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BALANCED SCORECARD ATTRIBUTES: KEY DETERMINANT AND PERCEIVED BENEFITS

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ABSTRACT

This study explored the application among Thai listed firms of four BSC attributes, i.e. translating strategy into operation terms, aligning the organizational units to the strategy, communicating strategy to employees, and providing feedback and learning. The study also provided evidence of key determinant and perceived benefits of each BSC attribute. With respect to the determinant, it was found, based on 81 returned questionnaires, that top management support was positively associated with each of the BSC attributes. Therefore, the support was the facilitating factor vital to the implementation of each BSC attribute. Concerning the consequence, thirty-seven BSC users perceived the four BSC attributes as the source of various benefits, e.g. overall benefits, planning, control and communication. The study contributed to the existing body of research on BSC as the determinant and consequence findings were derived from examination of each of the BSC attributes separately rather than collectively.

JEL: M190, M490

KEYWORDS: Balanced Scorecard, Strategy-Focused-Organization, Top management support, Perceived benefits

INTRODUCTION

The Balanced Scorecard (BSC), which was invented by Kaplan and Norton in 1992, attracted considerable worldwide interest and became one of the most important developments in management accounting (Atkinson, et al., 1997). Over the past two decades, BSC has transformed itself from merely a performance measurement system to a strategic performance measurement system. In addition, in 2001, Kaplan and Norton introduced the Strategy-Focused-Organization (SFO) framework, which was a sound conceptual foundation of BSC concept and its key determinant (e.g., Kaplan and Norton, 2001). The SFO framework comprises five principles: four BSC attributes and top management support. The four key attributes of BSC are: (1) translating strategy into operational terms, (2) aligning the organizational units to the strategy, (3) communicating strategy to employees, and (4) providing feedback and learning. Interestingly, most studies that examined the determinants or consequences of BSC investigated the BSC implementation in a collective fashion whereas very few studies studied each of the BSC attributes separately.

Most studies acknowledged that top management support was one of the key facilitating factors of BSC implementation. Nevertheless, none has examined the relationship between top management support and each BSC attribute.

Concerning the perceived benefits of BSC, a number of studies showed favorable outcomes; however, they contained limitations. Firstly, most of the papers investigated the contributions of BSC implementation rather than those of separate BSC attributes with the exception of one study by Simons (2000) that genuinely examined whether each BSC attribute was the source of organizational performance. Secondly, most studies not only examined only one single aspect of BSC implication but also narrowly focused on overall benefits and satisfaction. Thirdly, to the best of my knowledge, none has explored the perceived benefits of BSC in terms of planning, control and communication.

These limitations of the prior studies, hence, led to the exploring of the application of the BSC attributes among firms listed on the Stock Exchange of Thailand (SET) or the Market for Alternative Investment (MAI) by (a) investigating whether top management support was correlated with the BSC attributes and (b) examining whether each BSC attribute was the source of various perceived benefits, such as overall benefits, planning, control and communication.

The descriptive analysis which was based on 81 returned questionnaires revealed the degree of application of each BSC attribute. In addition, the empirical results demonstrated that, irrespective of the fact that firms were BSC users or non-users, top management support was positively associated with each BSC attribute. This not just supported Kaplan and Norton's assertion that this factor was crucial but also contributed to the existing body of research by highlighting the fact that top management support facilitated the application of each BSC attribute in the organization. With respect to the consequence, thirty-seven firms, through self-assessed responses, have identified themselves as BSC users. The examination on the perceived benefits showed that all of the BSC attributes produced diverse types of benefits, such as overall benefits, planning, control and communication.

This paper is divided into five sections. The first section is the introduction. The second section presents a brief literature review, which is followed by the research methodology in the third section. The fourth section shows the empirical results and the last section concludes the paper.

LITERATURE REVIEW

Balanced Scorecard (BSC) and Strategy-Focused-Organization (SFO)

The Balanced Scorecard was initially invented by Kaplan and Norton as the multi-dimensional performance measurement system with a collection of financial and nonfinancial measures. BSC was transformed into a strategic performance measurement system (Kaplan and Norton, 1992; 1996; 2001; 2008) and related to Strategy-Focused-Organization (SFO) in the sense that BSC was part of SFO (Kaplan and Norton, 2008) as shown in Table 1.

Table 1: BSC Attributes and SFO Principles

SFO Principles and BSC Attributes	Explanation
Translating strategy into operational terms (Strategy)	This is a foundation of BSC and consists of three sub-attributes: (1.1) Multiple perspectives, (1.2) Measures derived from strategy and (1.3) Cause-and-effect relationships among the strategic objectives or measures.
Aligning the organizational units to the strategy (Alignment)	Aligning business units' and functional units' strategies to the corporate-level strategy helps generate corporate synergy, i.e. a collection of business units create greater value than if each unit operates autonomously.
Communicating strategy to employees (Communication)	Communicating and educating enable employees to understand firm's strategy and scorecard. This intrinsically and extrinsically motivates employees to perform their work in ways that contribute to the success of the strategy.
Providing feedback and learning (Feedback)	Linking strategy to the budgeting process by setting targets for the strategic measures and by screening the strategic initiatives to achieve such targets. The feedback and learning process enables strategic refinement and makes strategy a continual process.
Top management support	Support from top management, including involvement and resource allocation, is the most important condition for implementing and sustaining BSC.

This table illustrates the relationship between SFO and BSC frameworks, the former of which contains four BSC attributes and their key determinant, i.e. top management support. This paper is based primarily upon the aforementioned relationship in that the SFO framework is a sound conceptual foundation of the BSC concept.

Table 1 illustrates that SFO encompasses BSC concept. BSC comprises four key attributes: (1) Strategy, (2) Alignment, (3) Communication, and (4) Feedback, while SFO consists of five principles: the four aforesaid BSC key attributes and top management support. Firms in the study were not required to implement BSC; instead, they are given an option to either fully implement, partially implement or not

implement. As such, the degree of each BSC attribute adopted and implemented by different organizations was varied.

Key Determinant: Top Management Support

Due to its dominant position in the organization, top management helped generate organizational support in terms of time and resources for implementing innovation in the organization (Chenhall, 2003; Roger, 2003). This also proved true in the case of BSC (Kaplan and Norton, 2008).

Although Chen et al. (2006) found the negative impact of top management support on BSC application, no explanation was provided in their study. Many studies and anecdotal evidence supported the significance of this driver (e.g., Braam and Nijssen, 2008; Kaplan and Norton, 2008).

As several studies acknowledged the importance of top management support in facilitating the collective implementation of BSC, this study thus speculated that the support should facilitate the implementation of each BSC attribute. With the support of top management, translating strategy into operational terms becomes possible by encouraging the use of financial and nonfinancial measures that could reflect firm's strategy through the cause-and-effect relationships. Members in management team normally come from diverse business units and departments within the organization; hence, they could contribute their tacit knowledge and efforts to align strategies of different business units and departments to the firm's overall strategy to create synergy. Additionally, top management tended to support both formal and informal training sessions to enhance employees' understanding of their tasks so that the employees could effectively perform their duties. Furthermore, another responsibility of top management is to oversee all strategy-related activities and decide whether the firm's strategy is appropriate. This underscores the importance of the feedback and learning process that enables strategic refinement or strategy formulation. The arguments led to the following hypotheses:

H1a: Top management support is positively associated with translating strategy into operational terms.

H1b: Top management support is positively associated with aligning the organizational units to the strategy.

H1c: Top management support is positively associated with communicating strategy to employees.

H1d: Top management support is positively associated with providing feedback and learning.

The Perceived Benefits of BSC Implementation

Prior research on BSC implication primarily revealed the significant consequences of BSC application in terms of employees' satisfaction (Ittner et al., 2003; McWhorton, 2001), perceived organization's performance compared to competitors' (e.g., Hoque and James, 2000), perceived performance improvement (e.g., DeBusk and Crabtree, 2006; De Geuser et al., 2009), the integration of management processes, and perceived benefits of BSC relative to its costs (De Geuser et al., 2009). Although the positive ex-post attitudes toward BSC use were discussed in many studies, very few research studies examined various aspects of BSC benefits. Furthermore, most studies did not examine the effects that each BSC attribute could have on the firm's operation.

One paper, nevertheless, did examine whether each BSC attribute was the driver of organizational performance. De Geuser et al. (2009) studied to determine whether the four attributes of BSC and top management support were the sources of BSC contribution. They found that attributes 1 (Strategy) and 4 (Feedback) seemed to be the key sources of overall improvement, while attributes 2 (Alignment) and 3

(Communication) showed marginal impact. Top management support, however, did not influence any perceived organizational performance. This implies that top management support may not directly influence the firm's performance but indirectly through the application of each BSC attribute. Therefore, this study aimed to examine whether each BSC attribute contributed to the firm's performance in the areas of overall performance, planning, control and communication.

As previously mentioned, BSC was one of the most important developments in management accounting, particularly in strategic planning and control (Atkinson et al., 1997). Based on Kaplan and Norton's assertion, organizations using BSC usually emphasized (a) achieving their strategic objectives and measures, (b) cascading the corporate strategy into aligned and integrated strategies at lower-level units, (c) communicating the strategy to ensure that everyone working toward common goals, and (d) adjusting strategy when needed. Hence, for BSC users, each BSC attribute was likely to enhance the perceived benefits in terms of overall benefits, planning, control, and communication. Each BSC attribute was expected to (1) facilitate the planning systems by gathering the strategy-related information to analyze how firm successfully operated in the dynamic environment, (2) strengthen the control systems by encouraging setting strategic goals, measuring leading and lagging indicators, and providing the variance information to ensure that the firm's activities were in line with the firm's goals, and (3) support the communication systems by providing stakeholders with the relevant information in order to analyze the direction and the success of the firm (Simons, 2000). Based on these lines of reasoning, the following hypotheses presented the postulated relationship between each BSC attribute and the various aspects of perceived benefits.

H2a: Translating strategy into operational terms is positively associated with the various aspects of perceived benefits, i.e. overall benefits, planning, control and communication.

H2b: Aligning the organizational units to the strategy is positively associated with the various aspects of perceived benefits, i.e. overall benefits, planning, control and communication.

H2c: Communicating strategy to employees is positively associated with the various aspects of perceived benefits, i.e. overall benefits, planning, control and communication.

H2d: Providing feedback and learning is positively associated with the various aspects of perceived benefits, i.e. overall benefits, planning, control and communication.

