

Critical Success Factors for Implementing Business Intelligence System: Empirical study in Vietnam

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Abstract

Although the application of business intelligence (BI) system has increased all over the world, the critical success factors (CSFs) of BI system implementation remain poorly understood. Therefore, understanding CSFs for BI system is very necessary for a company to be successful in implementing a BI system. Currently, the number of business successfully implemented BI in Vietnam is still limited. In order to understand the current situation of BI implementation in Vietnam, case study method has been used. Based on the research framework developed by Yeoh & Koronios (2010), in-depth interviews have been conducted with 4 Vietnamese companies, who already implemented BI system. The main result of this study helps to extract the lessons learnt from 4 cases to rank the importance of CSFs for BI implementation in Vietnam context. Based on this result, recommendations were made for increasing the probability of successfully implementing BI system in Vietnam and other countries with similar conditions.

1. Introduction

Since 1990s, the world economy has transitioned toward the knowledge-based economy. The important role of information/knowledge had been realized by many businesses. In this scene, Business Intelligence (BI) has emerged as a new method to support companies in extracting knowledge for improving their performance. According to Howard Dresner (1994), there would be a significant shift from application Business Intelligence solutions from information analyst to the business executive and management. Management of enterprises would use about 10% of the time to use BI. Indeed, more and more firms apply BI into their business and BI becomes one of the most crucial parts of the solution to provide businesses the necessary information for decision-making to be able to ensure competitive advantages. According to Garner's surveys five years ago (2011), BI applications have been dominating the technology priority list of many CIOs of many companies all over the world.

Vietnam also catches up with this trend of the world. According to Mr. Quang Tran, Director of Business Intelligence Solution of Oracle Vietnam, business should invest to BI because BI solution can provide many detail reports, access reports anytime, anywhere, help departments in company communicate better, control quality processes, and prevent risk instead of solving issues. There are several enterprises in Vietnam, which already implemented BI system. Most of them are multinational corporations, which aware the significant roles of Business Intelligence for a long time. The rest is some Vietnamese companies in retailer, food and beverage industry, which require accurately and timely response of information.

Although many companies have already implemented Business Intelligence Systems (BIS), the rate of failures is still high. Besides, BI is more complexity than Enterprise Resource Planning (ERP) in the meaning. To be successful in BI solution requires more information as well as more knowledge about how to use and manage information effectively.

In general, many companies aware the vital role of BI but they are still afraid of the failure. They need some lesson learns, experience sharing, and/or what else to secure the success of BI system implementation. Therefore, understanding the critical success factors of BI system is crucial and meaningful in the current situation to Vietnamese enterprises.

According to the report of Garner (2011), the rate of failure in implementing BI is about 70-80%. When estimating to the year 2014, although many businesses consider the importance role of BI, the rate of failure still does not decrease a lot, approximately 65-70%. There is no report or document about the situation of BI implementation in Vietnam; however, the rate surely higher than the number two-third as mentioned. As Mr. Cuong Vu, Vice Director a gold partner of Oracle in Vietnam, the rate of the company indeed implementing BI in Vietnam is only about 10%. Most of them just use a part of BI, such as

Management Report or Reporting System although they invest in the whole infrastructure for BI. That can be considered as failure cases because they do not use the strength of BI. To understand why the rate of failure is so high and how the rate success for BI implementation in Vietnam is increased, it is important to raise these following questions: (1) Why are some of the enterprises in Vietnam successful while others fail in implementing BI system? (2) What must be improved in management and process for implementing BI system?

The particular objectives of this research include: (1) To understand the situation of BI system implementation in Vietnam; (2) To get an understanding of the CSFs affecting the implementation of BI system in companies in Vietnam; (3) To provide suggestions for successfully implementation of BI system in Vietnam.

2. Theoretical background

This chapter figures out the review of related literature and information from textbooks, relevant reading materials and lecture noted on concept of Business Intelligence System (BIS), Critical Success Factors (CSFs), and Critical Success Factors for Business Intelligence (BI).

2.1 Business Intelligence Systems (BIS)

BI is understood as the set of techniques and tools using in the transformation of the raw data into the meaningful and useful information for business purposes. These technologies are capable of handling large amounts of unstructured data to help identify, develop and otherwise create new strategic business opportunities. BI is aimed to allow for the natural interpretation of these large volumes of data. BI also provide businesses with a competitive market advantage and long-term stability by its ability in helping corporate to identify new opportunities and implementing an effective strategy based on insights (Rud, 2009).

BI is processes and technologies that companies use to manage their enormous raw data in the history and current, transform to meaningful data. The result of these meaningful data can help business to predict the future. With the outcome from what predicts, corporate can build a set of actions (strategy) which useful to be enabled to make the decision effectively.

Additionally, BI can be used to support a broad range of business decisions from operational to strategic (Coker, 2014). Basic operating decisions include daily execution actions such as pricing or material planning. Strategic business decisions include long-term impact activities such as whether to remain a business (priorities), goals and directions at the high level. The business needs information from both external (data derived from the market) and internal (such as financial and operations data). When combined, these data can provide a complete picture that, in effect, creates an "intelligence" that any singular set of data cannot provide.

To summary, BIS is a system used for finding patterns from existing data from operations but not simple as a report set of an IT system. Software's reports just help to show raw data or raw-processed from one or two systems cannot be considered as BIS. BIS is more complexity than any other IT systems: a source of data combines both internal and external; data purpose is both operational and strategic, and data must be processed with complication techniques.

