ASSESSING THE LEVEL OF INFORMATION TECHNOLOGY (IT) PROCESSES PERFORMANCE AND CAPABILITY MATURITY IN THE PHILIPPINE FOOD, BEVERAGE, AND TOBACCO (FBT) INDUSTRY USING THE COBIT FRAMEWORK

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ABSTRACT

A grounded literature on how information technology (IT) processes are being managed is imperative in an industry with an increasing reliance on IT for its strategic and operational undertakings. This study seeks to provide a comprehensive assessment of the level of IT processes performance and capability maturity in the Philippine food, beverage, and tobacco (FBT) industry by applying the theory of benchmarking and the CobiT framework on IT governance. After administering the 167-item survey instrument to 22 publicly-listed companies in the FBT industry, represented by respondents composed largely of IT managers and administrators and subjecting the results to statistical tests and IT experts' validation, it was found out that the FBT industry currently has a maturity score of 2.05. At this maturity level, IT processes have developed to the stage where similar procedures are followed by different people undertaking the same task but there is no formal training of communication of standard procedures. To be able to evolve to the next immediate level where IT processes are standardized, documented, and communicated through training, companies in the FBT industry should bank on their key strength in the Acquire and Implement (AI) domain and improve on their weakness in the Monitor and Evaluate (ME) domain.

Keywords: Benchmarking; Capability; Domain; Governance; Maturity.

INTRODUCTION

The advent of information technology has significantly influenced and changed how businesses are being managed and monitored today (Hunton, Bryant & Bagranoff, 2004). It has brought both positive and negative impacts to the business world. As such, a term double-edged sword is often used to describe it.

To ensure smooth management of the new business set-up, the concept of corporate governance was redesigned to include information technology as a major part of it. New governance

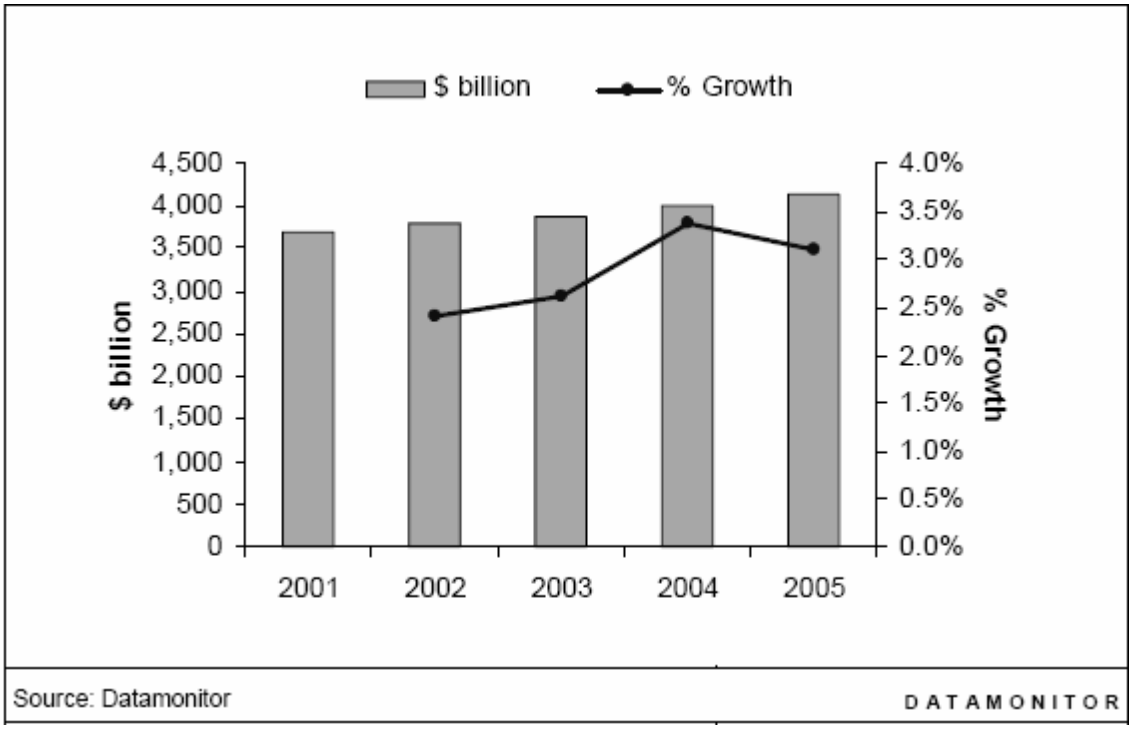
and internal control frameworks came up just for this concern to be addressed. This resulted to an increased awareness that IT governance is a major ingredient in achieving every organization's goal of value creation.

In spite of the availability of new governance and internal control frameworks, many organizations still compromised their going concern because of poor enterprise-wide governance. The collapse of Enron in 2002 and the recent 2009 Satyam scandal in India are among the proofs of this predicament. Much more alarming is that in 2008, Satyam was the winner of the coveted Golden Peacock Award for Corporate Governance under Risk Management and Compliance Issues. Because of this, the awareness for both corporate and IT governance must be heightened and taken more seriously.

THE STATE OF THE FBT INDUSTRY

Over the last few years, the global food, beverage and tobacco (FBT) industry group has exhibited modest growth, with growth particularly low in the tobacco and beverage markets. The industry group generated total revenues of $4,140.3 billion in 2005, this representing a compound annual growth rate (CAGR) of 2.9% for the five-year period spanning 2001-2005 (Datamonitor, 2006).

Figure 1: Global food, beverage & tobacco industry group value: $billion, 2001-2005



The leading revenue source for the global FBT industry group is the sale of food products, which generated total revenues of $2,634.3 billion in 2005, equivalent to 63.6% of the overall industry value. In comparison, beverage sales accounted for $1,035.4 billion in 2005, which represents 25% of the industry value. However, the increasing global population will drive demand up, while rising income levels in many economies allow increased spending on added-value processed, packaged, and luxury items in this category. The global consumption volumes of tobacco are steadily falling, as the health risks become more widely understood, although in some countries, such as India, volume growth remains positive (Datamonitor, 2006).

But looking forward, the global FBT industry group is expected to accelerate from its current value growth position. With an anticipated CAGR of 3% over the 2005-2010 period, the industry is expected to reach a value of $4,805.5 billion by the end of 2010. The drivers operating during the last five years are set to persist for the next five (Datamonitor, 2006).