RESEARCH METHODOLOGY

Data and Survey Instrument

The sample includes 508 firms listed on the Stock Exchange of Thailand (SET) or the Market for Alternative Investment (MAI). Since 81 replied questionnaires were received, the response rate was 15.94 percent. This low response rate was not unusual for the survey in Thailand. Survey packages, each with a questionnaire, a cover letter and a postage-paid, return-addressed envelope enclosed, were posted to chief financial officers (CFO's) in May and June 2011. The questionnaire was initially designed based on the fundamental concepts of BSC and subsequently revised based on the pre-tested results from and comments by academics and CFOs of the pre-tested firms. Respondents were required to specify both the degree to which each BSC attribute was embedded in their firms' performance measurement systems and the level of top management support (each ranging 0 - 100). The four BSC attributes and top management support were each accompanied with a set of questions in order to strengthen the construct validity. The averages of percentage points of scores of each BSC attribute and top management support were calculated for each firm. Then, the respondents identified whether they were BSC users by

answering the Yes/No question. Finally, they were required to specify the degree of perceived benefits of BSC application in terms of overall benefits, planning, control and communication.

Model Specifications and Variables

A simple regression analysis was employed to test the proposed hypotheses. The model specifications and variables are presented in Table 2. Specifically, Models 1 and 2 were employed to examine the relationships between top management support and each BSC attribute (H1a-H1d) and those between each BSC attribute and each aspect of perceived benefits (H2a-H2d).

Table 2: Models and Variables for Determinant and Perceived Benefit Tests

Model for Determinant Study				**Model for Perceived Benefit Study**	
M1: $BSCATT_i = \beta_0 + \beta_1 TOP_i + \varepsilon_i$				**M2:** $BENE_i = \beta_0 + \beta_1 BSCATT_i + \varepsilon_i$	
Variables					
TOP_i	Top management support	$BSCATT_i$	Each BSC attribute	$BENE_i$	Each aspect of perceived benefits
		$STRAT_i$	Strategy	ALL_i	Overall benefits
		$ALIGN_i$	Alignment	$PLAN_i$	Planning
		$COMM_i$	Communication	CON_i	Control
		$FEED_i$	Feedback	COM_i	Communication

This table shows the regression models and related variables. Model (1) is employed to test H1a-H1d; top management support and each BSC attribute are independent and dependent variables, respectively. Therefore, there are four regression models in this determinant study. Model (2) is employed to test H2a-H2d; each BSC attribute and each aspect of perceived benefits are independent and dependent variables, respectively. Hence, there are 12 specific regression models in this consequence study.

RESULTS

This section is concerned with the main findings of this study. The descriptive statistics are shown in Table 3, which indicate the application of BSC attributes among sample firms. Tables 4 and 5 provide the outcomes of determinant and consequence studies, respectively.

Table 3: Data for Determinant and Perceived Benefit Studies

Variables		**Avg.**	**Min**	**Max**	**SD**	**Cronbach's Alpha**	**N of Questions**
Panel A: Data for determinant study (H1a-H1d) (all samples, n=81)							
Strategy	$STRAT_i$	71.64	3.13	100.00	17.66	0.938	8
Alignment	$ALIGN_i$	70.25	3.75	100.00	19.06	0.902	4
Communication	$COMM_i$	69.58	3.75	100.00	18.77	0.880	4
Feedback	$FEED_i$	73.04	5.63	100.00	18.30	0.961	8
Top management support	TOP_i	76.57	14.00	100.00	16.33	0.959	5
Panel B: Data for perceived benefit study (H2a-H2d) (BSC users, n=37)							
Strategy	$STRAT_i$	76.74	37.63	100.00	14.99	0.938	8
Alignment	$ALIGN_i$	73.05	30.00	100.00	18.96	0.948	4
Communication	$COMM_i$	73.71	30.00	100.00	16.28	0.842	4
Feedback	$FEED_i$	76.72	43.75	100.00	15.42	0.958	8
Top management support	TOP_i	79.43	50.00	100.00	11.58	0.939	5
Overall benefits	ALL_i	75.41	50.00	100.00	14.06	N.A.	1
Planning	$PLAN_i$	77.51	50.00	100.00	13.36	N.A.	1
Control	CON_i	77.03	50.00	100.00	13.72	N.A.	1
Communication	COM_i	73.38	10.00	100.00	17.99	N.A.	1

Panels A and B of this table show descriptive statistics for determinant and perceived benefit studies, respectively. Specifically, the basic descriptive statistics (average, minimum, maximum and standard deviation), cronbach's alpha and number of questions for each variable are shown.

Tables 4 and 5 show the estimated regressions of Models 1 and 2, each of which respectively indicates the determinant and the perceived benefits of each BSC attribute.

Table 4: The Results of the Determinant Study (n=81)

Dependent		$STRAT_i$		$ALIGN_i$		$COMM_i$		$FEED_i$	
Independent	TOP_i	**0.856**	***	**0.996**	***	**1.001**	***	**0.869**	***
Intercept		8.772		-6.051		-5.771		7.778	
Adj.R^2		42.1%		35.2%		49.3%		40.9%	
		H1a is supported		H1b is supported		H1c is supported		H1d is supported	

This table shows the regression estimates of the equation: $BSCATT_i = \beta_0 + \beta_1 TOP_i + \varepsilon_i$ *, where BSC ATT signifies each BSC attribute (Strategy, Alignment, Communication, and Feedback) and TOP denotes top management support. ***,**, and * indicate significance at the 1, 5 and 10 percent levels, respectively.*

The findings indicated that top management support was positively and significantly associated with each BSC attribute at 0.01 significance level, ceteris paribus. Thus, H1a, H1b, H1c and H1d were all supported. Top management played an important role in supporting the implementation of each BSC attribute. The support from management facilitated translating strategy into operational terms along with aligning the corporate strategy to the strategies of various business units and supporting departments. Top management also enhanced employees' understanding of the firm's strategy such that employees could perform their tasks to accomplish the firm's goals. Moreover, top management enabled the feedback and learning process for strategic review. This not merely supported Kaplan and Norton's statement that top management support was as a key factor for the BSC implementation in an organization but also added to the existing body of research the discovery that top management support was an influencing factor vital to the implementation of each BSC attribute.

Table 5: The Results of Perceived Benefits Study (N=37)

Panel A		ALL_i		$PLAN_i$		CON_i		COM_i		
Independent	$STRAT_i$	**0.621**	***	**0.662**	***	**0.641**	***	**0.663**	***	H2a is supported.
Intercept		27.752	***	26.706	***	27.815	***	22.489	**	
Adj.R^2		42.2%		53.9%		47.7%		28.6%		
Panel B		ALL_i		$PLAN_i$		CON_i		COM_i		
Independent	$ALIGN_i$	**0.518**	***	**0.425**	***	**0.549**	***	**0.588**	***	H2b is supported.
Intercept		37.560	***	46.463	***	36.928	***	30.451	***	
Adj.R^2		47.3%		34.6%		56.4%		36.6%		
Panel C		ALL_i		$PLAN_i$		CON_i		COM_i		
Independent	$COMM_i$	**0.634**	***	**0.637**	***	**0.676**	***	**0.801**	***	H2c is supported.
Intercept		28.644	***	30.594	***	27.174	***	14.311	*	
Adj.R^2		52.6%		59.0%		63.4%		51.2%		
Panel D		ALL_i		$PLAN_i$		CON_i		COM_i		
Independent	$FEED_i$	**0.514**	***	**0.491**	***	**0.620**	***	**0.495**	***	H2d is supported.
Intercept		35.978	***	39.823	***	29.435	***	35.356	***	
Adj.R^2		29.8%		30.2%		47.2%		15.7%		

This table shows the regression estimates of the equation: $BENE_i = \beta_0 + \beta_1 BSCATT_i + \varepsilon_i$ *, where BSC ATT signifies each BSC attribute (Strategy, Alignment, Communication, and Feedback) and BENE denotes each aspect of perceived benefits. ***,**, and * indicate significance at the 1, 5 and 10 percent levels, respectively.*

The results in Table 5 indicated that, among the BSC users, each BSC attribute was positively and significantly associated with each aspect of perceived benefits at 0.01 significance level, ceteris paribus. In particular, this study showed that each BSC attribute produced benefits in the areas of planning, control and communication. Not only did BSC help glean the relevant information for decision makers to properly operate the business but also strengthened the control systems through, for example, strategic goal setting, timeliness reports of variance information. BSC also facilitated the communication systems for both internal and external users. This supported the benefits of BSC implementation as well as contributed to the existing research works with the finding that each BSC attribute brought about such benefits.

CONCLUSIONS

This paper studied the application of each BSC attribute and revealed the important determinant and the positive effects of BSC implementation in various aspects. In particular, based on the 81 received questionnaires, this research examined the degree to which the sample firms implemented each BSC attribute. For the determinant study, the regression analysis results showed that top management support was a key influencing factor of the implementation of each BSC attribute. This upheld the common belief that the support from top management facilitated the implementation of BSC, especially of BSC attributes. Furthermore, for the consequence study, thirty-seven BSC users were analyzed employing regression analysis. It was found that all BSC attributes were the sources of perceived benefits in various aspects, i.e. overall benefits, planning, control and communication. These findings encouraged firms to implement BSC since the adoption of merely one BSC attribute was proved to improve the organization's performance. Regarding the limitation, self-response bias was common in survey research and each aspect of perceived benefits contained merely one question. In addition, the application of BSC was examined at the corporate level, not business unit level. Therefore, the results should be carefully interpreted. Other determinants and quantitative impacts of BSC implementation should be examined in future research works with greater emphasis given to each of the BSC attributes.

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TIME EVOLUTION ANALYSIS AND FORECAST OF KEY PERFORMANCE INDICATORS IN A BALANCED SCORECARD

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ABSTRACT

This paper offers a generic and rational construction of Balanced Scorecard. The construction involves implementing a time-managed approach to identify the evolution of the main contributors to the current company's strategy as well as their behavior in the future organizational performance. After the optimal structure of the model is generated employing financial and non-financial strategic indicators collected from the organization, the study puts forward a realistic analysis of the evolution in time of the performance metrics. This analysis is based on the Partial Least Square equations behind the Balanced Scorecard proposed methodology, statistically comparable to the Structural Equation Modeling. Using historical data in the final model, an accurate prediction of the performance indicators can be achieved in the Balanced Scorecard tool as the approach establishes a stable cause-and-effect sequence. Under certain statistical assumptions, this allows forecasting the effects of future strategic decisions. Although the paper proposes a generic methodology, applicable to any organization, both public or private, commercial or non-profit, this technique is applied, reinforced and validated with a practical example from a public-owned Swiss electricity company.