2.2 Business Intelligence Systems in Vietnam

In recent years, the requirement for human resources skilled in data analyst and using tool for BIS in Vietnam increases dramatically. For example, a new graduate student who is still need to be trained more, after one year training to use tool for ETL (extract, transform and load data), creating BI report/analyze/dashboard easily to find a job with salary triple his one year ago. According to Mr. Cuong Vu, Vice Director of a consultant company, the value of BI solutions which his company provides for customers growths about 100% per year in the last five years. Besides, the headcount of Oracle BI salesforces also rises from two or three members five years ago to six or seven members now.

All of these facts can be assumed that BI market in Vietnam has been growing intensely and many companies in Vietnam aware the important role of BI. Even so, most of those do not actually apply complete BI solution, they just use a part of it, such as report functions, not use either analytics or forecast. One of the reasons is that those businesses do not know how to forecast, or their companies' characteristics are unpredictable. Vietnamese culture also impacts for the reason for not using advanced

parts of BI. Most of the Vietnamese managers do not have the habit of making decisions by viewing the numbers or reports on the computer. They like to hold meeting, discuss and make decisions. They like to read reports on paper, not by selecting parameters or difference style on the computer.

There are some enterprises invest for BIS with solutions from consultants, high performance IT infrastructure, a sufficient support team, including Vinamilk (Food and Beverage), Tan Hiep Phat (Beverage), Pepsi (Beverage), Masan (Food), Bibica (Food), Kinh Do (Food), Big C Super Market (Retailer), Coop-mart (Retailer), Vietsov Petro (Petrol), Phu My Fertilizer (Fertilizer), Vietnammobile (Telecom), Banks, etc. In which, Masan is an outstanding firm for success. Other companies choose to implement by internal technical and business team, such as Annam Group (Beverage and Cosmetics), VNG Corporation (Online Entertainment), Vietnamwork, etc.

Most of these companies apply commercial solutions from vendors SAP, Oracle, Microsoft, and IBM. Nowadays, the trend for small and medium enterprises (SMEs) applying BI solutions from open sources such as Pentaho, Odoo, Python also goes up due to the low license cost. However, the cost of developing and maintaining the stability of the system is not small in comparison with commercial solutions.

Some of consultant companies for BI solution in Vietnam can be listed as follow: Accenture Vietnam , IBM Vietnam, HP Vietnam, Cybersoft Vietnam, Elite Technology, Gimasys, SSG, FPT, CSC, Global Cybersoft (Viettel), Vietsoft, Pythis, etc.

A BI project in Vietnam is typically implemented in six months to one year. After that, they review the needs and decide to continue to upgrade the system or not. Some of the companies have invested infrastructure, framework, etc. for a full solution of BI although they just use a small part of BI. Not many businesses in Vietnam admit that they fail in implementing BI. However, based on the meaning of BI, providing meaningful information for users to make decisions, there are only about 10% of firms implementing BI in Vietnam meet these indicators.

2.3 Critical Success Factors (CSFs)

Critical success factor (CSF) is defined as the term for an element that an organization or project need to satisfy to achieve its mission. It is required for ensuring the success of a company as a key factor or activity (Rockart, 1979). This concept was first represented by (Daniel, 1961): There is some limited number of areas once being satisfactory; they will ensure successful competitive performance for the organization. This idea was later used by Anthony, Dearden and Vancil (1972), Rockart (1979). Umble (2003) also defined CSFs as the few critical areas where things must go right for the business to flourish and for a manager's goals to be achieved.

CSFs are not the same between different industries, even in the same industry; CSFs are also diverse between the various enterprises. They vary from strategic, managerial to operational and are divided into three aspects: organizational, industry and environmental. They can exist at all levels of the company: corporate, division, plant, and department. Sometimes CSFs are even necessary consider of individual employees (Turban, McLean, & Wetherbe , 2001).

2.4 Critical Success Factors for Business Intelligence

There are many CSFs studies for conventional application-based on an IT project (such as an operational or transactional system). Implementing a BI system is a set of complex activities demanding suitable infrastructure and resources over periods (Moss & Atre, 2003), (Yeoh & Koronios, 2010). BI system implementation is regarded as an "organic cycle" that develops continuously. CSFs in the context of BIS can be perceived as a set of tasks and procedures, which are either adopted (if they had already occurred) or worked out (if they were nonexistent), that should be taken to make sure BI systems achievement.

There are several studies on BI success factors. Some authors classify CSFs for BI in 3 dimensions: environment, organization, and planning of the project. Hwang, Ku, Yen, & Cheng (2004) found there is substantial support for organizational factors. Lately, Ariyachandra & Watson (2006) analyzed CSFs for BIS implementation's measurement into two key dimensions: process performance, and infrastructure performance. Process performance can be assessed in the time schedule and budgetary considerations. Infrastructure performance is evaluated by the quality of system and information as well as this system use. Yeoh and Koronios (2010) classified CSFs for BIS implementation into three dimensions: organization, process, and technology. An organizational dimension contains committed management support and sponsorship, clear vision, and well-established business case. The process dimension includes

business-centric championship and balanced team composition, business-driven and an iterative development approach as well as user-oriented change management. The last dimension, technology, focuses on these elements: business-driven, scalable and flexible technical framework, sustainable data quality and integrity.