In the Philippines, the FBT industry belongs to the industrial sector. There are 23 publicly-listed companies under the FBT industry (Philippine Stock Exchange (PSE), 2009). It is a highly regulated industry particularly the tobacco companies. A study by RNCOS in New Delhi on September 13, 2008 on the Philippine FBT Market Forecast until 2011 showed the patterns in consumption behavior in the different food segments. The study indicated five key results about the sub-industry: (1) because of the strong increase in consumer expenditure during 2001 to 2006, a rise of 7.5% is also expected from 2007 to 2011; (2) the increase in the working hours of employees, increase in number of employees and diverse eating habits has lead to a high consumption of ready-to-eat meals; (3) the demand for organic food will increase at a growth rate of 10% to 20% because of the growing middle class population; (4) an increase in disposable incomes and demand fro imported alcoholic beverages; and (5) there is an inadequate water supply and healthy drinking concerns that have resulted in the growth in the bottled water industry (Dy, Ha, Gan & Alba, 2009).

DEPENDENCE OF FBT COMPANIES ON IT

According to Siethe and King (1994), in the market where the existence of perfect competition restricts generation of a reasonable profit, successful implementation of IT systems plays a crucial role in order for organizations to maintain a competitive standing.

Since all the major players in the FBT industry group source ingredients and sell their products all over the world, the current high oil prices are significantly increasing transportation costs by way of inflated petroleum prices. Companies have begun to combat such problems by driving efficiency within their regional distribution networks. By monitoring demand within a particular global region, companies have been able to minimize transportation, thus mitigating their exposure to these rising costs (Datamonitor, 2006).

The use of information technology to manage its supply chain and distribution channels can be viewed as an opportunity in this case (Romney & Steinbart, 2008). Likewise, the heightened regulation set by the Bureau of Internal Revenue in terms of point-of-sale (POS) registers for FBT

companies also presents an opportunity for IT to be maximized. Because of this, to support the expected increase in consumer expenditure, the IT infrastructure and utilization is expected to cater to the growing volume of transaction processing to support daily business operations.

VALUE OF INVESTING IN IT

Investing in IT aids in surpassing competition by improving productivity, profitability, and quality of operations (Devaraj & Kohli, 2003). Likewise, according to a study conducted by Dewan and Kraemar (2000), when the World Bank provided assistance amounting to $1 billion annually to companies which want to invest in developing their existing systems, it turned out that the gross domestic product (GDP) growth of countries wherein there is a rampant utilization of IT systems is considerably higher compared to the GDP growth of countries where companies are non-IT users.

But according to a study conducted by Willcocks and Lester (1997), investment in IT systems alone does not assure companies that they will reap the full benefits that these systems promise. Instead, it is accompanied by the danger that improper application of such could be detrimental to the organization. With this, there is more reason for the need to ensure IT governance more specifically to ensure its alignment with business strategy.

IT GOVERNANCE: A FOCUS ON COBIT

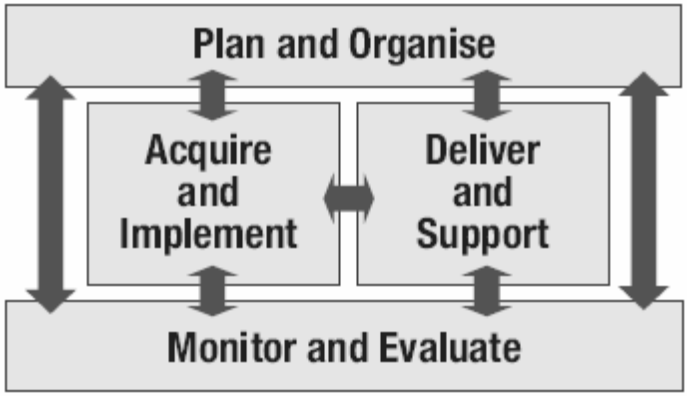
According to Simonsson and Johnson (2006), the existing literature on IT governance has inherited much from the discipline of corporate or enterprise governance but it has been able to develop itself into a discipline of its own (Dy, Ha, Gan & Alba, 2009). This is evidenced by several professional groups and organizations created for the purpose of establishing new internal control frameworks that primarily focus on IT governance.

Information Systems Audit and Control Association (ISACA) is one of the professional groups established for this purpose. In 1998, the Information Systems Audit and Control Association (ISACA) established the Information Technology Governance Institute (ITGI) to advance international thinking and standards in directing and controlling an enterprise's information technology (ITGI, 2007). The institute exists to clarify and provide guidance on current and future issues pertaining to IT governance, control, and assurance (Hunton, Bryant &Bagranoff, 2004). The framework that this institute developed emphasizes that an organization first sets its objectives, and then follows a continual process in which performance is measured and compared against those objectives. One its products is the Control Objectives for Information and related Technology (CobiT) which provides guidance on IT governance by setting the structure that links IT processes, IT resources, and information to enterprise strategies and objectives. While CobiT was once a tool primarily for auditors to use, the increasing criticality of IT governance has caused it to evolve into a management resource (Hunton, Bryant & Bagranoff, 2004).

Though at present, there is still lack of consensus on how IT governance is viewed; CobiT is the most renowned framework for support of IT governance concerns. It is based on best practice, focusing on the processes of the IT organization and how its performance can be assessed and monitored. This framework is maintained by an independent, not-for-profit research institute, drawing on the expertise of its affiliated association's members, industry experts, and control and security professionals. Its content is based on ongoing research into IT good practice and is continuously maintained, providing an objective and practical resource for all types of users. It provides good practices across a domain and process framework and presents activities in a manageable and logical structure. However, it is important to emphasize that CobiT framework is a model of IT governance only and not of organization as a whole (ITGI, 2007).

