



# FRAMEWORK OF STRATEGIC-AWARE INFORMATION SYSTEM FOR EXECUTIVE MANAGEMENT

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## Abstract

The information system for executive management aims to support decision making by manager in the strategic and tactical level; these decisions drive the organization and radically effect various function within it; any decision has to align with management process which starts from strategic level in order to set objective as a goal and align the plan to achieve objective in the tactical level. Most of information system developed in this area; are consisted of reporting functionality and still lack of strategic awareness with overall management process and consolidated monitoring view, which are the main purpose of this kind of system. Therefore we capture the management and monitoring processes of executive management and embed them within the framework that we purposed to fit any organization. The framework has developed as an application system which is based on three tier architecture; illustrated by management information from Electronic Government Agency of Thailand (EGAT), the framework seem to fit well with the organization.

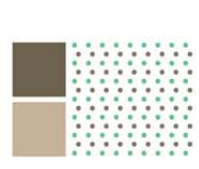
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**Keywords:** executive information system, decision support system, business intelligence.

## Introduction

Within the organization, executive-level decision making is critical part as it have to align with the strategy of the organization in order to drives the organization to the goals set; as it radically effects the organization, chances of failure and risks must be taken in consideration. The organization can be divided into 3 management levels namely from the top: strategic level, tactical level and operational level. The strategic level involves setting the overall objective and goal of the organization which can be achieved in the long term, the tactical level takes the objective from the strategic level and make a planning of how to achieve them in different function e.g. human resources, production, marketing etc. This plan is later implemented by the operational level.

The concept as mention above is true for any organization no matter what size they are. The strategic and tactical level are always critical to any organization (Walls J., Watson H.J et al. 1996), therefore in these levels any decision have to be made carefully with enough information provided from inside and outside the organization; the development of information system called Executive Information System (EIS), serves the decision made in these levels, is also significant, as the result of it; is radically impact the whole organization (Musoko M.M et al. 1990) and involves the users which are executive officer; in the development process. EIS is a subset of that also are referred to in the industry as business intelligence (BI) software (Watson H.J. et al. 1993); it is fastest growing application in



corporate, various size of organization are in the process of developing one. (Walls J., Watson H.J et al. 1996) This raises an important question: “how the executive information system can be effective to the management of the organization?”

Our paper aims to answer this question by capturing the processes of management and embed them in a framework that can be implemented to fit any organization in order to serve strategic and tactical decision. The rest of the paper is organized as following. Section 2 shows the framework that includes management and monitoring process to cope with strategic and tactical management. Section 3 describes the application in details and illustrates how they can be used. Section 4 discussed related work and the paper concluded in Section 5.

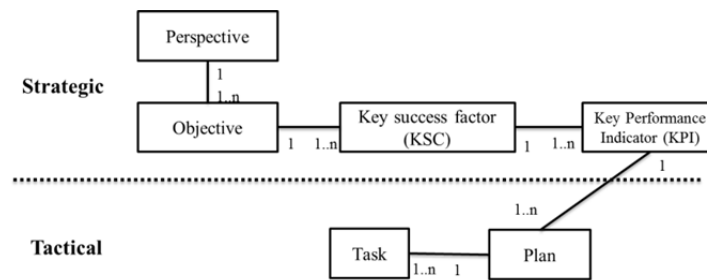
## **Framework of Executive Management**

### **Management Process**

The management aims to set business plan in order to drive organization to the goal. In the strategic management, the manager sees the organization in different viewpoints called perspective e.g. financial, human resources, customer etc. this varies between organization depends on their area and norm of their business. Each perspective requires multiple objectives to be defined that can be either tangible or intangible e.g. gain customer satisfaction, improve employee morality etc. Each objective has weight assign to define how much it effect the perspective as a whole; and multiple key success factors (KSC) defined. Key success factor is also known as Critical success factor (Mahamsiatus K., Rozilawati R., Aziz Deraman et al.2011, Asmahan M. A. et al.2010), these key success factors influence or involve in achieving the objective; each key success factors requires tangible key performance indicators (KPI) (Hai-ao Z., Jean-Jacques C., Jian-xin Y., Xiao-li C. et al.2009) in order to measure and monitoring the factor; this is described in more details in the next section. Some KPI reflects the observable indicator such as number of new customer, number of new certified employees; some reflect the progression of scheduled plan defined in tactical level.

In tactical level management (sometime is referred as departmental level in (Lungu I et al. 2010), the detailed scheduled plans are defined in order to achieve target of KPIs defined for each KSC as each plan influence one or more KPI. These scheduled plans are broken down into different task that can be able to track down the status of its progression.