Lately, some other research, e.g. (Dawson & Belle, 2013), (Olszak & Ziembra, 2012) Olszak & Ziembra (2012), (Sangar & Alahad, 2013) generally agree with Yeoh and Koronios (2010) and build upon those CSFs for implementing enterprise-level BI. Up to now, the number of academic research on the CSFs of implementing BI systems is rare and limited in scope of analysis.

3. Research methods

3.1 Research purpose

This research is based on exploratory research as the author wish to verify and validate the results obtained from analysis of CSFs in the literature review. In the process of achieving the overall objective of the project, the author have experienced practical study as interviews with relevant participants in companies implementing BI and also gone through various literatures and have done analysis of the CSFs of the BI implementation process. The purpose of this research is to give better understanding of the quality of data gained and analyzed, the context of it and relevance to the current project.

3.2 Research framework

This research follows (Yeoh & Koronios, 2010) who classify seven CSFs for BIS to three key dimensions: Organization, Process, and Technology. This framework pointed out how a set of CSFs contributes to success of BIS implementation: there is a set of multi-dimensions CSFs that influences the success of implementing BI systems that are assessed through infrastructure performance and process performance. The infrastructure performance can be measured with the three major Information System success variables: system quality, information quality, and system use (Delone & McLean, 1992). The process performance can be assessed in terms of time-schedule and budgetary considerations.

Each factor contains several contextual elements. While some elements defining in (Yeoh, Koronios, & Gao, 2008) were still used in (Yeoh & Koronios, 2010), some were removed. In this research, the author uses all elements both in (Yeoh, Koronios, & Gao, 2008) and (Yeoh & Koronios, 2010). Besides, during the interviews, there are some elements emerged and added into research framework for further analysis including Involvement of top management (Committed management support and sponsorship), Change Management (User-oriented change management), Performance considerations (Business-driven, scalable and flexible technical framework). Seven critical success factors were described in below table:

Table 1 – CSFs and their contextual elements and descriptions

Dimension	Critical success factor (CSF)	Contextual elements
Organization	Committed management support and sponsorship	<ul style="list-style-type: none"> _ Committed top management support _ Adequate resources are provided _ Involvement of top management (Added by author)
	A clear vision and a well-established business case	<ul style="list-style-type: none"> _ Aligning the BI project with organizational business vision _ Well-established business case
Process	Business-centric championship and a balanced team composition	<ul style="list-style-type: none"> _ Existence of a business-centric champion _ Use of external consultant at early phase (consider to remove) _ Committed expertise from business domain _ The team is cross-functional
	Business-driven and iterative development approach	<ul style="list-style-type: none"> _ Adoption of iterative development approach _ Project scope is clearly defined _ Project scheduled to deliver quick wins (2008, remove in 2010)
	User-oriented change management	<ul style="list-style-type: none"> _ Formal user involvement throughout the lifecycle _ Foundation education, training, and support are in place _ Change Management (Added by author)
Technology	Business-driven, scalable and flexible technical framework	<ul style="list-style-type: none"> _ Stable source systems are in place _ Establishment of strategic scalable and flexible technical framework _ Performance considerations (Added by author)
	Sustainable data quality and integrity	<ul style="list-style-type: none"> _ High quality of data at source system _ Business-led establishment of common measures and classifications _ Sustainable dimensional and metadata model _ Business-led data governance (2008, remove in 2010)

Success criteria for implementing a BIS was defined as below (Yeoh & Koronios, 2010):

- Each criterion was measured on 3 levels: Good, Acceptable, Poor.
- A case will be evaluated “Successful” only if all criteria of Infrastructure performance are “Good” and criteria of Process performance are “Good” or “Acceptable”.
- If there is any “Acceptable” and no “Poor”, the case will be assessed Partially Successful.
- A case will be appraised “Unsuccessful” if there is any “Poor” criterion.

3.3 Research process

This research use qualitative (case study) method to achieve a deep understanding of the problems. The case study methodology provides better explanations of the examined topic which would be lost in quantitative designs (Yin, 2003). This study has been carried out through three steps:

Step 1: Through the literature review of the BIS, a list of the success factors identified or found in the previous study was summarized. The summarized list of key success factor, then it was then being used as the check-list for testing against the findings from the interviews in the selected cases.

Step 2: Then, based on interviews with project members of 4 cases, this research analyzed, evaluated, and benchmarked to confirm the existence or importance of CSFs.

Step 3: Finally, the conclusion is withdrawn from the study, and the recommendations for the management and the project team in implementing BI solution are suggested.

4. Data collection & analysis

4.1 Sample design

This research takes place in enterprises implementing BI system in Vietnam. For this study, each case study is an empirical analysis that allows replicating logic leading to analytic generalization. Case studies in this research should be considered as experiments and not merely respondents in a survey (Yin, 2003). Therefore, selecting cases must focus on relevance rather than representativeness. Several studies recommend the number to attain “theoretical generalizability” (e.g., Eisenhard, 1989; Miles & Huberman, 1994; Yin, 2014) should be at least 4 and should not over 15 cases to enable comfortable understanding of “local dynamics” (Miles & Huberman, 1994). Four cases is chosen for this study falling within the recommended range. Table below lists the background of four cases (see the appendix for more details). Their descriptions have been masked slightly to preserve the anonymity of the participants.