CobiT defines IT activities in a generic process model with four domains and 34 generic control processes. These domains are Plan and Organize (PO), Acquire and Implement (AI), Deliver and Support (DS), and Monitor and Evaluate (ME). The domains map to IT's traditional responsibility areas of plan, build, run, and monitor (ITGI, 2007). PO domain covers strategy and tactics, and concerns the identification of the way IT can best contribute to the achievement of the business objectives. AI domain addresses the aptness and likelihood of providing solutions that will meet business needs. DS domain is concerned with the actual or physical delivery of required services, which includes service delivery, management of security, and continuity, service support for users, management of data and operational facilities. ME domain addresses performance management, monitoring of internal control, regulatory compliance and governance. Across these four domains, CobiT has identified 34 IT processes where links are made to the business and IT goals that supported (ITGI, 2007). The four domains and 34 IT processes largely represent a comprehensive dimension of an organization's IT processes performance and capability that needs to be managed.

Figure 2: The four interrelated domains of CobiT



Moreover, the United States (US) Securities on Exchange and Commission (SEC) mandated the use of a standard internal control framework established by a body or group that has gone through due-process procedures, including the wide distribution of the framework for public comment, and made particular mention to the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Internal Control – Integrated Framework, which was issued in 1992. COSO is widely accepted as the authority on internal controls and is incorporated into policies, rules, and regulations that are used to control business activities (Romney & Steinbart, 2008) and CobiT is the generally accepted internal control framework for IT (ITGI, 2007). Using the CobiT framework, an organization can devise a system of IT controls to conform with Section 404: Management's Report on Internal Control over Financial Reporting (Yu, Rogacion, Perez & Lichengyao, 2006).

Furthermore, the Public Company Accounting Oversight Board (PCAOB) Auditing Standard No. 2 states that because of the frequency with which management of public companies is expected to use COSO as the framework for the assessment, the directions in the proposed standard are based on the COSO framework.

VALUE OF IT GOVERNANCE

The huge amount of capital expenditures in IT systems emphasizes the importance of proper governance in organizations. Once this is achieved, the full potential of IT is maximized. The single most important determinant of whether an organization will gain the full value of IT is through an effective IT governance structure (Robinson, 2005)

Melnicoff (2002) highlighted various benefits of investing in effective IT governance. First, it adds value to the business. Effective IT governance takes into account the rate changes of the industry where the business belongs. The governance could also add value by providing the company with a competitive advantage. Another advantage involves the concept of accountability. Lines of responsibility among different management positions would be clear since authorizations of IT decisions are defined. Moreover, Melnicoff (2002) provides that an effective, business-specific IT governance model is an essential tool for executives struggling with the challenge of leveraging the full potential of IT as a generator of sustainable business value. It allows top managers to readily evaluate their company's existing governance structure and to determine if the IT environment needs to be altered (Dy, Ha, Gan & Alba, 2009).

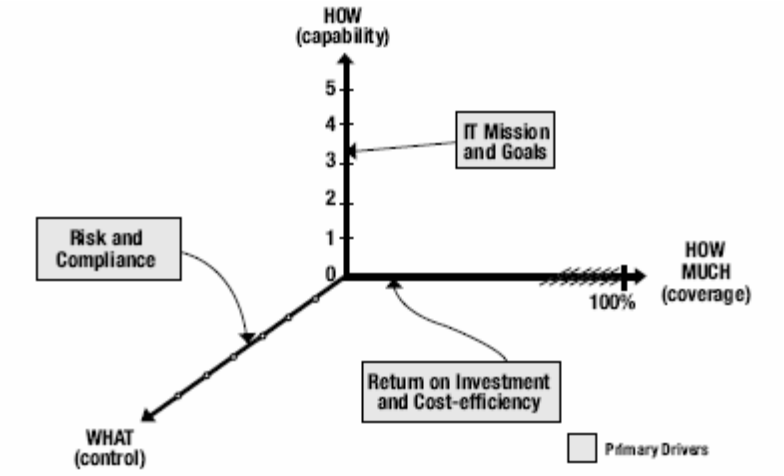
COBIT AND THE MATURITY MODEL

Companies need an objective measure to assess where they are and identify where improvement is required. Answers to this are provided by CobiT by means of benchmarking of IT process performance and capability, expressed as maturity models, derived from the Software Engineering Institute's Capability Maturity Model (CMM), goals and metrics of the IT processes

to define and measure their outcome and performance based on the principles of Kaplan and Norton's balanced business scorecard, and activity goals for getting these processes under control, based on CobiT's control objectives (ITGI, 2007).

The three dimensions of process maturity are capability, coverage, and control as illustrated in figure 3 (ITGI, 2007).

Figure 3: The three dimensions of maturity



The three-dimension model is a way of measuring how well developed management processes are. How well developed or capable they should be primarily depends on the IT goals and the underlying business needs they support. How much of that capability is actually deployed largely depends on the return enterprise wants from the investment. On the other hand, the degree and sophistication of controls that need to be applied in a process are more driven by the enterprise's risk appetite and applicable compliance requirements (ITGI, 2007).

CobiT provides maturity models to enable benchmarking and identification of necessary capability improvements. Maturity modeling for management and control over IT processes is based on a method of evaluating the organization, so it can be rated from a maturity level of non-existent (0) to optimized (5). This approach is derived from the maturity model that the Software Engineering Institute (SEI) defined for the maturity of software development capability. Although concepts of the SEI approach were followed, the CobiT implementation differs considerably from the original SEI, which was oriented toward product engineering principles, organizations striving for excellence in these areas and formal appraisal of maturity levels so that software developers could be "certified" (ITGI, 2007). The maturity models primarily focus on how well a process is managed.

The CobiT maturity levels are designed as profiles of IT processes that an enterprise would recognize as descriptions of possible current and future states. They are not designed for use as a threshold model, where one cannot move to the next higher level without having fulfilled all conditions at the lower level. The maturity models primarily focus on how well a process is managed. With CobiT's maturity models, unlike the original SEI CMM approach, there is no intention to measure levels precisely or try to certify that a level has exactly been met. A CobiT maturity assessment is likely to result in a profile where conditions relevant to several maturity levels will be met (ITGI, 2007).

The right maturity is influenced by the enterprise's business objectives, the operating environment and industry practices. Specifically, the level of management maturity depends on the enterprise's dependence on IT, its technology sophistication and the value of information (ITGI, 2007).