JEL: G39, M19, M40, L32

KEYWORDS: Balanced Scorecard, Key Performance Indicators, Performance Measurement, Structural Equation Modeling (SEM), Partial Least Squares (PLS), Principal Component Analysis (PCA), Public Organization, Energy Industry, Energetic Sector

INTRODUCTION

Numerous authors criticize older management systems that focus on financial indicators because of their shortfalls, retrospective emphasis and incapacity to indicate modern-day value-creating activities. Financial measures are usually regard as 'lagging indicators of performance', because they record the consequence of decisions not when decisions are taken, but rather as the financial effect of these decisions materialize, which can be long after the choice was made (Epstein and Manzoni, 1998). Other critics go much further by arguing that financial indicators do not increase customer satisfaction, quality, cycle time or employee motivation. Old management's approaches fail to notice the significance of the company's relationship with its environment, particularly with its customers. Therefore, the necessity is obvious for a series of performance criteria more oriented towards the organization's final goals (Butler et al., 1997).

A novel approach to strategic management was introduced by Robert Kaplan and David Norton in the early 1990s, named the Balanced Scorecard (BSC). Identifying some of the limitations and ambiguities of previous management systems, the BSC method offers comprehensive guidance regarding what organizations should focus on to "balance" the financial perspective with other crucial areas. The model facilitates companies to refine their vision and strategy and convert them into action, thereby supplying executives with a complete framework that translates the strategic goals of an organization into a consistent set of performance measures. These key measures are regrouped by strategic perspectives

comprising financial indicators and harmonizing them with operational measures that are the drivers of future financial performance, such as customer satisfaction, internal processes and the company's innovation and development activities (Kaplan and Norton, 1992).

One advantage of the BSC and one of the essential distinctions from other methodologies is the model has the ability to provide managers with a method of articulating a complex chain of cause-and-effect in the company. This pattern grants executives with a base to handle the drivers of wanted results and consequently, the cause-and-effect chain is crucial to the BSC. In fact, this is the heart of the model - connecting in a causal sequence the performance measures of the four strategic perspectives.

Kaplan and Norton (1996) presume the following underlying liaison: the measures of organizational learning and growth will affect the measures of internal business processes, which will influence the measures of the customer perspective, which, finally, will alter the financial measures. The metrics of organizational learning and growth are consequently the drivers of the performance measures of the internal business processes. The metrics of these processes are in sequence the drivers of the measures of the customer angle, while these performance indicators are the drivers of the financial ones. An optimal balanced scorecard should have a combination of result measures (lag indicators) and performance drivers (lead indicators). Each strategic field should have both lead and lag performance indicators, generating two directional cause-and-effect sequences: lead and lag performance indicators apply horizontally within the sections and vertically between sections. The causal paths from the metrics indicators on the scorecard should be connected to financial goals. This course of action entails that strategy is converted into a suite of hypotheses about cause and effect (Kaplan and Norton, 1996a; Kaplan and Norton, 1996b).

One of the drawbacks of the BSC lies in its construction. Despite the fact that the authors offer several fundamental elements and describe the milestones for building the BSC, the concepts are quite vague and can be difficult to apply in an organizational environment.

There are three main goals in this study. The first is to overcome the above limitations and advance several statements for a demonstrative construction of a BSC using the Partial Least Square (PLS) technique. The aim is to generate a realistic model applicable to any organization environment. The second objective is to validate the assumptions with a real example from a Swiss organization where performance indicators outline the strategic perspectives. A cause-and-effect structure will be generated and norms set as to which strategic perspectives are influencing the others. A main findings of this example is that the Kaplan and Norton's model of BSC is nothing more but a particular case of our conclusions. As the suggested approach establishes the most stable cause-and-effect sequence, the third and final objective is to accurately predict the future changes in performance indicators. Under certain statistic assumptions, this will naturally allow forecasting the effects of future strategic decisions.

The paper is organized as follows. In the next section, we present and underline the main BSC concepts from the specialized literature. We highlight the "idealistic" process of 4-axes construction followed by a logical structure allowing for the identification of the number of strategic perspectives and the performance indicators connected to each perspective. We put forward a tentative modeling of BSC that can be implemented in any organization environment. This is pursued by a real example of a Swiss establishment in the energy sector in which the PLS method is applied to build a coherent BSC. Using the structural equations behind the PLS Path Modeling, we better predict the future company trends and take enhanced corrective measures to quickly adapt in a challenging and complex organizational environment. The paper closes with some concluding comments.

LITERATURE REVIEW AND RESEARCH DEVELOPMENT

According to Kaplan and Norton, the BSC is a management model (not only a measurement tool) that allows organizations to identify their vision and strategy and translate into specific actions controlled through a coherent set of actions performance measures. It supplies responses across internal company processes as well as external results so that it constantly advances strategic performance and results. As mentioned by Fielden's (1999), worldwide organizations use BSC for translating vision and strategy into measurable objectives. Moreover, a recent study estimates that 60 percent of Fortune 1000 companies have worked with the BSC (Silk 1998). Adopters include top organizations such as KPMG, Peat Marwick, Allstate Insurance, and AT&T (Chow et al. 1997).

The BSC is set to handle the base of the company's efforts in defining and communicating the vital key interests to managers, employees, investors and even customers (Kaplan & Norton, 1993). With only four strategic perspectives, the BSC reduces information surplus by forcing executives to focus on the handful of measures that are most essential. Consequently, it enables organizations to outline financial outcomes while simultaneously monitoring the resources and obtaining the intangible assets they would need for future growth (Kaplan & Norton, 1996). The BSC offers managers with the ability to identify performance indicators that could forecast the wealth and health of an establishment. By translating strategy in quick and quantifiable actions, a BSC controls strategy in an organizational environmental and uncover hidden assets and information. Furthermore, by linking both internal and external people with these strategies, continuous learning and development can be attained (Pineno, 2002).

The BSC identifies cause-and-effect connections between the various constituents of a company (Kaplan & Norton, 1996). From a practical point of view, this is the core of the BSC, enclosing result metrics and performance drivers, connected together in a cause-and-effect relationship. In fact, the essence of the model is this hypothesis permitting measurements in non-financial areas to be used to predict future financial performance (Nørreklit, 2000).

However, the BSC also has several limitations with some of its key assumptions and relations underlined by numerous authors from the specialized literature. Nørreklit (2000) argues that there is not a causal but rather a logical connection between the strategic perspectives analyzed. Moreover, the author opposes that customer satisfaction automatically create superior financial outcomes. Indeed, series of actions produce high customer value ratio and this will eventually lead to good financial results, but this is not a matter of causality; it is commonsense since it is incorporated in the concepts. As a result, the BSC makes illogical assumptions, which may lead to the anticipation of incoherent measures, triggering sub-optimal performance. Additionally, the BSC is not a representative strategic management tool because it does not consider any rapport between organizational and environmental reality (e.g. competition). Consequently, a variance must be acknowledged between the strategy articulated in the undertaken actions and the presumed strategy (Nørreklit, 2000).

Kanji (2002) summaries more BSC weaknesses highlighting that the model is excessively abstract and not easy to use it as a measurement model. Furthermore, the links between criteria are not clearly defined and, lastly, the causal relationships are problematic (more like interdependence, rather than correlations). Finally, Malina & Selto (2001) claims that the BSC is very difficult to put into practice. The authors make reflections on some negative aspects of the BSC and assert important controversy and friction between the company and its distributors. They further concluded that the performance indicators employed in the model are biased or inaccurate, the communication about the BSC within a company is one-way and not participative (i.e. strictly top-down) and the benchmarks between organizations are inappropriate but used for evaluation.

Introduction to Structural Equation Modeling (SEM)

Within this environment of uncertainty and criticism, some authors (Shields, 1997; Shields & Shields, 1998) have called on management accounting researchers to make better use of Structural Equation Modeling (SEM). SEM is a statistical approach comprising a family of different techniques (Path Modeling, Partial Least Squares and latent variable SEM) that allows the simultaneous analysis of a series of structural equations. However, there seems to be some agreement that all SEM contain two features: first, the estimation of multiple interrelations between variables, and, second, the capacity to represent latent variables in these equations while accounting for assessed measurement error associated to the unsatisfactory measurement of variables. These techniques are specifically useful when a dependent variable in one equation becomes an independent variable in another equation (Hair et al., 1998).

An important concern is the need for a substantial sample size for the majority of SEM models. A suggested rule of thumb for latent variable SEM is a minimum sample volume of 100 (Medsker et al., 1994). Moreover, it has been recommended that a sample size of 200 may be needed to obtain valid fit measures and avoid generating erroneous conclusions (Marsh, Balla, & McDonald, 1988; James & James, 1989; Boomsma, 1982; Medsker et al., 1994). In spite of these issues, Smith and Langfield-Smith (2004) conclude that 11 of the 20 surveys (55%) had sample volumes beneath the acknowledged threshold of 200. Even if the endorsed sample size of 100 is deemed as the lowest level acceptable, three of the 20 papers (Magner, Welker, & Campbell, 1996, Chalos & Poon, 2000, Abernethy & Lillis, 2001) fall underneath this bound, denoting that the conclusions drawn from these studies could be inaccurate.

For this reason, management accounting researchers may be restrained from using covariance based methods because of the significant dataset requirements, and endorse the statement that this technique is suitable in areas where theory is relatively robust. Despite the fact that these limitations are true for latent variable SEM techniques, Partial Least Squares (PLS) modeling presents an appropriate alternative.

Partial Least Squares (PLS)

PLS regression is a recent technique that generalizes and merges features from both principal component analysis (PCA) and multiple regressions. It is particularly useful when predicting a series of dependent variables from a (very) large sequence of independent variables (i.e., predictors). It was used in the social sciences (specifically economics, Herman Wold 1966) but became popular first in chemometrics (i.e., computational chemistry) due in part to Herman's son, Svante (Geladi & Kowalski, 1986), and in sensory evaluation (Martens & Naes, 1989). Nevertheless, PLS regression is becoming an alternative in the social sciences as a multivariate method for non-experimental and experimental data alike (neuroimaging, see Mcintosh, Bookstein, Haxby, & Grady, 1996). It was first pioneered as an algorithm similar to the power method (used for calculating eigenvectors) but was rapidly retained in statistical environment (Hervé, 2003). Offering strong forecast abilities (Hoskuldsson, 1988), the technique was successfully used in the Geology field (Tootle, Singh, Piechota & Farnham, 2007).