Table 2 - Case Background

Case	Org. Code	Type of organization	Annual Revenue	No. of staff	BI system owner	Implementation success level
S	A	Importation, Wholesale, Retail and Distribution	M	700	MIS Department	Successful
P1	B	Retail, Distribution, and E-commerce	M	600	MIS department	Partially successful
P2	C	Digital Content	M	1500	Customer Service Dept.	Partially successful
F	C	Digital Content	M	1500	Technical Support Dept.	Unsuccessful

Note. Vietnam Govt. classification: annual revenue is Medium (M) if it is between 500,000 and 2,500,000 USD.

4.2 Data sources

Primary sources information and data has been collected through the semi-structure interviews. There are total 18 interviewees, and the author herself was the interviewer for all interviews. The author tries to contact participants by calling, emailing to the relationship before for asking they join the interview and using snowballing for filling in some missing informants of research design.

There are five face-to-face interviews and recorded in the audio tape. One interview is a short communication happening when the author accidentally met the interviewee in the company lounge, so there is no audiotape was recorded. The rest 12 interviewees accept to take part in the interview via some internet message tools including Skype, Facebook Messenger and Google Hangout due to they cannot arrange the time for the face-to-face interview.

The interviews were taken place any time the participants are available and not continuity. Sometimes, the author reviews the data and need to make clear some information and suggest for a short interview to confirm or check data. During the interview, the author was introduced the systems such as the way to use systems, the information systems provide, the schedule of the projects.

Overall, 18 interviews was taken place for all four cases. Interviewees are people who join in the process of implementing BI system including project sponsors, project managers, technical people and key users.

Table 3 - Summary of interviewees

Case	No. of member	Position of participants	Project Role	Function	Coding	Method of interview
S	4	Managing Director	Project Sponsor	Business	S-Sponsor	Email
		MIS Manager	Project Manager	Business /IT	S-PM	Face-to-face
		System Leader	Project Member	IT	S- Technician	Internet Message
		Planning Manager	Project Member	Business	S-User	Internet Message
P1	5	Finance Controller	Project Sponsor	Business	P1-Sponsor	Internet Message
		MIS Manager	Project Manager	IT	P1-PM	Internet Message
		MIS Specialist	Project Member	IT	P1-Technician	Internet Message
		Budget Owner	Project Member	Key user	P1-User 1	Internet Message
		Budget Controller	Project Member	Key user	P1-User 2	Internet Message
P2	5	CEO	Project Sponsor	Business	P2-Sponsor	Short conversation
		Head of Customer Service Department	Project Member	Business/IT	P2-PM	Internet Message
		Process & Operation Leader	Project Member	Key user	P2- Technician	Face-to-Face
		Technical Leader	Project Member	IT	P2-Coordinator	Face-to-Face
		Product Manager	Project Member	Key user	P2-User	Internet Message
F	4	COO	Project Sponsor	Business/IT	F-Sponsor	Face-to-Face
		Tech Manager	PM Assistant	IT	F-Technician	Face-to-Face
		Management Accountant	Project Member	Key user	F-User 1	Internet Message
		PQA	Project Member	Key user	F-User 2	Internet Message

4.3 Data analysis

This study uses a cross-case analysis approach to understand the findings better (Miles & Huberman, 1994). Examining similarities and differences in relationships within the data helps to search the pattern and varying the order in which case data are arranged enables patterns to become more evident (Stuart, McCutcheon, Handfield, McLachlin, & Samson, 2002).

Four cases were categorized to successful (S), partially successful (P), or unsuccessful (U) by applying the research framework with a set of success criteria of. The extent of implementation success was examined against two key dimensions: (1) Infrastructure performance, which was viewed through the lens of system quality, information quality, and system use; (2) Process performance, which budgetary considerations and time-schedule measures were taken into account.

After the interview results for all four cases have been analyzed, one success cases emerged, two partially success cases, and one failure case. The success case was described as stable, dynamic, extendable, and the time of responsive within expecting. Likewise, the information provided by the BI system was considered timely, accurate, complete, and relevant to most participants. Additionally, the implementation processes were completed with an acceptable delay and within budget. Table below shows in more detail how the four cases measured up against the previously introduced list of success measures.

Table 4 - Implementation success level of four cases.

Case	Infrastructure Performance			Process Performance		Overall
	System Quality	Information Quality	System use	Budget	Time Schedule	
S	G	G	G	A	G	S
P1	G	A	A	A	G	P
P2	G	G	A	A	A	P
F	A	X	X	G	A	U

Note: G = Good, A = Acceptable, X = Poor, S = Successful, P = Partially Successful, U = Unsuccessful.

5. Findings

5.1 Background to Implementing the Business Intelligence Systems

For better understanding the relevance of the CSFs, we need to think through the background and motivations for implementation the BI system across all cases.