BENCHMARKING

Robert Camp (1989) developed a 10-step model moving sequentially through for phases. Kearns, along side, defined benchmarking as the continuous process of measuring products, services, and practices against toughest competitors or those companies recognized as industry leaders (Moriarty, 2008). Watson (1993) views benchmarking as a continuous process that searches for and applies significantly better practices for the purpose of achieving superior competitive performance (Moriarty, 2008). Yu, Rogacion, Perez and Lichengyao (2006) defined benchmarking as a comprehensive technique that can be used to identify operational and strategic gaps, and to look for best practices that eliminate such gap. Benchmarking has an "internal dimension" whereby the organization critically examines itself searching for best practices and an "external dimension" whereby the organization explores its industry and other relevant areas outside of its own industry in order to identify those best practices that may be applicable in its own operating environment (Yu, Rogacion, Perez & Lichengyao, 2006).

Moreover, Watson (1993) provided another perspective of benchmarking. This unconventional perspective approaches benchmarking as a process of organizational adaptation, not adoption – not simply a question of copying others, but learning how to improve by sharing ideas (Moriarty, 2008).

PREVIOUS STUDIES

The 2008 IT Governance Global Status Report, a research conducted by ITGI through PricewaterhouseCoopers (PwC), revealed that though the importance of IT continues to increase and organizations know who can help them implement IT governance, appreciation for the available expertise and delivery capability is only average. But on a positive note, 92% of IT users are aware

of problems with the use of IT and the need to do something about them and 88% of the same IT user community recognizes the IT governance is the solution.

Moreover, separate studies on IT practices conducted by Yu, Rogacion, Perez and Lichengyao (2006) and Acosta, Samson, Tan and Tecson (2009) yielded maturity scores of 2.97 and 2.70 for listed expanded and non-expanded commercial banks and selected life insurance companies in the Philippines, respectively.

Yu, Rogacion, Perez and Lichengyao (2006) developed a 167-item that was taken from the four domain and 34 IT processes of the CobiT framework with the level of perceived importance as an added dimension to at least compensate, indirectly, for the level of centrality of IT to business operations and the level of IT to business strategy. The level of importance served as the weight to get a more accurate assessment of the IT practices. The survey instrument was a product of classroom conceptual inputs under the researcher's tutelage and was validated with select group of IT Security and Audit Practitioners using the Delphi Method. The results of the study were further validated by practitioners in the banking industry and were presented to the Accountancy department of the De La Salle University (DLSU).

Nonetheless, the following trends were identified in the study of Yu, Rogacion, Perez and Lichengyao (2006): (1) overall fair ME domain was due to consistency of performance; (2) fair score of the DS domain was largely attributable to outliers; (3) high absolute score of the AI domain was somewhat attributable to outliers; (4) consistent low performance in the PO processes and low overall performance for the PO domain; (5) overall industry strength in core operations processes; (6) overall strategic weakness in strategic processes; (7) decentralization of managing IT resources and processes leads to lower overall IT governance maturity; and (8) poor performance in earlier domains in the IT governance life cycle leads to poor performance in related processes in subsequent domains.

EXCLUSION OF OUTLIERS

The study of Yu, Rogacion, Perez and Lichengyao (2006) considered the effect of outliers in the results. Outliers are points of data that lie outside of the range of reasonably expected values. Based on the concept of the Capability Maturity Model Integration (CMMI), in the area of IT governance maturity in the Philippine financial services industry, no firms have yet to achieve the Managed and Optimized levels. The latest appraisal dated December 15, 2005 the organizations which were identified as having achieved the Managed level and which were identified as candidates for the Optimized level in the future, do not include the banks within the population of the study of Yu, Rogacion, Perez and Lichengyao (2006). The list also did not include the companies in the Philippine FBT industry.

RESEARCH PROBLEM AND SIGNIFICANCE

A shortcoming recognized in the previous studies conducted by Yu, Rogacion, Perez and Lichengyao (2006) and Acosta, Samson, Tan and Tecson (2009) was the non-conclusiveness of their findings with respect to the industries chosen.

By making use of 22 (of which 21 responded) out of 23 (one was excluded) publicly-listed companies in the FBT industry, this study provides a comprehensive assessment of the current level of IT processes performance and capability maturity.

Furthermore, this study provides answers to the following questions:

1, What are the industry's key strengths?
2. What are the industry's weaknesses and what are the reasons behind these?
3. How does the industry fare with respect to other industries?
4. What maturity level does the industry need to be at and how can it get there?

Moreover, one of the short-term plans of the Philippine government is to create a new executive office that caters specifically to the information and communication technology issues that face the country. This research study has the potential to provide a globally accepted direction in terms of assessing IT management maturity levels of the local government units and the national agencies.

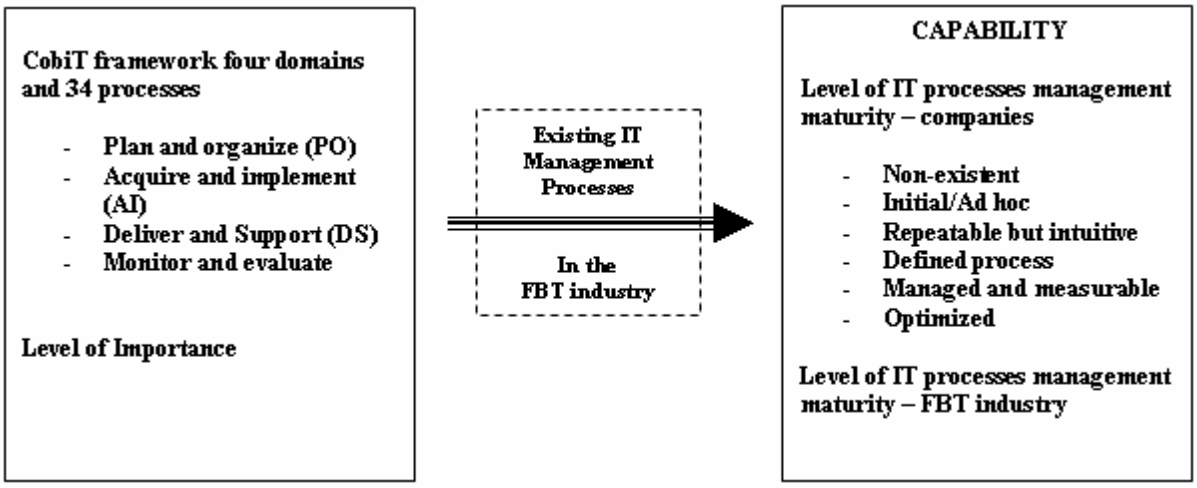
ASSUMPTIONS AND SCOPE

This study is working under the assumption that the survey instrument adopted passed instrument validation and the assessments provided by the respondents generally represent the current states of how IT processes are managed in their respective companies and they aware of the level of centrality of IT to business operations and the level of centrality of IT to business strategy. Variables not covered in the operational framework are excluded from the scope of this study. Likewise, quantitative techniques applied are not intended to be mathematically rigorous but are used primarily to aid in the qualitative analysis. Companies not publicly listed under the FBT industry are also excluded from the scope of this study.