As mention above, different management level involves various data entities such as perspective, objective, key success factor, plan and task. The Fig 1 illustrates the structure of these data entities with relationship between them. The structure of data entities are the same for every organization, however different organization shall have different concern of perspective, objective, plan and task. Therefore we take what are the same into our framework which is the structure of data entities, this structure shall enable user to define what different such as perspective, objective, etc. to fit the need of organization; this definition has to be done top-down (from strategic level to tactical level or from perspective to task)



**Figure 1** Relationship between each involved data entity of different management levels

### Monitoring Process

The monitoring process aims to measure whether the business plan achieves the goal based on set plan and involve periodically status monitoring which is significant to the manager in order to react and adapt the plan. Therefore *features typical found in an EIS include the ability to "drilldown" to successive levels of information detail* (Taleghani M. et al. 2011). The monitoring process is reverse comparing to management process which is done top-down, whereas monitoring is performed bottom-up as illustrated in Figure 2, the calculation have to be done from task, plan, KPI, KSC, object and show overall status of perspective at the end.

The percentages of tasks progression are calculated to reflect the overall plan completion according to Equation 1 where  $T_i$  is the percentage of current task progression and n is number of tasks within the plan.

$$\% \text{ Plan Completion} = \frac{\sum_{i=0}^n T_i}{n}$$

**Equation 1** formula for plan completion

**Each plan has weight defined to reflect how much it influences KPI achievement. So**

Equation 2 is used to calculate how much we archive target of KPI where  $P_i$  is percentage of plan current completion and weight of plan according KPI achievement.

$$\% \text{ KPI achievement} = \sum_{i=0}^n \frac{P_i \times W_i}{100}$$

Where  $\sum_{i=0}^n W_i = 100$

**Equation 2** formula for KPI achievement calculation

The Equation 3 is used to calculate KSC target achievement where  $KPI_i$  is percentage of KPI target achievement,  $TKP_i$  is target of KPI to achieve and  $W_i$  is weight of KPI that indicate how much KPI influence KSC.

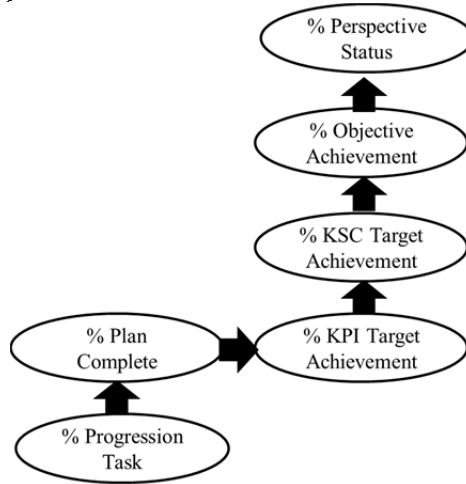
$$\% \text{ KSC achievement} = \sum_{i=0}^n \left[ \frac{KPI_i}{TKP_i} \right] \times W_i$$

**Equation 3** formula for KSC achievement calculation

The Equation 4 is used to calculate how much objective has been achieved where  $KSC_i$  is percentage of KSC achievement,  $TKS_i$  is target of KSC to achieve and  $W_i$  is weight of KSC that indicate how much KPI influence KSC.

$$\% \text{ Perspective status} = \sum_{i=0}^n \left[ \frac{OBJ_i}{TOB_i} \right] \times W_i$$

**Equation 4** formula for perspective status calculation

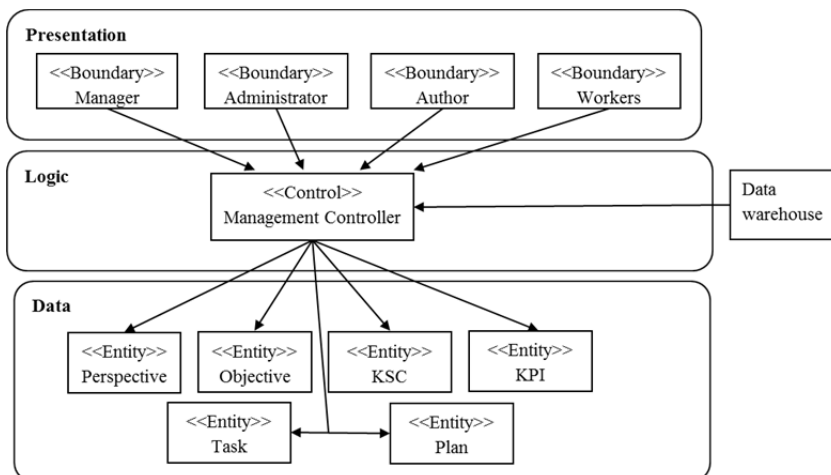


**Figure 2** Monitoring calculation process

### The Executive Information System

The System Overview.