Table 5 - Background to and motivations for implementing the BI

Case	Background to and motivation for implementing the BI systems
S	<ul style="list-style-type: none"> • BI system was used for advance analysis of exists data from ERP system and to leverage the business such as estimating sale requirement, planning for resources, business performance appraisal, finding focus sale items/sale markets, cost determine. • BI help to improve business performance and shortage period of planning due to information was updated every day: Planning for sale requirement and importation weekly, analyzing for sale markets monthly, planning for budget quarterly ... • BI system was implemented to meet the requirement of top management: having more meaningful data to get deeper understanding of the business situation and improving the processes of the enterprise. • The accuracy of reports is also an important thing: to get data directly from its container, not be processed or cooked by anyone.
P1	<ul style="list-style-type: none"> • BI system was implemented to use information from ERP in another way: saving time to get data and make reports, overviewing the entire organization, managing data in an easy-to-use interface: all information show on the dashboard, analyze with what if forecast business situation and make decisions • BI system to plan finance indicators with a small variation, therefore, helping to control finance performance effectively, supporting managers easier. • Solving problems: user used to take much time to collect data from ERP and Budgeting System then cooking it to make reports and send to Budget Owners. Sometimes they said that data is not what-they-want such as the template is hard to sense the situation or more suitable for financing view not for strategy aspect, data is not exactly as they remember. • Saving cost for human resources: <ul style="list-style-type: none"> ○ Technical people: time to develop reports, e.g., one layout need one report takes about 1-2 MD. Each type of user needs the different layout of the reports. That needs to take time for development. Users can build reports analytic on BI dynamically by the way of pulling data sources and creating analytics by some indicators they care. ○ Business users: some of summary report were daily sent to users; therefore, they can aware their situation without login to the BI system or waiting report from Finance Department. • Accuracy and in-time report: Users need real-time and updated data for accurate reports. If users export data from the transactional system (ERP) and create reports, it takes them much time, lead to reports not accurate anymore at the time the top managers receive them. • Providing more analytics for different types of user, for example, one just needs some key information, while his subordinators need information in detail. A BI system must stipulate this requirement.
P2	<ul style="list-style-type: none"> • Solving problems: <ul style="list-style-type: none"> ○ There are many data but still diffuse from many systems and not be standardization. Therefore, those data are not exploited and used effectively. When users need information, they do not know whether data exist, where the data are from or what specific data they need to request the data owner provide. Hence, it is critical to implementing a BI system to integrate all of the related systems and give an overview picture of the business, from which people can make an important decision. • BI Tool was created to use existing data effectively, to analyze and exploit data in many views. From which, they can make the questions and find the answers from the BI system. For example, the system does not only provide information about revenue increase or decrease but also give the reason. BI system has meaning if it help users base on it to make decisions. • Saving time to make reports or aware and answer for a phenomenon: data was consolidated, therefore making reports or analyzing business situation do not make users take the time to find data.
F	<ul style="list-style-type: none"> • Solving problem: <ul style="list-style-type: none"> ○ Lack of necessary information ○ Lack of close link between departments in corporate ○ No history for data due to reports are kept in Excel ○ Waiting much time for reports • Request from Managers for a BI system for new industry Game online. • Request from Finance Controller to control the cash flow in products.

5.2 Case analysis based on 7 CSFs of research framework

Based on the scoring of each CSF's element, the overall appraisalment for each CSF is summarized in table below. By multiplying scores of elements with the case's coefficient (successful: 2, partially successful: 1, unsuccessful: 0), the ranking of CSFs' elements was calculated in table 7. By calculating the average score for each CSF via its elements, the ranking of CSFs also is listed in table 8.

Table 6 - Summary of overall appraisalment for CSFs in four cases

Dimension	Critical success factor (CSF)	Cases			
		S	P1	P2	F
Organization	Committed management support and sponsorship	Yes	Yes	Partly	No
	A clear vision and a well-established business case	Yes	Partly	Partly	No
Process	Business-centric championship and a balanced team composition	Yes	Partly	Yes	No
	Business-driven and iterative development approach	Yes	Partly	Yes	No
	User-oriented change management	Yes	Partly	Partly	No
Technology	Business-driven, scalable and flexible technical framework	Yes	Yes	Partly	No
	Sustainable data quality and integrity	Yes	Yes	Yes	No

Table 7 - Ranking of CSF elements in four cases

CSF elements	Ranking
Adoption of iterative development approach	1
Project scope is clearly	1
The team is cross-functional	2
Change Management	2
Establishment of strategic scalable and flexible technical framework	2
Committed top management support	3
Existent of a business-centric champion	3
Committed expertise from business domain	3
Formal user involvement throughout the lifecycle	3
Aligning the BI project with organizational business vision	4
Well-established business case	4
Stable source systems are in place	4
Adequate resources is provided	5
Involvement of top management	5
Foundation education, training and support are in place	5
High quality of data at source system	5
Sustainable dimensional and metadata model	5
Performance considerations	6
Business-led data governance	6
Business-led establishment of common measures and classifications	7
Use of external consultant at early phase	8
Project scheduled to deliver quick-wins	8

Table 8 - Ranking of CSFs in four cases

CSF	Ranking
User-oriented change management	1
A clear vision and a well-established business case	2
Business-driven, scalable and flexible technical framework	2
Committed management support and sponsorship	3
Business-driven and iterative development approach	4
Business-centric championship and a balanced team composition	5
Sustainable Data Quality and Integrity	6

The overall appraisalment for CSFs in four cases points out that there is a positive relationship between the CSFs and the system success. It showed a pattern related to the presence or absence of CSFs. Overall, the success case manages all CSFs right; the failure case seemed to manage all of them wrong while the two partially success cases appeared to manage some of them right and some half-done.