FRAMEWORK OF ANALYSIS

This is study is grounded on benchmarking theory by Robert Camp (1989) and the IT processes performance and capability maturity of the CobiT framework with the level of importance as an additional dimension to indirectly address the level of centrality of IT to business operations and the level of IT to business strategy.

Figure 4: Framework of analysis



Benchmarking takes place in two phases; (1) it begins as the search for best practices, and (2) culminates with mapping of current practices to these established best practices. According to Camp (1989), the process of benchmarking is divided into 10 steps (table 1) which progress through four phases.

Table 1: 10-step benchmarking model developed by Camp	
Phase 1 – Planning	
1.	Identify what is to be benchmarked.
2.	Identify comparative companies.
Phase 2 – Analysis	
3.	Determine data collection method and collect data.
4.	Determine current performance levels.
Phase 3 – Integration	
5.	Project future performance levels.
6.	Communicate benchmarking findings and gain acceptance.
Phase 4 – Action	
7.	Establish functional goals.
8.	Develop action goals.
9.	Implement specific actions and monitor progress.
10.	Recalibrate benchmarks.

The steps applicable to this research study are steps one to six, encompassing planning, analysis, and integration phases of Camp's general methodology. Phase four, the Action phase, constitute the use as intended of the results of the study by the companies in the FBT industry.

The maturity level of an organization presents a means to foresee the future performance of an organization contained by a certain discipline or set of disciplines. Practice has revealed that organizations do their best when they concentrate their process-improvement efforts on a controllable number of process areas that entail more and more sophisticated effort as the organization improves. A maturity level is a definite evolutionary table of process improvement. Each maturity level evens out a significant fraction of the organization's processes. The maturity levels are determined by the accomplishment of the specific and general goals that relate to each pre-defined set of process areas. There are six maturity levels, each a layer in the base for constant process improvement (ITGI, 2007).

The first step in improving a process is to know the limits of the process to be improved. The process could be any process and it will be a mixture of people, tools, technologies, and methods used to finish a job. Once the operational entity is definite, a clear understanding of the operational entity's principle and objectives directs improvement efforts. A lot of times, the principle and objectives are maintained in strategic planning documents. A clear understanding of the principle and objectives will maintain improvement efforts next to strategic needs and will keep away from burning up significant resources on improvement efforts that don't contribute to those needs. Together with understanding the operational entity's objectives, it is essential to understand how to know if objectives are achieved. The objectives of an operational entity are defined first so that some level of confirmation can be performed to verify that improvement efforts help to achieve those objectives. If the operational entity requiring improvement is known and its point is clearly understood, limits and risks are more simply identified and attended to. The present state of the operational entity could be measured against its objectives to identify current and possible barricades to attaining those objectives. Improvement plans would then be made and applied to deal with these hindrances. Operational process improvement using this maturity type model is just an organized approach to naming and addressing these limits and risks and improving the operational entity to more successfully attain its objective (Camp, 1989).

IT processes performance and management capability is interpreted using six levels of maturity (figure 5) are 0 for non-existent, 1 for initial /ad hoc, 2 repeatable but intuitive, 3 defined process, 4 managed and measurable and 5 optimized. This is best viewed as a guide on how enterprises can evolve from a non-existent to an optimize process.

Figure 5: Graphic representation of maturity models

Table 2 briefly explains each maturity level according to CobiT's generic model of maturity (ITGI, 2007).

Table 2: Generic Maturity Model	
0 Non-existent	Complete lack of any recognizable processes. The enterprise has not even recognized that there is an issue to be addressed.
1 Initial/Ad hoc	There is evidence that the enterprise has recognized that the issues exist and need to be addressed. There are, however, no standardized processes; instead, there are ad hoc approaches that tend to be applied on an individual or case-by-case basis. The overall approach to management is disorganized.
2 Repeatable but intuitive	Processes have developed to the stage where similar procedures are followed by different people undertaking the same task. There is no formal training or communication of standard procedures, and responsibility is left to the individual. There is a high degree of reliance on the knowledge of individuals and, therefore, errors are likely.
3 Defined process	Procedures have been standardized and documented, and communicated through training. It is mandated that these processes should be followed: however, it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are the formalization of existing practices.
4 Managed and measurable	Management monitors compliance with procedures and takes action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation and tools are used in a limited or fragmented way.
5 Optimized	Processes have been refined to a level of good practice, based on the results of continuous improvement and maturity modeling with other enterprises. IT is used in an integrated way to automate the workflow, providing tools to improve quality and effectiveness, making the enterprise quick to adapt.

The advantage of a maturity model approach is that is relatively easy for management to place itself on the scale and appreciate what is involved if improved performance is needed. The scale includes 0 because it is quite possible that no process exists at all. The 0 to 5 scale is based on a simple maturity scale showing how a process evolves from a non-existent capability to an optimized capability (ITGI, 2007).

RESEARCH METHODOLOGY

Applying the first six steps of Camp's benchmarking model, the first step of the model is complete at this point. The second step is the identification of participating companies. After discussing the survey instrument in class, students in Computer Information Systems (CIS) were grouped and tasked to identify one publicly-listed company each group belonging to the FBT industry as a requirement for the course. The researcher took care of other companies not chosen by the groups.

Twenty-three publicly-listed companies composing the Philippine FBT industry were considered. Out of the 23, one company was automatically removed because its business office is not located in the National Capital Region or Metro Manila. All 22 companies were invited to participate.