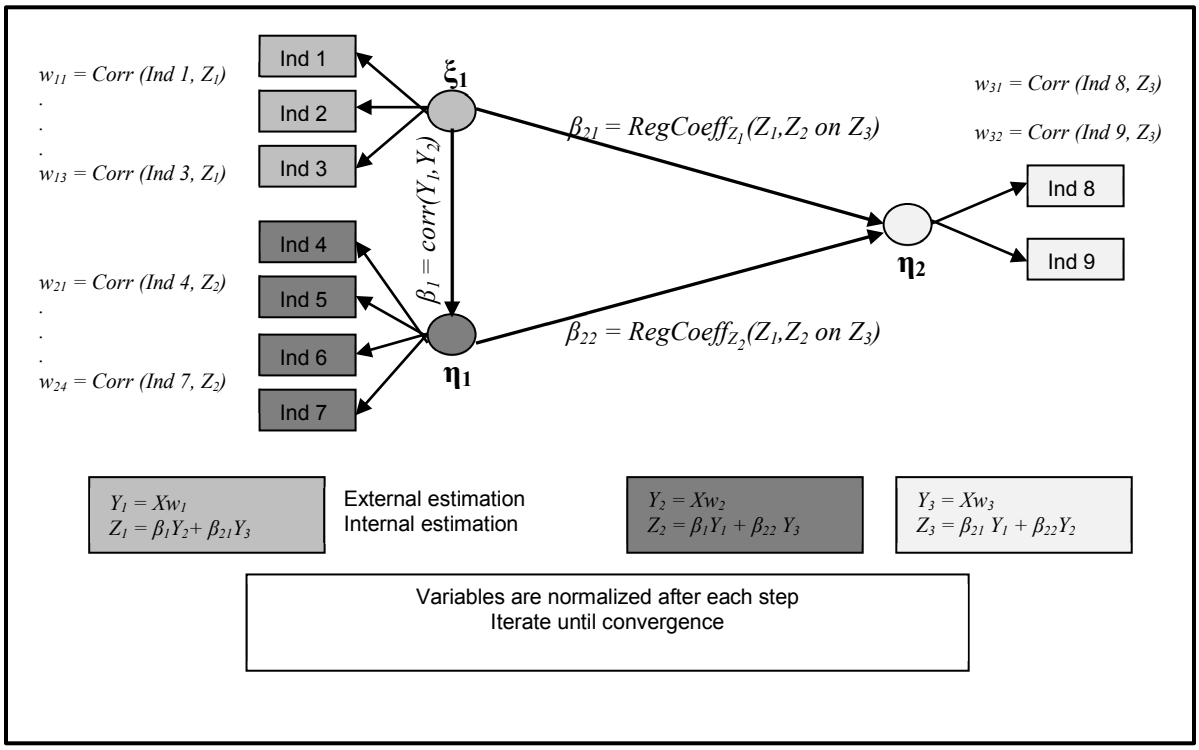
The usage of PLS, in spite of its intrinsic shortcomings (specifically that it is a limited-information method, aimed to maximize prediction, rather than fit), works out to be a way in which statistical modeling in management accounting research can progress without the need to obtain large samples, something which management accounting researchers have found challenging. Another advantage of PLS is the method's ability to accommodate non-normal data, generated by lower demanding assumptions behind the technique (Smith & Langfield-Smith, 2004).

However, there is some misinterpretation in the terminology used in the PLS field. Herman Wold first introduced the notion of Partial Least Squares in his research about principal component analysis (Wold, 1966) where the NILES (nonlinear iterative least squares) algorithm was developed. This algorithm (and

its extension to canonical correlation analysis and to specific situations with three or more latent variables) was later named NIPALS (nonlinear iterative partial least squares) (Wold, 1973; Wold, 1975).

The "PLS approach" concept is somewhat too large and combines PLS for path models on one side and PLS regression on the other. Following a suggestion by Martens (1989), this paper uses the term PLS for Structural Equation Modeling to designate the use of "PLS Path Modeling" as illustrated in Figure 1.

Figure 1: Example of PLS Path Modeling



Above figure describe the two key relations found in any PLS path model: a first one named the outer model, illustrating the connections between the latent variable and its manifest variables and a second one called the inner model defining the relationships among the latent variables themselves.

The outer model specifies the relation between the observed variables and the latent variables. Each latent variable ξ_j is implicitly explained by a set of observed variables x_{jh}. Each observed variable is connected to its latent variable by a simple regression:

$$x_{jh} = \pi_{jh0} + \pi_{jh}\xi_j + \varepsilon_{jh} \quad (1)$$

The Inner Model specifies the relation between the latent variables. The causality model leads to linear equations linking the latent variables:

$$\xi_j = \beta_{j0} + \sum_i \beta_{ji}\xi_i + \upsilon_j \quad (2)$$

The latent variables connected to ξ_j are segregated into two categories: the predecessors of ξ_j which are latent variables impacting ξ_j and the successors which are latent variables impacted by ξ_j. For any predecessor ξ_i of the latent variable ξ_j, the inner weight e_{ji} is equivalent to the regression coefficient of Y_i

in the multiple regression of Y_j on all the Y_i's connected to the predecessors of ξ_j. If ξ_i is a successor of ξ_j then the inner weights e_{ji} is equivalent to the correlation between Y_i and Y_j (Tenenhaus & Vinzi, 2004).

The available software has been for many years LVPLS 1.8 developed by Lohmöller (1987, last existing version). Lohmöller extended the basic PLS algorithm in numerous aspects and published all his research results in 1989. More recently, Wynne Chin developed a user-friendly PLS Path Modeling software labeled PLS-Graph 3.0 (2001, for the last version) and Christian Ringle added more statistical tools for a comprehensive validation of the PLS model in his software entitled SmartPLS. Besides the user-friendly graphical interface to PLS Path Modeling, the algorithm has been further refined and improved with major capabilities, like cross-validation of the path model parameters using jack-knife and bootstrap.

Bootstrapping is the method of determining components of an estimator (for example its variance) by computing those aspects when sampling from an estimating distribution. One usual option for computing distribution is the observed distribution of the empirical variables. In the situation where a group of observed variables are assumed to be from an identically and independent distributed population, this can be solved by generating a number of resamples of the observations (and of same size of the observations), each of which is achieved by random sampling with replacement from the initial set of data. The advantage of bootstrapping compared to analytical techniques is its high straightforwardness - it is significantly easy to use the bootstrap in order to find estimates of standard errors and confidence intervals for complex estimators of the distribution, such as percentile points, proportions, correlation coefficients and odds ratios.

Nevertheless, even if newer and more complex PLS programs are available today (e.g. PLS-Graph or SmartPLS), a better analysis of the PLS Path Modeling allowed us to develop our own software from scratch. The goal was to combine all statistical techniques we are using in one single and reliable tool: compute the principal component analysis (PCA), estimate the path weighting scheme and, finally, generate bootstrap validation procedure and evaluate the best from all possible graphs.

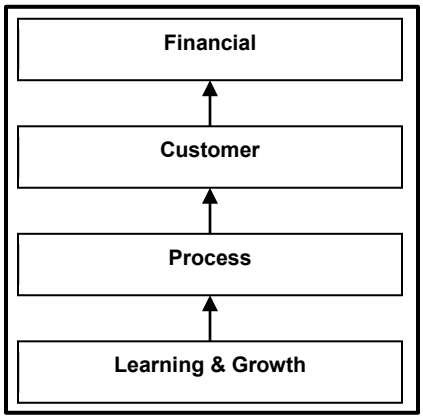
Ittner and Larckner affirmed in 1998 that "(...) decisions using multicriteria performance measurement systems should be computed using explicit, objective formula that prescribes the weights to be attached to each measure, or should be based on subjective evaluations where the weights to be attached to each measure is implicitly or explicitly chosen by the decision maker". This should always be taken into account when building, checking and validating assumptions of causality relations between performance indicators in the context of the BSC implementation. While this might seem difficult from a practical perspective, the PLS technique offers a suitable solution.

As shown in Figure 2, the initial statements of causality relations between the four strategic perspectives remain subjective in the Kaplan and Norton's BSC. The use of the PLS Path Modeling is recommended to establish, in a more objective way, the intensity of the relationships between the strategic perspectives (or the latent variables in PLS terminology) defined by their key performance indicators (or the observed variables in PLS language). Undoubtedly, whereas the choice of strategic perspectives and the hypotheses that link them remain subjective and biased in the case of Kaplan and Norton, the proposed model of structural equations aims "to provide a meaningful and parsimonious explanation for observed relationships within a set of measured variables" (MacCallum, 1995).

In a structural equations approach, the latent variables cannot be measured in a direct and precise way. Accordingly, these latent variables require measurable variables, which are described through performance indicators that can be directly observed and evaluated. The structural equations method is derived from the principal component analysis of the data (confirmatory or exploratory, in line with each specific case) to identify and validate the model of the causal relations which represent the focal point of

BSC. It is essential to stress that one of the intrinsic limitations in the use of structural equations in the BSC framework are the prerequisites for the data validation, which demands a significant quantity of observations in order to validate the final results. The collection of large series of data is not simple, especially in small and medium-sized companies. This is one reason why the PLS technique presents an important advantage in any case where large datasets are not available.

Figure 2: Generic Relationship Map in a BSC (Kaplan and Norton, 1996)



This figure illustrates the original cause-and-effect pattern in a BSC as defined by the Kaplan and Norton (1996), starting from the learning and growth perspective that will affect the measures of internal business processes which sequentially will influence the measures of the customer perspective which, finally, will affect the financial area.

DATA AND METHODOLOGY

Data Collection and Validation

The proposed approach presented in this paper, although universally appropriate to any type of organization, is portrayed using an example of a public-owned Swiss electricity institution. Based in western Switzerland, this governmental organization has active involvement in various electricity projects, especially those concerning to new sources of renewable energy. The core mission of the company is to establish a strong renewable electricity platform in western part of Switzerland.

Data were gathered with the help of the Corporate Strategy Head certifying high quality and reliable data. Data on 144 performance indicators were collected throughout the company over 2 years on a monthly basis. The critical part in the proposed methodology is the choice of the number of axes and of the corresponding measures. It is vital that the key measures describe to a certain extent the strategy of the organization. Undeniably, strategy performance indicators differ among corporations, especially among different sectors and areas (e.g. profit vs. non-profit, private vs. public, etc.). The initial cleaning of the database was completed with the business owners and under the guidance of the Corporate Strategy Head. Due to a relatively high number of duplicates and inconsistent data, only 64 key performance indicators were retained in the final database.