6. Discussion and Conclusion

6.1 Summary of main findings

In case successful (case S), all CSFs' elements were satisfied. The Managing Director, who is directly involved in the project, expressed her determination to implement the project at the company-wide level, the project was widely noticed and taken on high priority. This requires all participants to dedicate their resources to the project from the senior management, the support people for management, to direct staff to do the work of business operation. That the policy of project results would impact the annual performance of forces people to find ways to coordinate effectively with each other to ensure the success of the project. This case has a huge advantage that there is a long-term business strategy. Clear and long-term vision helps a lot for the BIS system not only in defining clearly the requirement and the business cases but also support for the following stages as choose to filter the information integration, design data model, master data management, data quality management more convenient and less change. With such a long term strategy, the report sets that users reporting for superior are still updated and can be applied into the BIS. Users have been very familiar and skill to analyze data despite there is BIS software system, or not. Therefore, they know what they want and what they must report to the higher levels. This lead to an advantage for the technical team when they get requirements and advise users, they just benchmark the requirements to the ability of the system. The budget for the project is not abundant although when necessary it will be supported. The decision to choose Microsoft solutions for small and medium enterprises shows that there was the consideration of the project budget. This also indicates that the selection of appropriate technical platform and capable of mastering the technology are more important than the budget more or less. On technical factors, this project also has an advantage that the data sources from the ERP system has been standardized, and the entire data sources are all controlled the MIS Department. This helps to eliminate many issues.

In the first case of partial success (case P1), there are some similarities with the case of success (case S) such as the Project Sponsor is also fierce in putting the project align with the project objectives, and the system uses data from the standardized application before such as ERP, EPM, and BPM. However, that the differences cause the project did not succeed completely. First, the Project Sponsor as Finance Controller could not push all the business stakeholders, including the management. Although this project also made policy of putting project results into the annual individual performance appraisal, but this policy was just only applied to the Finance and MIS department, the other members were not affected by this regulation. This leads to the second difference compared with the case of success, the difficulty in handling the requirements. Although the stakeholders also got the benefits from the project but they did not really take the time for the project. To be able to involve these people in the process of taking the requirements is really the most difficult work for this project such as arranging appointment, lack of knowing about the changing of business within the next few months. The reason given is that the nature of this business is always volatility and large-scale growth of the company. The fact that the enterprise did not have a stable business strategy in a year influences to the project. A bright spot is that the system is designed according to the directions easy to open and flexible, so the changes can be implemented quickly.

Before referring to the second case of partially success (case P2), the unsuccessful case (case F) should be mentioned to see more visible the similarities and differences between case failures and two cases partially successful. In case F, most of the CSFs are ignored. Although the budget for the project is quite big to invest in technical platform with the purpose of building a more integrated system of data sources and contains a large amount of data but the skip CSFs made the project to a heavy defeat and cannot be improved (case P1) which forced company either continue to use the system with the current status or construct a new system. That the Project Manager did not concern the project is an imperative factor leading to many factors causing the failure. Top Management can only support the project if any raised up need help. In case S and case P1, along with the Project Managers, Project Sponsors always actively involved in most of the activities of the project, entirely different from case F. Besides, although the vision of this project was defined, it was not satisfied since the Project Manager did not stands out balance between technical and business, resulting in the system went towards technical direction and could not solve the business problems. Technical-oriented also leads to obtaining requirements only at the high-level and ignoring the level below. At the testing phase, the management said that they just care the overview numbers from their subordinates, who really need more detailed information to assess the situation of the product. Until then, the system had been built, and some changes could not be implemented. In addition, the

inclusion of too much redundant data pushes the project to some other issues such as poor performance and costs for managing the data, making the data outdated or unnecessary for business.

In the second case of partial success (case P2), the CEO is the person who launched the project and appreciated the meaning of the project. Nevertheless, the CEO and Top Management had not yet really confident in the success of the project, so the project was launched in two phases: the exploring phase and the upgrading phase. Because the CEO thought that the first phase was just for exploration purpose, he involved into the project at the extent of demanding the relevant departments providing data sources. The concept of exploration had limited the vision and the business case in an unclear definition. The highlight of this project is the Project Manager, a person capable of in-depth technical but also have the mindset toward business. This helps the effective balance between business and technology solutions in the context of the budget for the project is limited. Lessons from the failed project previously, case F, this project focuses on the requirements of both high-level and low-level. The project team consists of both technical and business side. The business analyst presented the requirements collecting from the business side to the technical team. Then they analyze what was the necessary data to satisfy the requirements, where those data were stored. Then they decided to remove the redundant data to prevent the increase of data size. In any cases the business requirements conflicted with technical capacity, the project manager would stand off balance by prioritizing business or technical depending on each stage. After the completed prototype, the business analyst guided and convinced users to use the prototype to give suggestions, from which the project team would make the necessary changes. The management of the data quality was especially focused because the system integrated with many different systems without any standardization. When put into the integrated system, the data must be standardized and cleaned by a tool to standardize data. The benefits of managing data quality are the accurate data, and the proper performance of the system.

From above analysis, compared with the assessment in the study of (Yeoh & Popovic, 2015), there are differences in the ranking of CSFs for BIS implementation as follows:

Table 9 – Comparison of CSFs ranking of this research and previous one

CSF	Ranking in this research	Ranking in research of (Yeoh & Popovic, 2015)
Business-centric championship and a balanced team composition	1	3
User-oriented change management	2	4
A clear vision and a well-established business case	3	2
Business-driven, scalable and flexible technical framework	3	6
Committed management support and sponsorship	4	1
Business-driven and iterative development approach	5	5
Sustainable Data Quality and Integrity	6	7

Note. In this table, the author assumes the ranking of Yeoh (2015) by deducting from the content of the research.