Step three is the determination of data collection method and collection of data. The design of the survey instrument was based on the four domains and 34 processes of the CobiT framework with a level of importance scale on the left-hand side of every item. The latter served as the weight per process in computing the maturity score. The researcher, with the help of CIS students, gathered primary data through the administration of a 167-item survey instrument developed by Yu, Rogacion, Perez and Lichengyao (2006). One company refused to participate and two companies did not continue to answer the survey instrument due to absence of formal IT processes in place. Automatically, the latter two companies were given a maturity score of 0.

Step four is the determination of current maturity levels. Accomplished survey tools were tallied per domain and summarized for each company. Likewise, maturity scores of each company were summarized per domain and per overall total to determine the industry's current maturity score. Likewise, profiles of the respondents and the participating companies were also considered in this step.

Step five involves in-depth analysis to develop recommendations. This was accomplished by analyzing process-level and domain-level results and drawing implications to identify opportunities for industry-wide IT processes management maturity level improvement. Similar to the study of Yu, Rogacion, Perez and Lichengyao (2006), the researcher also excluded outliers. Companies that were assessed (overall) with managed level score (4.0) or higher were considered outliers in accordance with the appraisal conducted by CMMI in 2005.

Data collected and tabulated were tested for normality using Stata .sktest before the obtained values and adjusted values were subjected to t-test to determine the significance of differences

between them, both per domain and per overall maturity score, using PHStat. Since the quantitative equivalents of the six levels in CobiT's maturity model are all whole numbers, the overall maturity scores of both obtained value and adjusted value were compared to the whole number equivalent of the assessed level and likewise tested for significance of differences using PHStat. This was done to ensure that the maturity score as assessed is indeed the maturity level of the industry as per CobiT's maturity model.

The conclusion and recommendations at this point were reviewed to ascertain that overall results would be value-adding and that the recommendations are practicable before final results were sent to the participating companies. IT auditors' and practitioners' validation was sought to carry out this sixth step.

RESULTS, DISCUSSION AND CONCLUSION

The respondents were composed of senior technical managers, wide area network (WAN) and data administrators, management information systems managers, and corporate IT managers. Based on the 2008 audited financial reports obtained from the PSE website, the total assets of publicly-listed companies in the FBT industry range from P237 million to P339 billion. Of the industry's total assets of P579 billion, 98.34% was from the respondent-companies. Of the 21 respondent-companies, 18 were audited by a Big 4 firm.

Table 3: Overall and per domain mean and standard deviation (obtained and adjusted)

	Obtained mean	*Standard deviation*	***Adjusted mean***	*Standard deviation*
Plan and organize (PO)	2.51	*1.28*	***2.09***	*1.03*
Acquire and implement (AI)	2.71	*1.46*	***2.26***	*1.23*
Deliver and support (DS)	2.46	*1.41*	***2.02***	*1.15*
Monitor and evaluate (ME)	2.41	*1.60*	***1.83***	*1.16*
Overall level	2.52	*1.39*	***2.05***	*1.08*

The FBT industry registered a 2.52 maturity score but removing the outliers as employed in the study of Yu, Rogacion, Perez and Lichengyao (2006), the FBT industry would have an adjusted maturity score of 2.05. The sets of data used in computing for both means passed the normality test. To determine the significance of differences between the overall and per domain obtained and adjusted maturity scores, they were subjected to two-tail t-test using 0.01 level of significance.

Table 4: Tests of significance overall mean and per domain mean (obtained and adjusted)					
	Overall	PO	AI	DS	ME
t Test Statistic	1.1469	1.0951	1.0111	1.0506	1.2416
Two-Tail Test					
Lower Critical Value	-2.7194	-2.7194	-2.7194	-2.7194	-2.7194
Upper Critical Value	2.7194	2.7194	2.7194	2.7194	2.7194
p-Value	0.2589	0.2807	0.3186	0.3004	0.2224
Do not reject the null hypothesis (NR)	NR	NR	NR	NR	NR

At 0.01 level of significance, the null hypotheses could not be rejected. Thus, the overall and per domain obtained and adjusted means do not significantly differ from each other. Though the removal of outliers does not result to any significant difference in the maturity score, such would make identification of the maturity level easier as the adjusted maturity score is nearer to a maturity level that is denoted by a whole number.

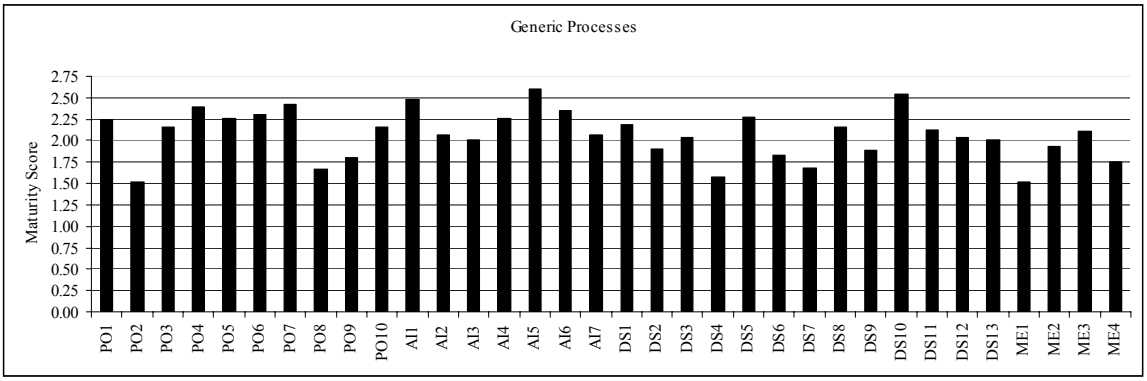
To ensure further that the overall obtained and adjusted means do not significantly differ with respect to the maturity level assessed at 2.0, they were subjected to an upper-tail t-test using 0.01 level of significance and 0.05 level of significance.

Table 5: Tests of significance overall mean (obtained and adjusted) and maturity level				
	Obtained	Obtained	Adjusted	Adjusted
Level of significance	0.01	0.05	0.01	0.05
t Test Statistic	1.7276	1.7276	0.1980	0.1980
Upper-Tail Test				
Upper Critical Value	2.5279	1.7247	2.5834	1.7458
p-Value	0.0497	0.0497	0.4227	0.4227
Do not reject the null hypothesis (NR)	NR	R	NR	NR
Reject the null hypothesis (R)				

At 0.01 level of significance, the null hypotheses could not be rejected. But at 0.05 level of significance, only the adjusted mean hypothesis could not be rejected. It is at this point that removal of the outliers has a significant effect in the determination of the maturity level. The adjusted maturity level of 2.05 is closer to level 2, denoted by the whole number 2.0, than the obtained maturity level of 2.52. It is, therefore, safer to say that the FBT industry is currently at level 2 using the adjusted mean.