To find the number of strategic perspectives and filter all performance measures per each axis, the principal component analysis (PCA) was applied to the final database using PLS Assistant software. After the final selection and grouping of variables, the same software has been used for the PLS Path Modeling. The software is capable of evaluating the most stable PLS graph by employing the bootstrap technique to each possible arrangement and connection between the strategic perspectives (or latent variables in PLS terminology). Lastly, the data were validated using several measures frequently used in

the PLS specialized literature: AVE and Composite Reliability for the outer model validation and R-Square and Redundancy Index for the inner model validation.

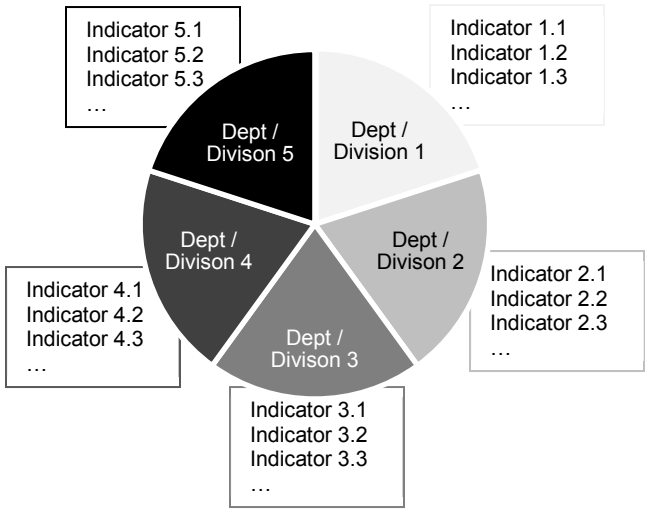
Detailed Methodology Exemplified with a Pragmatic Case

There are five consecutive steps proposed in this paper, at the end of which will allow the construction and implementation of a rational and optimal BSC: (1) collect historical data from the company, (2) sort out and prepare the final database, (3) determine and identify the numbers of strategic perspectives and performance indicators connected to former, (4) construct the cause-and-effect link between all strategic perspectives and, lastly, (5) operate this management tool for long-term planning.

At the end of the proposed five consecutive steps, and when fully implemented, the proposed BSC approach using PLS approach will allow the following: 1.) It identifies the vision and strategy emphasizing only the essential performance indicators. The accent is placed on the fact that financial measures must be "balanced" with non-financial ones, coming from other strategic perspectives, 2.) It retains only the key performance indicators strongly correlated to the objectives of the strategic perspectives, while seeking to identify the series of actions that ultimately create the success of the company, 3.) It will generate the cause-and-effect chain between the strategic analyzed by portraying the optimal diagram of the company's strategy. 4.) It defines the organization's crucial competences, vital to the development and the improvement of the processes relative to its success and 5) Using the structural equations behind the PLS Path modeling technique, the approach permits the forecast of required actions in order to achieve progress or in order to adjust and recalibrate after an imminent harmful impact.

As displayed in Figure 3, the first step is related to the collection of all historic key performance metrics throughout the company. This first step is fundamental greatly influences the following steps. Although this appears a simple task, it actually involves a massive time assembling the measures employed in the organization, especially building a valid historic database. Applying this step in our Swiss example resulted in a total of 144 variables summarizing their evolution over 24 periods on a monthly basis.

Figure 3: Identifying and Collecting Company's Performance Indicators



Above figure shows an example of an organization with its various departments or divisions. After a careful analysis all performance measures will need to be identified and subtracted with the help of the main business owners.

Considering the significant number of indicators, the second step is associated with a final cleaning of the database (Table 1). As mentioned in the previous step, database preparation is essential as the collected

metrics could contain errors and might potentially pollute the findings. Accordingly, the variables should be characterized by (a) reliability and consistency, (b) same incidence in time, (c) ability to capture a fraction of the organizational strategy, (d) information singularity and (e) clarity and straightforwardness. This second step is realized through consistent analysis and intense top management discussions and will ensure that the retained variables are the essential drivers for the company. Following this step only 64 key performance indicators were retained.

Table 1: Example of Database Final Preparation and Cleaning

Strategic Performance Indicators Database

Time Series	Ind 1.1	Ind 1.2	Ind 1.3	…	Ind Zz.Yy
Month 1	x	x	X		x
Month 2	x	x	X		x
Month 3	x	x	xxx		x
…		x	X		x
Month n		x	X		x

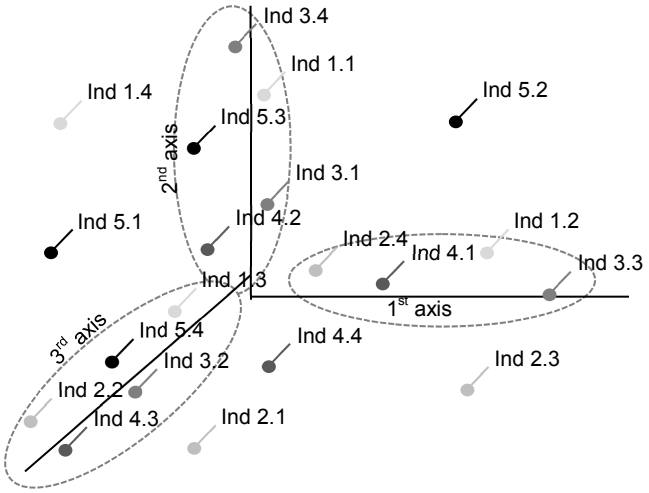
Missing variables *Unreliable variable*

This table exemplifies the cleaning of the database, where one performance indicator contains several missing values and another one that have unreliable data (e.g. due to a change in the measurement or the re-definition of the variable). These kinds of indicators should either be corrected (if possible) or, otherwise, completely excluded from the final database.

Although this rational managerial selection has been engaged, the organization continues to have a large KPI database, which is quite difficult to manage in the BSC construction process. As showed in Figure 4, the third main step is to filter and assemble the variables within specific axes (or strategic perspectives) able to summarize a part of the company's performance. There are three main achievements in performing this step. First is to generate the number of strategic axes encapsulating an suitable level of the total organization's performance, second is to filter each axis and keep only the key measures that are highly correlated, disregarding any redundant and inappropriate information and, third is to tag these groups of indicators by examining the nature of information that gravitates each strategic perspective.

Several existing statistical techniques are available to accomplish the forth step. Factor analysis and principal component analysis (PCA) can be used. Although different, the two methods are frequently confused. Factor analysis becomes similar to PCA if the "errors" in the factor analysis model are assumed to have the same variance. Principal component analysis can be employed for dimensionality reduction in a dataset by conserving those characteristics of the data that affect most its variance and by maintaining lower-order principal components and ignoring higher-order ones. Such low-order components regularly summarize the "most important" features of the dataset. Factor analysis on the other hand, is a statistical method applied to designate variability among analyzed variables in terms of fewer unobserved variables named factors. Factor analysis helps in identifying "factors" that explain a diversity of results on distinct tests.

Figure 4: Filtering the Performance Indicators Per Strategic Perspectives



Above figure illustrates the three main achievements in performing this third step: 1) generate the number of strategic axes (example shows 3 perspectives), 2) filter and retain only the performance indicators that are highly correlated (illustrated by the circles seizing only the relevant variables) and 3) label the groups of indicators by analyzing the information that gravitates each strategic perspective (for the sake of clarity the perspective names have been kept as 1st, 2nd and 3rd axis).

The PCA suits better our study requirement, as it is fitting for a non-predefined experimental model, while factor analysis is better for models that have a standard beforehand. As the statistical method employed (e.g. PCA) is processing historical data, the results of the research will be dependent on the data available at the time of compendium. However, the intention of our study is not to develop the best indicators, which sometimes could be driven from subjectivity and personal preference, but to actually highlight the importance of the measures available.

Conducting this step in the Swiss company example over the 64 performance indicators, one can clearly notice that with five components, approximately 67% of the total organizational variance is explained (Table 2). This percentage can be explained as the influence of the axes on the total performance: the higher this percentage, the more explanation it provides on the company's performance.

Table 2: Extract of Total Variance Explained

Component	% of Variance	Cumulative %
1	23.4	23.4
2	14.6	38.0
3	12.7	50.7
4	9.3	60.0
5	6.6	66.6
6	4.8	71.5

This table shows the extract of the first six components cumulating a total of 71.5% of the organization's variance. However, with only five components (grey highlighted line) and a total variance explained of 66.6% it is assumed to be sufficient to extrapolate to the total variance of the company.

The same PCA also provides the influence of the variables (indicators) against each of these five axes with the help of the component matrix determining the correlation of all variables with each of these axes. Table 3 illustrates the correlation of the first 10 normalized variables with each axis. The nearer a

correlation is to zero, the less the corresponding variable affects the axis. Finally, the variables will be ordered and filtered with respect to the correlation is has upon the axes.

The first 10-15 performance measures per axis are preferred for selection. They are ordered in function of their correlation with the axis. These measures offer a picture of the clustered information. As the variables are ranked by correlation, their descriptive capacity decreases when advancing in the ordered list. This basic selection assembles the performance indicators specific to one area of the organization. To be precise, a simple mathematical grouping will classify the strategic areas specific to the company. The ranking and clustering of variables by axis allows us to label and define them strategically.

Table 3: Extract of the First 10 Indicators from Component Matrix (normalized)

VAR no.	VAR name	1st axis	2nd axis	3rd axis	4th axis	5th axis
VAR001	Chiffre d'affaires net	0.835	0.031	-0.310	0.145	-0.273
VAR002	Chiffre d'affaires interne	-0.297	0.517	0.376	-0.185	-0.223
VAR003	Achats d'énergie	0.384	0.000	0.571	-0.472	0.345
VAR004	Résultat mouvements d'énergie (partiel)	0.932	0.132	0.064	-0.134	-0.133
VAR005	Autres produits d'exploitation	0.439	-0.622	0.227	0.232	-0.180
VAR006	Prestations activées	0.280	0.246	-0.611	0.187	0.397
VAR007	Prestations internes (produit)	0.170	-0.063	-0.673	-0.150	-0.188
VAR008	Produits d'exploitation	0.496	-0.583	0.026	0.229	-0.150
VAR009	Matériel & prestation	-0.455	0.629	-0.063	0.244	0.029
VAR010	Charges de personnel	-0.573	-0.101	0.350	-0.010	0.081

This table displays an extract of the first 10 performance indicators (out of the total 64 from the final database) with their respective correlation with each of the five components (or axis).