6.2 Discussion and implications

From the findings above, some differences in the cases studied in Vietnam are realized as follows:

Table 10 - CSFs for BI and implications for Vietnamese enterprises

CSFs	Ranking	Implications
Business-centric championship and a balanced team composition	1	In Vietnam, this is the most significant weakness for BI system deployment success. Meanwhile, Vietnam is a huge shortage of people with the ability to deeply knowledgeable about the technology and mastery of the business. In fact, it is hard to rely on a consultant because no other one understood the business of enterprise by a person in that enterprise. One of solutions is that one with technical background should take part in the professional course as well as join the business activities of the company to gradually infuse the company's business. Then that person would manage a BIS project more efficiently.
User-oriented change management	2	While the study of Yeoh & Popovic (2015) considers this factor rating is lower than the elements of the perspective Organization, in this study, this factor was considered the second important factors affecting success. The reason is that if the process of defining the stakeholders for project do not do well in order to involve them at the first stage, the system will potentially in a risk causing the failure such as the users refuse to use, the design is not flexible enough to able adapt to changes or new requirements, costs for maintaining the outdated data are inflated since the demand cannot be maintained which is still in use and which is obsolete.

A clear vision and a well-established business case	3	This study and the study by Yeoh & Popovic (2015) are both appreciated the level of influence to the success of BIS implementation of this factor. If the organization does not obtain clear vision, making the business case will encounter many difficulties and lead to consequences such as business side does not support the project (case F), request to change too quickly leads to the system cannot satisfy (case P2, F). The results will be worse if the design of the system is not flexible and scalable enough (case F).
Business-driven, scalable and flexible technical framework	3	While research by Yeoh & Popovic (2015) confirms the factors related to Technology is affecting the less to the success of BIS implementation, in the cases in Vietnam, this factors are ranked equivalent to factor "A clear vision and a well-established business case ". The reason is that the technology must follow the right way from the beginning to adapt to meet business demands.
Committed management support and sponsorship	4	While this factor is assessed in the study of Yeoh & Popovic (2015), at level four, it is affecting the most to success BIS implementation in Vietnam. Deeper analysis in case P2, although the degree of support only to the extent and budget for the project was not plentiful, the project team can still rotate and find appropriate solutions. In case of success we noticed the budget for the project is also only in moderation. In addition, the levels of involving high or low of management do not affect much on the success of the project. However, to success in implementing BIS, the stipulation is that management is the determination and appreciates the importance of the project.
Business-driven & iterative development approach	5	The approach is not highly appreciated in cases in Vietnam due to iterative deployment model has been developed for a long time, and many companies apply. No company would use the waterfall model for deploying BI.
Sustainable Data Quality and Integrity	6	This factor is rated at the lowest level affecting the success of the deployment project BIS. The project will certainly fail if it does not control well this factor. In other countries, the majority of systems are developed stable and data quality good while in Vietnam the majority of the applications are in-house developed with many issues related to the quality of the data. Furthermore, it is necessary to guarantee for the integrated system to be smoothly to prevent the problem such as the system does not retrieve data from the source systems, do not know whether the problem involved interrupted data, etc. To resolve this issue, it is necessary to aware of the importance of this, to understand the data source to perform data cleaning steps: getting the data needed and standardize data, to build the tool alert when there are problems related to integration.

6.3 Recommendations

From the results of research through case-study, this research based on the framework of Yeoh & Popovic (2010), the research questions could be answered as follows:

1. Why are some of Vietnamese enterprises successful while others fail in implementing BI system?
=> In order to implement BIS successfully, the enterprises should properly manage the CSFs for BIS implementation. Vietnamese enterprises must understand the CSFs for BI implementation and they should focus on high ranking factors for ensuring the success of BI project.

2. What must be improved in management of BI implementation project in Vietnam?

- Solving the culture problem that managers do not like to use the system or prefer to read the reports on paper => Top management makes policies to force people in the company must show reports in the meeting from the BIS. This will create the habit to use the BIS every time.
- Solving the human resources problem: The ability to understand the business and analysis capabilities of the Middle Managers still low and should be raised. => Middle managers must spend more time to get a really understand about their business; Top management frequently shares the business vision, strategies to the middle managers.
- Solving the problem of the quick changes in the business environment which requires the technical team must have high skills requirements gathering, design, building systems that are flexible to meet future expansion needs. => Top management frequently shares the business vision, strategies to the middle managers; The project manager should be the person who strong in technology and having time to work on the business side.
- Solving the problem of the process of implementation: difficulty in getting data from sources of other departments. => Top management should make policies to force departments; Project Manager

should define the right stakeholders at the beginning of the project to involve them in the meeting having the top management.

In the case of Vietnam, the critical success factors' elements in the research framework were confirmed. Besides, there are four elements emerged, including Involvement of top management, Change Management, Performance considerations, Business-led data governance.

6.4 Limitations and implications for future research

The number of cases in this study is still a small number (4). Future studies should examine more cases for the better results; especially focus on studying cases of failure would also add valuable insights. In addition, selection of cases in this study does not regard industry and size of the organization. The industry sector and the firm size of the organizations could have influenced results on the success of BIS implementation. Thus, future research should control for firm size and industry sector. For differences attributable to organizational resources, future research should extend and examine how other elements, such as: culture, organizational structure, people, and their skills, and routines interaction to ensure the success of BIS implementation within organizations.