As such, the adjusted figures, with lower standard deviation, would be used in the subsequent analysis and discussion of the results.

Figure 6: Maturity score per generic process



In the PO domain, the industry scored the highest (2.42) in managing IT human resources (PO7) and the lowest (1.52) in defining the information architecture (PO2). The PO7 score, though not that high, can be attributed to the local laws enforced that govern recruitment, training, promotion, and termination practices. The PO2 score can be attributed to the communication problems between business and IT.

In the AI domain, the industry scored the highest (2.60) in procuring IT resources (AI5) and the lowest (2.01) in maintaining technology infrastructure (AI3). The AI5 score can be attributed to procurements that management is fully aware of but the AI3 score is an indication that once these resources are procured, less emphasis is given to their maintenance thereby reducing efficiency of use over time.

In the DS domain, the industry scored the highest (2.55) in managing problems (DS10) and the lowest (1.58) in ensuring continuous service (DS4). The DS10 score tends to compensate the low AI3 score; poor maintenance means more problems to manage. Because of this, continuous service (DS4) is compromised since most of the resources are used up in troubleshooting.

In the ME domain, the industry scored the highest (2.12) in ensuring regulatory compliance (ME3) and the lowest (1.51) in monitoring and evaluating IT performance (ME1). The ME3 score, though not that high, can be attributed to the awareness of potential financial liability once regulations are not complied with. But this still indicates a lack of full understanding of all issues related to these requirements. Moreover, the low score in ME1 can be attributed to the costs related to monitoring controls and the absence of a culture geared toward continuous improvement.

On a domain level, the FBT industry scored the highest (2.26) in Acquire and Implement and the lowest (1.83) in Monitor and Evaluate. The high score in AI domain can be attributed to the

anticipated compound annual growth rate of 3% over the 2005-2010 period in the FBT industry. This increasing demand tends to compel companies to provide solutions that will meet business needs through IT initiatives. Slowly, these companies should view this as an opportunity to grow and maximize the use of their existing IT infrastructures. This result is consistent with the study of Yu, Rogacion, Perez and Lichengyao (2006) and that of Acosta, Samson, Tan and Tecson (2009). Banks and selected life insurance companies scored also the highest (3.17 and 2.86, respectively) in this domain.

The low score in the ME domain is not consistent with the maturity scores obtained by Yu, Rogacion, Perez and Lichengyao (2006). Banks scored 2.97 in this domain and 2.73 in the PO domain, its lowest. But this low score is consistent with that of Acosta, Samson, Tan and Tecson (2009). Selected life insurance companies scored 2.53 in this domain. Though both banking and FBT industries are regulated (tobacco, in particular), banking regulations tend to be more established, structured, and implemented. The Bangko Sentral ng Pilipinas (BSP) which oversees and monitors strict compliance to these regulations plays a huge part in this. In addition, the BSP has a dedicated group that supervises and examines solely the IT component of the banking industry. This set-up, though may exist in the FBT industry, tends to be not strictly followed and observed.

Moreover, analyzing the results by identifying the number of IT processes that scored below the adjusted maturity score in each domain, the PO domain has three out of 10 (30%), the AI domain has three out of seven (43%), the DS domain has six out of 13 (46%), and the ME domain has two out of four (50%). In the PO domain, these are defining the information architecture, managing quality, and assessing and managing IT risks. In the AI domain, these are acquiring and maintaining architecture software and technology infrastructure, and installing and accrediting solutions and changes. In the DS domain, these are managing third party services, ensuring continuous service, identifying and allocating costs, educating and training users, managing the configuration, and managing operations. In the ME domain, these are monitoring and evaluating IT performance and providing IT governance. Among the generic IT processes, ME1 has the lowest score of 1.51 and AI5 has the highest score of 2.60.

The overall maturity score of FBT industry is 2.05. This is an indication that IT processes performance and capability maturity level in the Philippine FBT industry is repeatable but intuitive. This maturity score is below the maturity scores of banks and selected life insurance companies as assessed by the first two previous researches. Banks and life insurance companies are under compliance reporting with specific laws that make them controls and risk sensitive. Likewise, the nature and the core of business of these two industries highly involve processing of information and reports that are mission-critical, sensitive, and crucial. It follows, therefore, that to be able to cope with these, they should maximize the use of IT. The FBT industry, on the other hand, has its core business processes in the manufacturing and the delivery of a tangible good. Though, at present, there have been trends of automating production lines, the industry is still in the transitional stage in spite of companies in this industry to have been in existence, in an average, for more than 15 years.

As companies in the FBT industry aim to a higher maturity level, they usually just stick to a repeatable but intuitive process first. This maturity level is only temporary as these companies may choose to improve on their internal setup. A reason why companies undergo this level is the absence of a concrete set of formal procedures on how processes are performed. IT procedures are usually established by middle- or low-level management. However, if new processes are set, then it would only follow that the proper procedures are yet to be established for these new processes. Having the proper IT processes is a matter of discovery for most companies. Then they will realize that these become the best practices. It then takes numerous revisions to the manuals before the most effective and efficient means of executing the process is discovered. With this, it takes a while for a company to reach the level where a defined IT processes are already documented, in place, and practiced.

RECOMMENDATIONS

But companies in the FBT industry may fast track reaching the next immediate level. To move to the next level, companies need to; (1) continually refine a common language for goal setting, stating these in business terms so that IT process improvement measures now well understood by senior management and enterprise stakeholders; (2) make annual planning a cross-organizational team effort where the common goal is maximizing IT value delivery and managing IT-related risks. This includes regular steering group evaluation and assessment of IT capabilities and projects that have been completed and that have, whether or not, delivered real improvements to its performance; and (3) develop meaningful service level agreements for both internal services to users and external service providers.