Even though statistically speaking the highest ranked measures are strongly correlated to the respective axis, one still needs to rigorously analysis the data and remove and/or replace those indicators that would not effectively support the definition of the perspective. While this procedure it is not mathematically corroborated, it is primarily intended to clear certain metrics that would violate the definition of the axis. The rejection or substitution of any performance measure must be well justified in support of the strategy defining the axes. In any economic environment (which by definition is uncertain), it is inappropriate to consider that all indicators correlated to the perspective in cause are also fully representative from a strategic point of view. Those performance indicators that do not describe the definition of the axis should not be selected in the final model as these might potentially corrupt the outcomes.

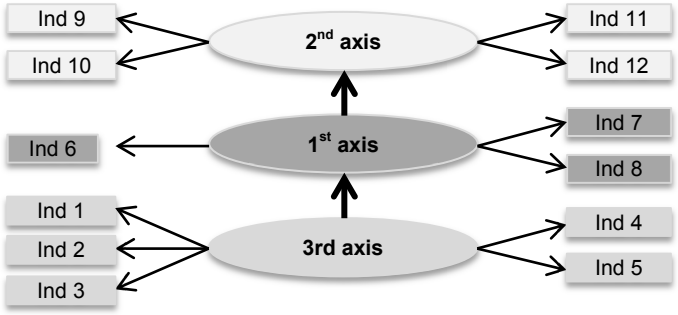
In order to maintain certain accuracy on the strategic perspectives, the final number of measures per axis should rarely exceed 10. This helps in better controlling and comprehending the final management tool. At the end of this third step, the organizational strategy from our chosen Swiss example was recognized to gravitate along five main perspectives: Finance Perspective, Internal Processes Perspective, Development and Growth Perspective, Support Perspective and, finally, the Quality Perspective each of them comprising 4 to 5 explanatory variables as explained in the next step.

Figure 5 illustrates the fourth major step in determining the current strategy of the organization is to apply a PLS Path Modeling regression on the final strategic perspectives. To determine the most sustainable cause-and-effect chain between the perspectives, all possible valid connections between these axes should be analyzed. The most stable PLS model from all possible combinations is the closest to the company's actuals strategy. The stability of the PLS model is determined with a bootstrap technique on each possible graph.

RESULTS AND MODEL VALIDATION

Applying the above fourth step to the specific Swiss example of this study, all possible valid connections between the five axes were analyzed, that is to say a total number of 52'720 possibilities. This step has been achieved using our educational software (PLS Assistant) that was developed and programmed from scratch based on PLS algorithms. Represented in Figure 6, the software is capable of selecting the most stable PLS graph from all valid arrangements. This diagram is the optimal structure of connections between the five strategic perspectives and turns out to be more representative than any other model, being the closest illustration of the actual organizational strategy.

Figure 5: Exemplification of a Cause-and-effect Chain Using PLS Path Modeling



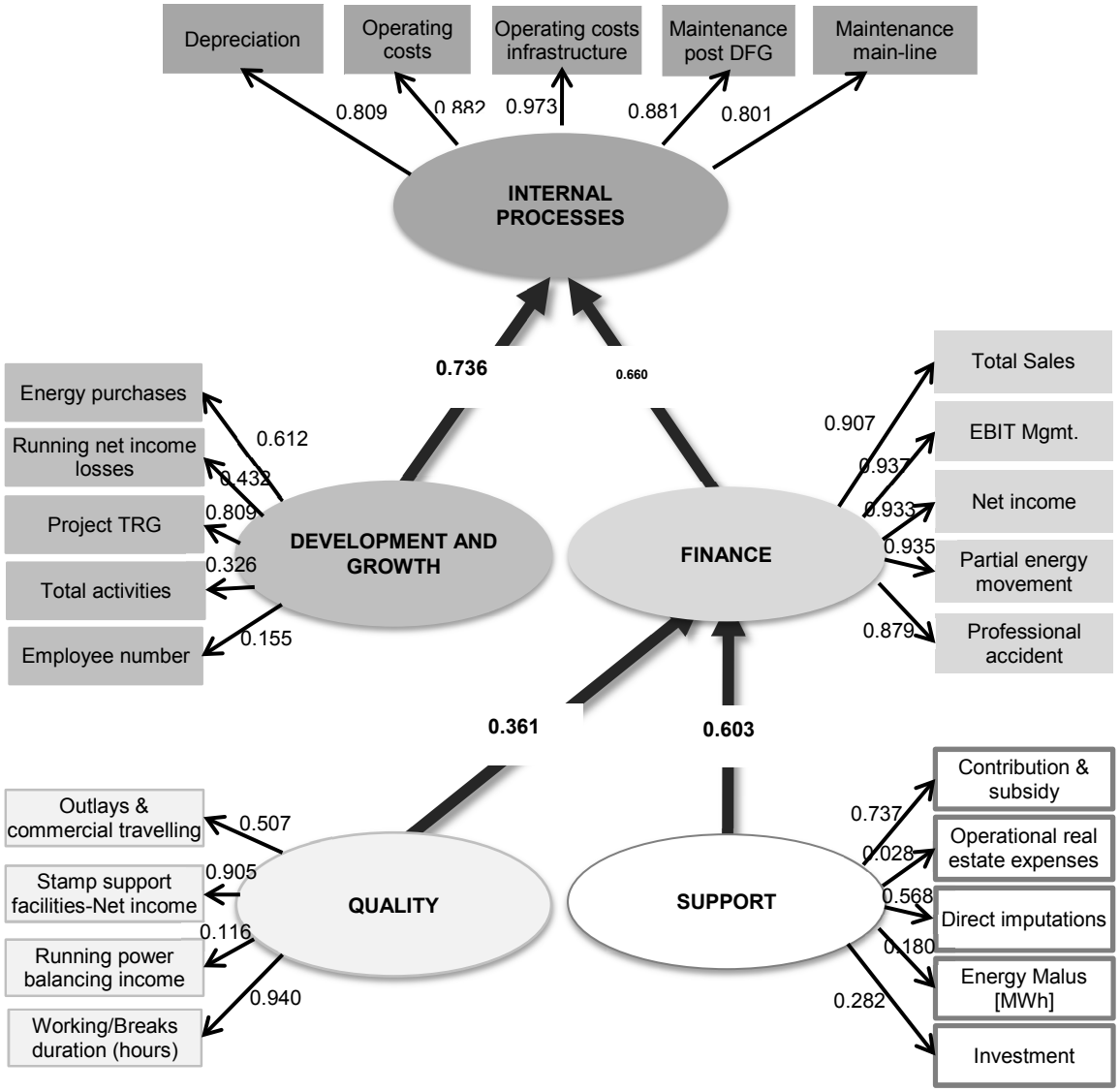
This figure illustrates three strategic perspectives together with their respective performance indicators linked in a cause-and-effect chain. The order of the axes is different to show that after the bootstrap technique is completed, the optimal model sequence might be different.

This assembly is the optimal structure of connection between the five axes and is more realistic than any other model - the closest to the actual organizational strategic vision. Contrary to Kaplan and Norton's BSC model, it was straightforward that this Swiss electricity company was not expected to have the angular stone characterized by the finance perspective. In fact, the company is an old and unhealthy institution lead by structural issues, with obsolete and inefficient equipment that erodes its competitive strength. The lead-management had to take some strategic decisions recently with the intention of restructuring their internal processes, by focusing on the financial and human aspects.

The finance perspective appears logically in this present strategy as a secondary, and hopefully temporary, objective. The financial indicators are strongly correlated with their axis, confirming their indirect contribution to improve internal processes. In a similar purpose, efforts are made in this Swiss institution to improve the quality of their services, but models tend to show in contrast that the support perspective has more impact on the financial axis. Lastly, the diagram emphasizes the emphasis on development & growth, support and quality in the present strategy.

When it comes to model validation from a statistical point of view (Table 4), the overall figures are assessing both measurement of the (outer) and structural (inner) model. As a general rule of thumb, to validate the outer model (measurement model), the Average Variance Explained (AVE) should be greater than 0.5 (Chin, 1998) and Composite reliability higher than 0.6 (Werts, Linn, and Jöreskog, 1974).

Figure 6: BSC's cause-and-effect Chain Using PLS Approach



The above illustration represents the optimal structure of connection between the four strategic perspective and is closest to the actual strategy of the organization. This final assembly was selected from all possible connections using the bootstrap technique, being the most stable PLS graph.

As for structural (inner) model validation, the best indicator is the R-square level. Values of 0.67, 0.33 and 0.19 are considered strong, moderate and respectively weak for the inner model valuation (Chin, 1998). The R-square have acceptable values for all perspectives being all in between the higher and medium thresholds.

As noted earlier, the inner and outer relations are founded on structural equations. Consequently, at the back of each PLS Path model are equations that explain the relationships between indicators and the corresponding axis (outer model equations) and between the axes or strategic perspectives themselves (inner model equations). The fifth major step is based on using these equations in order to study and predict the relations for the long term. From a practical viewpoint, there are significant benefits to doing this including that: 1.) examine the variance impact of one (or several) measures to the whole model; 2.) predict the strategic changes by looking at the relations between the strategic perspectives; 3.) visualize and manage both direct and indirect changes needed for an important change in the organization‘s

strategy; 4.) simulate the impact of resources allocation decisions on the future performance, thus complementing the traditional budget approach.