The executive information system (EIS) we developed has embedded framework mention in the previous section; including the management and monitoring process. The system architecture is based on three-tier architecture as depicted in Figure 3

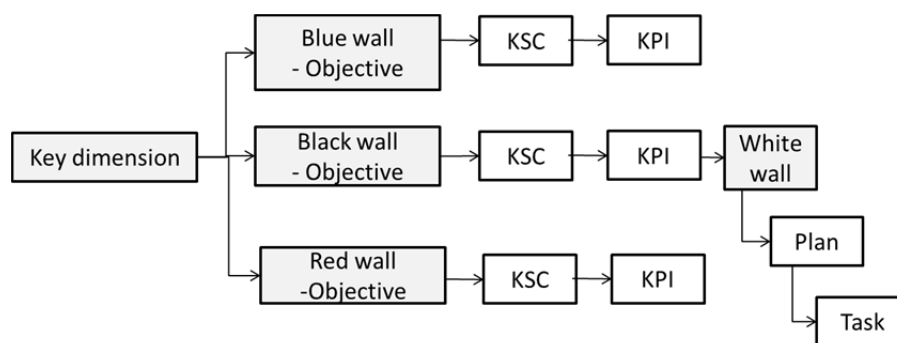


**Figure 3** System architecture

The presentation tier is consisted of four boundary components each is built particularly for rendering user interface for different role of user. The logic tier contains management controller which control the whole process of the application including calculation for the monitoring process as mention in section 2.2. The key performance indicator (KPI) is calculated based on plan completion however some of the KPI does not involve plan, therefore this controller component import some data from data warehouse store summarized data extracted from various system that serve operational transaction such as enterprise resource planning (ERP) system, human resource management system, customer relational management (CRM) system etc.(Watson H.J. et al. 1993) The data tier contains component that helps to manage data necessary for the system such as perspective, objective, KPI, plan etc.

## User Interface

The user interface is organized into five walls namely, key dimension wall, red walls, blue wall, black wall and white wall. The key dimension wall is the main screen of the application that enable user to go to the other walls. It includes different perspectives that author previously set for manager to view on the system in the form of spider chart, each axis represent a perspective that allow user to click on drill into that perspective. The flow of application screen is illustrated in Figure 4



**Figure 4** screen flow of user interface

The black wall is used to display perspective that has objectives associated with, which can be drilled down to KSCs and KPIs that associate with plan and task shown on by the white wall), whereas blue wall is used to display perspective with objective, key success factor (KSC) that is internal factor within the organization, and KPI that does not associate with plan but derived from other systems through data warehouse as mention in section 3.1. The red wall illustrates perspective that is consisted of KSCs that is external factor to the organization such as competitor's number of customer, supplier inventory trends. These data need external sources, such as press information services, supplier system etc. In the system we developed, it only allow user with author role to enter these data manually.

## Illustration

The section shows illustration of how the framework is being used by the management of Electronic Government Agency of Thailand (EGAT). The *Human resources* is selected perspective shown in Table 1, it has 3 objectives associated with.

**Table 1** human resources perspective

<b>Perspective: Human resources</b>			
Status: 90%			
<b>Objective</b>	<b>Weight</b>	<b>% Actual achievement</b>	<b>% Target achievement</b>
Improve professional expertise	50	65	70
Increase morality awareness	25	76	90
Increase working satisfaction	25	72	80

**Table 2** objective: improve professional expertise

<b>Objective: Improve professional expertise</b>			
% Achievement: 95.5			
<b>Key Success Factor (KSC)</b>	<b>Weight</b>	<b>% Actual achievement</b>	<b>% Target achievement</b>
Current employee's professional expertise	50	90	95
New employee's professional expertise	50	77	80

**Table 2** shows overview of objective: *improve professional expertise*, which has 2 key success factors in consideration, the factors has equals set weight which illustrates the same level of influential to the objective. Meanwhile **Table 3** shows one of the factors of objective shown in **Table 2**: *Current employee's professional expertise*, it contains 2 key performance indicators (KPIs) with different weight set as manager consider the number new certified employee is more significant than the number of training in order to determine the level of professional expertise. The calculation of status of perspective which reflects that perspective of how the company is running (human resources in this case), achievement of KSC and KPI are calculated according to formula given in section 2.2.

**Table 3** KSC: employee's professional expertise

<b>KSC: Current employee's professional expertise</b>			
% Achievement: 90			
<b>Key Performance Indicator (KPI)</b>	<b>Weight</b>	<b>Actual achievement</b>	<b>Target achievement</b>
Number of new certified employee	70	85	90
Number of training	30	80	100

## Conclusions

We present the framework which has embedded management and monitoring process necessary for tactical and strategic level management of any organization; the framework manages necessary information to drive an organization to the set objectives and yet provide robust way of monitoring which give multi-level view of how much the objective is achieved. The framework is partly implemented for Electronic Government Agency of Thailand (EGAT), and can be further developed to support managing information of external factor of an organization in order to give full view of how effective the organization is operating.



## Acknowledgements

This project is supported by the Electronic Government Agency of Thailand (EGAT).

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