Further, in the longer run, there is also a need to: (1) achieve full transparency of IT activities, senior management has complete confidence in the strategic role of IT and in how decisions are made; (2) fully optimize the direction of IT activities toward real business priorities, and the value being delivered to the enterprise can be measured and steps taken on a timely basis to correct significant deviations or problems; (3) have a standardized performance measurement process, such as balanced scorecard, is fully understood and embraced by the organization; (4) have the practice of continuous improvement of IT capability embedded in the culture and this includes regular external benchmarking and independent audits providing positive assurance to management and that the cost of IT is monitored effectively and the organization is able to achieve optimal IT spending through continuous internal improvements; and (5) have an effective outsourcing of selected services and effective negotiation with vendors such that when dealing with external business partners or service providers, the organization is able to demonstrate first-class performance and demand best practices from others.

Companies should also realize that the industry's core business is related to manufacturing goods. It is recommended, therefore, to continue improving and investing in systems related to manufacturing processes and streamlining production line since this is the industry's key strength. However, with regard to its back office operations, it is recommended to look at the possible option

of outsourcing them as they are not the core business of the industry. In this case, companies will be more focused on allocating its budget and resources to producing goods more efficiently and in high quality through sophisticated automated manufacturing processes.

In addition, regulatory agencies should revisit and review existing policies and regulations that govern the FBT industry and devise means on how to increase compliance and adherence to those in a doable and practicable fashion.

Finally, it is recommended that more research be conducted in this discipline – and more on to the empirical type of research – that will serve as a jump-off point to enrich further existing literature in applied IT governance. Variables of key interest for future researches range from selecting a comparable industry type to relating maturity levels to different quantitative and qualitative factors.

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EXHIBITS

Exhibit A: Maturity scores (per generic process per domain)		
		Maturity Score
	PLAN AND ORGANIZE	
PO1	Define a Strategic IT Plan	2.25
PO2	Define the Information Architecture	1.52
PO3	Determine Technological Direction	2.15
PO4	Define the IT Processes, Organization and Relationships	2.4
PO5	Manage the IT Investment	2.26
PO6	Communicate Management Aims and Direction	2.3
PO7	Manage IT Human Resources	2.42
PO8	Manage Quality	1.67
PO9	Assess and Manage IT Risks	1.79
PO10	Manage Projects	2.15
	ACQUIRE AND IMPLEMENT	
AI1	Identify Automated Solutions	2.48
AI2	Acquire and Maintain Application Software	2.07
AI3	Acquire and Maintain Technology Infrastructure	2.01
AI4	Enable Operations and Use	2.26
AI5	Procure IT Resources	2.6
AI6	Manage Changes	2.35
AI7	Install and Accredit Solutions and Changes	2.07
	DELIVER AND SUPPORT	
DS1	Define and Manage Service Levels	2.19
DS2	Manage Third-Party Services	1.91
DS3	Manage Performance and Capacity	2.03
DS4	Ensure Continuous Service	1.58
DS5	Ensure Systems Security	2.28
DS6	Identify and Allocate Costs	1.83
DS7	Educate and Train Users	1.68
DS8	Manage Service Desk and Incidents	2.15
DS9	Manage the Configuration	1.89
DS10	Manage Problems	2.55

Exhibit A: Maturity scores (per generic process per domain)		
		Maturity Score
DS11	Manage Data	2.12
DS12	Manage the Physical Environment	2.03
DS13	Manage Operations	2.01
	MONITOR AND EVALUATE	
ME1	Monitor and Evaluate IT Performance	1.51
ME2	Monitor and Evaluate Internal Control	1.94
ME3	Ensure Regulatory Compliance	2.12
ME4	Provide IT Governance	1.76

Exhibit B: Participating companies	
FBT Company	*Office Address*
AgriNurture, Inc.	35 Gasan St., Masambong, San Francisco Del Monte, Quezon City
Alaska Milk Corporation	6F Corinthian Plaza, 121 Paseo de Roxas, Makati City
Alliance Tuna International, Inc.	Suite 1205 East Tower, PSE Center, Exchange Road, Ortigas Center, Pasig City
Bogo-Medellin Milling Company, Inc.	30F Citibank Tower, 8741 Paseo de Roxas, Makati City
Central Azucarera de Tarlac, Inc.	J. Cojuangco & Sons Bldg., 119 dela Rosa cor Palanca, Jr. Sts., Legaspi Village, Makati City
Cosmos Bottling Corporation	1890 Paz Guazon Ave., Otis, Paco, Manila City
Ginebra San Miguel, Inc.	3F & 6F, San Miguel Properties Center, St. Francis Ave., Mandaluyong City
Jollibee Foods Corporation	10F Jollibee Plaza Bldg., Emerald Ave., Ortigas Center, Pasig City
Liberty Flour Mills, Inc.	Liberty Bldg., 835 Arnaiz Ave., Makati City
Pepsi-Cola Products Philippines, Inc.	Km. 29 National Road, Tunasan, Muntinlupa City
Philippine Tobacco Flue-Curing & Redrying Corporation	802 A. Bonifacio St., Balintawak, Quezon City
RFM Corporation	RFM Corporate Center, Pioneer St., Mandaluyong City
Roxas and Company, Inc.	6F Cacho Gonzalez Bldg., 101 Aguirre St., Legaspi Village, Makati City
Roxas Holdings, Inc	6F Cacho Gonzalez Bldg., 101 Aguirre St., Legaspi Village, Makati City
San Miguel Brewery, Inc.	40 San Miguel Ave., Mandaluyong City

Exhibit B: Participating companies	
FBT Company	*Office Address*
San Miguel Corporation	SMC Complex, 40 San Miguel Ave., Mandaluyong City
San Miguel Pure Foods Company, Inc.	JMT Corporate Condominium, ADB Ave., Ortigas Center, Pasig City
Swift Foods, Inc.	8F, RFM Corporate Center, Pioneer St., Mandaluyong City
Tanduay Holdings, Inc.	348 Nepomuceno St., San Miguel District, Manila City
Universal Robina Corporation	43F Robinson Equitable Tower, ADB Ave., Ortigas Center, Pasig City
Vitarich Corporation	Unit 30 2F, Facility Center, 548 Shaw Blvd., Mandaluyong City

Exhibit C: Participating IT experts	
Name	*IT-related certification*
Villuerbanne C. Ave	CPA, CISA
Caroline D. Guadana	CPA, CISA
Christian P. Soriano	CPA, CISA

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