.X., Tam, C.M., Deng, Z.M., and Tam, W.Y. (2003). "ISO 14000 and the Construction Industry: Survey in China". *Journal of Management in Engineering, ASCE*, Vol. 19, Issue 3, pp 107-115.