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Appendix 1. Four Vietnamese cases of BIS implementation

Case No. 1 (Case S – Organization A, BI System Owner: Management Information System Department)

Company A in this study is a full-service distribution company for food, wine, and cosmetics with head office in Vietnam. It imports products from Europe market and distributes for Indochina market. Information System has implemented in two phases including phase 1 – ERP implementation, using solution from consultant partner and phase 2 – ERP maintenance and BI implementation, using internal resources, and continue to be developed until now on demand. BI system has been using from 2012 at corporate-level: Top Management, BU Director, Department Head, Middle Manager, Product Operation Team, Showroom Management, etc. The data sources for BI is from ERP system including Planning, Sales, Logistics, and Finance. All of data sources were also maintained and controlled by MIS department. The BI project was initiated by the Managing Director, who is a member of Executive Board and direct boss of the Project Manager (PM), an MIS Department Head. The project was implemented in 6 months and went live. During the project, members of MIS department coordinated with all business functions in the enterprise from top management to sales in stores. The way to collect business cases is that work closely with Top Managers to get requirement in high level, then they find down how to meet those requirement with next down level managers in business, and iterative to employees. An advantage for this case is that all people in companies have familiar to making report suiting the requirement from their boss in many years. Therefore, the technical team simply implements most of reports and designs analytics or forecast base on existed report set. This case applies BI framework from Microsoft.

Case No. 2 (Case P1 – Organization B, BI System Owner: Management Information System Department)

Company B one of the two companies lead in distribution mobile card and game card and collection for utility fee (electric, water, telecommunication, internet, television) with about 60% market in Vietnam. Company B also extended to e-commerce several years ago. It has physical delivery network system while develops an online system. The company has software system serving for sales. Then it builds MIS with 3 phases: Phase 1 - ERP implementation, using solution from a Vietnamese consultant partner, phase 2 – Enterprise Planning Management (EPM) implementation and BIS implementation, solution from an Indian consultant partner, and phase 3 – EPM and BI improving, using internal resources. Phase 1 completed in 2010, Phase 2 completed in 2012, Phase 3 started in the haft of 2014 and went live in begin of 2015. The system uses data sources from systems including Business Process Management (BPM), EPM, and ERP (which data from sales system integrated with). All of data sources were maintained and controlled by MIS department. The outcome is used for Top Management, Key Managers, Middle

Managers, assistants to managers, and key users from Finance Department (called Budget Controllers). Finance Controller are the project sponsors for this project. Project Manager is MIS Manager, who reports to COO. The COO involves in this project as span to push stakeholders from departments in the enterprise. Budget Controllers take role "Coordinator" to get requirements from stakeholders from all departments. Besides, there is an assistant for Finance Controller takes the role as Project Manager inside Finance. She is also technical background, in charge of confirming business cases, taking part in meetings of reviewing technical solution, representing for Finance Controller to push users involved in the project seriously. This case applies BI framework from Oracle.

Case No. 3 (Case P2 – Organization C, BI System Owner: Customer Service Department)

In this study, company C was introduced in two instances: case P2 and case F. Company C is a Digital Content Company, including game online, music online, social network, business to customer (B2C) e-commerce, online payment gate and so on. Since most of its services are online, its market reaches to Japan, China, Indonesia, and Singapore by the way online. Because most of the services require high technical understanding, more than half of employees in company C is technical background, the COO and BU directors (in four BU directors) is also the technical background. There are many software systems or tools owned by particular departments in the enterprise, maybe 3-5 systems per each department. Each department controls data they have and keep confidential. If someone in firm need specific data, he does not know exactly where is that data, who owned it, how to approach it and how to understand it. With the technical background, most of the technicians do not aware the meaning of data they have in business. Moreover, when the business and technical do not have the same direction, there are many restrictive things lead to disadvantages for company C. Although company C has ERP system and BIS using data from ERP mostly for Management Report, this system does not be mentioned in this study. In case P2, the BIS has been built and owned by Customer Service Department. The purpose of BIS is to monitor, analyze and forecast information of customers using products online games (from here we call "gamer"). It uses data sources from sporadic systems of many departments in organization: (1) Account information of gamers from Passport Department, (2) Payment and revenue information from Payment Department, (3) Log and behavior of gamer when using games from many departments of products, (4) Support information from Customer Service Department. The outcome is used for Top Management, Key Managers, Product Managers and Product Operators. The project plans in two phases. Phase 1, the Explore Phase, was prepared in the half of 2014 and built up to the half of 2015. It went live in begin of Jun-2015 and received positive feedbacks from users. Phase 2, the Upgrade Phase, will be implemented if phase 1 would perceive positive react and the data is bigger by the time. Sponsor for the project is the CEO; the project manager is Department Head of Customer Service. Customer Service Department is in charge of support customers using all products of the company, receiving demands from customers, solving it or transferring to product depending on each case. That is the reason the project manager has a view of business-oriented although he is the technical background and has a closely relationship with almost other departments in the company. This case applies BI framework from Microsoft.

Case No. 4 (Case F – Organization C, BI System Owner: Technical Support Department)

Case F is also a BI system of company C. This system was built from 2010 with demanding of the COO for the need of understanding the situation of the company through some key indicators of products. This system has been used until now but just for limited stable functions in the stage waiting for the new system (in case P2) covers full of functions of it. The system also uses data sources from systems of many departments in the organization: (1) Payment and revenue from Payment Department, (2) Log and behavior of gamer when using games from many departments of products. The outcome is used for Top Management, Key Managers, Product Manager and Management Accountant from Finance Department. The project manager of this project is Department Head of Technical Support, a technical background, and completely technical-oriented person. Most of project members are from Technical Support department, some of the key users did not involve in the initial phase. The COO was a business and technical balancing person, but he did not involve much in the project. This case applies BI framework from Oracle.