Table 4: PLS Model Validation Criteria

	AVE	Composite reliability	R-square	Redundancy index
DVLPMT & GROWTH	0.569	0.719		
FINANCE	0.842	0.864	0.658	0.402
INTERNAL PROCESSES	0.759	0.840	0.546	0.361
QUALITY	0.550	0.619		
SUPPORT	0.542	0.673		

The table is summarizing several validation criteria for the selected PLS graph. The AVE and Composite reliability are used for the measurement model validation (or the outer model, that is to say the relationships between the latent variables with its observed variables) and the R-Square and Redundancy index are employed to validate the structural model (or the inner model, thus the relations between the endogen and exigent latent variables)

Toward an Assisted Scenarios Simulation

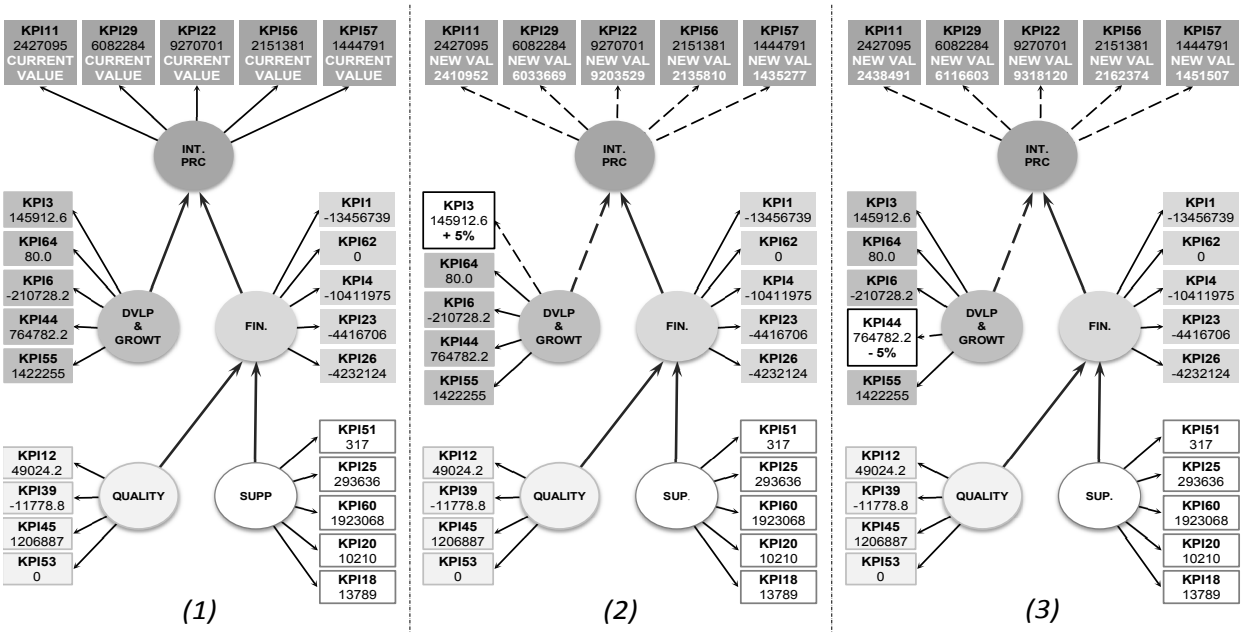
In any management-controlling field centered on strategic decisions, it is obviously appealing for the organizations to use Partial Least Square to simulate and measure impacts of strategic indicator variations over the rest of the model. With this kind of a tool, the manager can forecast the behavior of his current strategy, sorting the potential future of his organization into a couple of scenarios with the possibility to study the impact of each of them over the rest of the structure.

In estimating its coefficients, PLS uses algorithms having elements in common with both linear regression and LISREL. Similar to regression analysis, the PLS works with the variance of the individual data item derived from the means. When partialled out, the variance for the entire model via iterative analysis, PLS resembles LISREL. In fact, this latter characteristic allows the model to be categorized as a SEM technique (Gefen, Straub & Boudreau, 2000). Therefore, for many data analysis issues, estimates of the linear relationships between variables are adequate to describe the observed data, making them reasonable predictions for new observations. From this perspective, PLS is generally referred to as a "prediction oriented approach" (Sellin, 1995) statistically outperforming simple benchmark models (Cengiz & Herwartz, 2009).

Working with data provided by companies with many explanatory variables and comparatively little sample data is a statiscally specific area where PLS proves to be useful in constructing prediction equations (Hoskuldsson, 1988). The model founded by bootstrapping comparison has good quality scores to to forecast variation of indicators. This variation should be rather small, otherwise the whole model weighing/loadings lose too much consistency to be faithfully used. In addition, as any statistical tool used, the prediction model should be considered more as trends rather than exactly future relevant values.

Using the PLS equations, a "simulation view" has been implemented in our PLS Assistant software in order for the manger to test the impact an indicator modification can have on the overall model (Figure 7). This exclusive feature of the PLS Assistant software allows managers to forecast different scenarios.

Figure 7: PLS Assistant 2.1 Simulation UI Presentations (1), Impact of different Scenarios Study (2&3)



Above graphs exemplifies a "simulation view" of future indicator changes if one measure is changed. Scenario 1 is the current BSC illustration as initially found after the PLS bootstrap techniques. In scenario 2 we increased KPI3 by 5%, whereas is scenario 3 we decreased KPI44 by 5%. Dotted lines illustrate the repercussions and new values for the performance indicators can be noticed in Internal Processes perspective.

Keeping notations values seen in Figure 1 and applying the forecast technique, the final equation is:

q_{ij} : Present value of the indicator
q'_{ij} : New value, simulated or chosen

$$q'_{31} = \left(\frac{q'_{21}}{q_{21}} - 1\right) * \frac{w_{21}}{\sum_{k=1}^{4} w_{2k}} * \frac{\beta_{22}}{\sum_{k=1}^{2} \beta_{k2}} * \frac{w_{31}}{\sum_{k=1}^{2} w_{3k}} * q_{31} \qquad (3)$$

However, one should keep in mind that any company takes time to recalibrate from any change or crisis situation. Any change in the organization's strategy should be completed in a pondered and controlled way. Furthermore, it should be noted that a pubic detained organization cannot be revolutionized or radically transformed as a private-owned company might be. The example used in this study refers to an electricity institution that has strong connections with the local public authorities, thus her status is borderline between these two concepts.

CONCLUDING COMMENTS

The research goal of this study was to develop and empirically validate a comprehensive framework that bridges a Balanced Scorecard model with a Structural Equation Modeling approach and endorses a modern understanding of aspects underlying the actual strategy, with the intent of better manage and control the corporate performance.

The fundamental step towards this objective was the development of a general frame of reference that harmonized previously contradictory theoretical assumptions associated with the Balanced Scorecard as well as with its ease of implementation. On this basis, the suggested framework is embracing several main concepts: 1.) tackles the issues of strategic vision of any company and converts the current strategy into an easy-to-use model for better integration, communication and long-term management, 2.)

highlights the key performance indicators that have the capability to capture the most relevant information from the organization, information that is strongly linked to the actual goals the company is aiming for, 3.) assembles distinctive strategic perspectives that summarizes organizational information in an appropriate way, in order to create a thorough illustration driving institutions on their road to success, 4.) establishes the relations between strategic perspectives in a cause-and-effect chain that underlines the interactions taking place at a strategic level, helping in emphasizing the organization's advantages and weaknesses and 5.) overcomes the static aspect of prior models disclosing the dynamic evolution over time by employing mathematical PLS equations, refining the planning and control of the main components within a company.

The main purpose of this paper was to examine the Kaplan and Norton BSC theory compared to a more pragmatic approach. Having established the strategic research framework, we empirically validate the proposed methodology by developing a strategic map in the context of a Swiss electricity organization. The results suggested that the BSC issues could be formalized in a more rigorous manner. It is thus possible to reconsider the notions advanced by Kaplan and Norton as showed in the analysis of this case.

The application of PLS Path Modeling converts the current strategy into a cause-and-effect model that can be monitored and controlled using a handful of main performance indicators. One might argue that by handling historical data, the model summarizes outdated information by illustrating a picture that cannot be exploited to predict future planning. While this concern is legitimate, the methodology is actually identifying the current strategy applied by the institution. Only by fully recognizing the actual situation one can plan for the period to come. The PLS regression is more suitable for maximizing prediction, thus the model is also capable of revealing the forecast strategy of the company. In addition, this approach permits the simulation of the resource allocation impact on the organization's overall performance. Finally, these managerial tools are applied in a moment of major need for strategic change in the company. The use of this approach acknowledges not only the recognition of the chain of causality between different strategic areas of the corporation's performance, but also reinforces the intuition with "a measure of the measures".

The necessary conditions for the proposed methodology are relatively constraining. It is essential to have an adequate number of indicators together with a consistent historical sample of data. Additionally, the real value of BSC lies more in the distribution and the understanding of the strategy at all levels within the organization. Therefore, this involves strong communication, interpretation and analytical skills.

We aimed to have high objectivity in our methodology. For both data collection and data analysis, some variables may have been biased by personal views. Our approach can be impartially applied. However, in practical terms a level of flexibility, that cannot be mathematically verified should be considered.

Even if the model founded with the current technique is robust, the PLS equation affiliated are no longer efficient if the scenario tested involve too much variations and thus loses its predictive strength. However, our tests with an alteration up to 50% show no radical change to the whole model robustness. Nevertheless, within the framework of our study, we limited the possible variation at only one indicator at a time and the variation did not exceed 5%. One should also note that the results found using the PLS simulation are trends and should not be treated as precise forecast values.

The Partial Least Square (PLS) technique will likely grow in usage in the coming period, as it is significantly less difficult to understand than the covariance-based methods when it comes to identifying a model and explaining results. However, PLS involves higher complexity for explaining loadings of the independent latent variables. Since the distributional characteristics of estimates are not recognized, the researcher cannot assess model significance with the exception of bootstrap induction. Additionally, being a new statistical technique, there are few commonly agreed thresholds for the model validity and

stability. Nevertheless, we used the small number of tools available for PLS Path Modeling approach, tools frequently employed in other PLS studies found in the specialized literature.
Based on the findings from our study, further research may have a higher degree of complexity and dynamism. The more insights are achieved into the "mechanics" underlying performance, the more individual models can be developed with the suggested method. It would be beneficial to apply our research framework to other industries or countries. The framework could be particularly valuable for analysis of other industries such as media, telecommunications and high tech. Increasingly, industries are characterized by a changing and challenging environment. It is time to change old and traditional tools with a more realistic approach to analyzing performance. A comparison of the results of such an analysis with the findings of this study could conduce to a higher validity and generalizability of the approach.

It is relevant to develop a more formal methodology to validate the organization's strategy in a rational way, while using a simplified model. Indeed the PLS method suffers from a deficiency of theoretical foundation. Similarly, Kaplan and Norton's approach was criticized in the specialized literature from this perspective as well. The difficulty with which future researchers will be challenged lies in the compromise between the pragmatism required by corporations and the need for the theoretical framework requested by researchers.

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MANAGEMENT TEAM CHARACTERISTICS: EVIDENCE FROM UNIVERSITY GOVERNANCE AND SCHOOL PERFORMANCE

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ABSTRACT

The paper examines cognition from the viewpoint of internal management teams of private universities against satisfaction with school performance, applying the SEM model. Empirical results show that the board's operational effectiveness and attendance rate for internal important meetings held on campus have a significantly positive relationship with implementing effectiveness and satisfaction with school administrative performance. The satisfaction with school administrative performance and school performance satisfaction showed a significantly positive relationship. The attendance rate for important internal meetings held on campus, the implementing effectiveness, and school performance satisfaction showed a significantly negative relationship. However, the intermediary effect enhances school performance satisfaction to achieve a positive effect, indicating the cognitive level of satisfaction for school administrative performance impacts school performance satisfaction.

JEL: I20, I29, C39

KEYWORDS: University Governance, School Performance, SEM model

INTRODUCTION

Development of information technology in the past ten years, changes in the socioeconomic environment, and competition among universities, have resulted in pressure for Universities to reform (Shattock, 1999; Amoral and Magalhães, 2002; Chevaillier, 2002; Salter and Tapper, 2002; Melo et al., 2010). Although the government has not abandoned control over higher education, it has changed to taking a supporting role. Governments encourage universities to take initiative through a more indirect approach in order to achieve the target efficacy and efficiency as well as the changes in social demand (Goedegebuure et al., 1994).

Governance is the structure and process which forms decisions in higher education (Sporn, 2006) University governance is further divided into external and internal governance mechanisms. External governance is mainly the supervision of universities and colleges from the Ministry of Education (MOE) and the specification of university laws. Currently, university laws specify that the selection of public university presidents should take place 10 months before the expiration of the term of the existing president. The school forms a president selection committee to choose the president through a public recruitment process, with the committee recruited by the MOE or subordinate local government. Presidents of private universities are chosen by a selection committee organized by the Board of Directors. The selection is submitted to the MOE for approval and recruitment. The internal governance mechanism is determined by the relationship between academic affairs meetings, board of directors, and the president. The academic affairs meeting is the highest decision-making meeting in the university. This decision model prevents arbitrary decisions. Although intentions are good, the actual implementation could cause unknown responsibilities and powers in the university as well as ineffectiveness (Chen Weizhao, 2002).

This paper examines internal university governance to discuss the relevance of the university governance mechanism for school performance. The university governance mechanism and school performance use recognition from supervisors of administrative and academic departments toward the operations of the university governance mechanism. It uses school performance in the internal management team of the university. School performance is the exhibition of school quality, which is therefore evaluation with

more objective measuring standards and multi-dimensions. The study applies dimensions such as administrative performance and external performance to evaluate the performance of universities. LISREL is the confirmed linear structural relation (LISREL) and combines factor analysis and path analysis. This technique can concurrently process the causality between multiple dependent variables and independent variables. This study applies SEM (Structural Equation Modeling) to verify the research assumptions for the efficacy of board of directors, meeting effectiveness, administrative effectiveness, administrative performance satisfaction and the variables of external performance satisfaction. This provides a reference for the establishment of university governance mechanisms and agencies of education based on objective empirical results.

The remainder of this study is organized as follows. In the next section, a literature review and hypothesis development is presented. The following section has an introduction to the study's methodology, along with a description of our sample and variable measures. The empirical results are then presented, and conclusions and implications are provided in the final section.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

University Governance

University governance includes external and internal governance; the former emphasizes the school and external stakeholders, including the relationship among the government, industry, and communities. The latter is concerned with the power distribution within the school, the decision-making process, and intentions. When the substantive and procedural degree of autonomy in universities remains sufficiently high, external stakeholders are unlikely to interfere with the university affairs. In contrast, when the substantive autonomy of universities remains low, universities are more likely controlled or interfered with by external stakeholders and autonomy is constrained by procedures (Dai Xiaoxia, 2007).

University governance aims to facilitate university development, assure effective innovation, pass on knowledge, and enhance education quality and competitiveness, in order to cultivate talents needed by society and to provide services for the society. The concept of university governance stresses that each university is obliged to pursue diversity and excellence under its criteria and environment, to develop outstanding education characteristics (Huang Zhengjie, 2008). Cheng Weizhao (2002) suggested that external governance mechanism, in terms of future development in university governance, refers to the incorporation of public universities and the repositioning of the relationship between the MOE and the universities. The internal governance mechanism is adjusted to the internal operational mode of universities by establishing a responsible-power-consistent decision-making system.

Stakeholder theory is about organizational management and commercial ethics, which is used mainly for solving ethical and value issues in organizational management. Stakeholder theory claims that all stakeholders must participate jointly in governance. The corporate manager must develop a strategy meeting the needs of different stakeholders in order to maintain sustainable development (Freeman, 1984). The Association of American University Professors constructed a joint governance theory based on the board of directors, administration, and faculty, which is based on stakeholder theory (Li Fuhua, 2007).

University Governance Mechanism

The basis of laws and regulations for university governance (ROC) is the private school law. According to Article 31 of the ROC, the board of directors meeting shall be convened in accordance with the Articles of Association. Article 41 of ROC specifies: "The president shall process the academic affairs in accordance with the laws and articles of association to execute resolutions reached by the board of directors, who are subject to the supervision and assessment on behalf of the school within the scope of job tasks." The specification of private university law shows that the governance structure of private universities is similar to company governance with the exception of shareholder meetings. Private universities treat the board of directors as the decision-making agency while the president serves as the

general manager of a company. The president executes academic affairs and is held responsible for school performance.

School Performance

The implementation of university governance must be operated through the school organization framework, and therefore school performance is also exhibited through operation of the organizational framework. Performance refers to measurement of the degree of achievement for organizational objectives, using indicators and measurement methods to present the degree of achievement for plans in terms of mission, objectives, and purposes (Duquette and Stowe, 1993). It could also reflect behaviors taken by individuals to achieve organizational objectives, guiding the resource allocation of the future organization (Campbell, 1990). The measurement indicator of performance is no more than efficiency, efficacy, and quality (Browning, 1997; Elizabeth, 1996; Donna, 1996). Running a school with efficacy not only requires appropriate curricula and sufficient equipment but also skillful teachers. The efficacy of the president can affect teacher efficacy and teacher efficacy will directly affect student efficacy (Wu Qingshan, 1998). Chang Kuopao (2003) divided the factors of school efficacy into 1. Education Objectives: School vision, education objectives, development and planning of key and characteristics. 2. Education Input: Education resources, strategies, courses, organization, environment, and supportive growth. 3. Education Process: Leadership, teaching, research, development, marketing, mobile solutions, learning atmosphere, teacher-student participation, and interaction, school, parent and community relationship. 4. Education Output: School efficacy, reform, progress, and performance, teacher efficacy; teaching quality, work satisfaction, student efficacy; learning behavior, quality of learning performance, and administrative efficacy; legalization, efficiency, administrative communication, and presidential leadership.

School performance requires additional evaluation mechanisms in addition to the measurement of internal administrative management system. The purpose of higher education assessment is to enhance the teaching, research and management quality of higher education institutions, which can be divided into internal and external assessments. The purpose of internal assessment is to establish the self-control mechanism to improve the education quality of the institution. External assessment, on the other hand, requires an external group or team to execute the assessment based on external certification or accrediting requirement, in order to comply with the performance requirement as the main purpose (Su Jinni, 1997).

The Higher Education Evaluation & Accreditation Council of Taiwan (hereinafter referred to as HEEACT) accepts a commission from the MOE to conduct an evaluation to enhance quality in higher education. Based on the premise of university autonomy and separation between evaluation of academic affairs and subject professional evaluation, the evaluation works includes: (1) Evaluation of Academic Affairs: evaluation of academic affairs adopts a quality audit system to assist the universities with the planning and implementation of a university self-evaluation mechanism in addition to reviewing the self-evaluation report submitted from all schools. (2) Evaluation of Departments and Colleges: The evaluation methods include self-evaluation and peer in-field visit evaluation, followed by visiting evaluation committees to judge the accredited status of department quality. The accreditation status is divided into "passed," "to be observed," and "failed." (3) Performance Statistics Analysis: The university performance statistics emphasize the performance output of universities with focus on both quality and quantity, as well announcing in priority ranking. The purpose aims to recognize quality universities with excellent performance (HEEACT, 2010).

The evaluation of vocational colleges is commissioned by the Ministry of Education to the Taiwan Assessment and Evaluation Association (TWAEA) for organization. Assessment results are divided into administration, professional colleges and professional departments for announcement. The assessment results are divided into "Class 1 (Excellence), Class 2 (Good) and Class 3 (To be improved)." To continue the follow-up of assessment of subsequent teaching quality improvement for various schools, the three assessment classes for departments (colleges) organize the counseling visits and follow-up assessment, while other schools re-organize comprehensive assessment for other schools in 4 years (TWAEA, 2005).

Due to international competition and poor domestic finance, the Ministry of Education applied its limited resources to universities with the most potential for development to maintain quality in higher education by formulating competitive educational funding. Universities compete in the evaluation and the schools that outperform others receive grants (Liu Arong, 2009). Competitive research funds can only be allocated according to school performance using assessment classification (Gai Zhesheng, Liu Xiuxi, 2006; HEFCE, 2000). To guide the university with classified development, the MOE corrected university inclination toward over emphasis on research and less on teaching by improving the teaching quality in universities. The Ministry started implementing the application for "Incentives for University Teaching Excellence Program" (hereinafter referred to as Teaching Excellence Program) in 2004 and announced the awarded schools and grant amounts in 2005. The MOE follows the development overview of the school and their program when giving teaching excellence program grants determined through in-field visits from the committee. Hence, whether if the universities are awarded with grants and the amount of grants, are regarded as the evaluation results from the Ministry of Education towards the development research or teaching from the school. Hence the Teaching Excellence Program grant can be used as the objective standard for evaluating school performance.

Coccari and Javalgi (1995) summarized the literature on how students choose schools through explorative research and proposed 20 determinants: faculty quality, course level, tuitions, convenience in life, teaching quality, curriculum arrangement, school locations, student-faculty ratio, faculty-student interaction, scholarship, admission permit, teaching equipment, course counseling, sport class, employment services, university libraries, computer equipments, health insurance service, barrier-free environment, and campus safety. It is clear the factors students take into consideration diverse. Changes in student numbers can explain the comprehensive results The changes in recruitment and student numbers are the focus of attention for universities under the currently competitive environment. For this reason, this study applies the effectiveness of school recruitment as the external performance index for measuring the school performance of schools.

This study consists of the supervisors of the internal administrative units and the teaching units of the university and their cognition to the university governance system operation and school performance. Such dimension divides school performance into two aspects, including MOE grants and assessment projects as well as the recruitment effectiveness.

University Management Team and School Performance

The next sections discuss the cognition from the supervisors of the administrative units and academic units inside the school toward university governance mechanism operation and the relevant school performance.

Administrative Performance

In addition to BOD supervision, the internal administrative operational effectiveness of private universities take into consideration university governance in terms of confirmation, decision, and resource allocation of the university internal values, mission, and objective, authorization and hierarchical system model. It also considers the different academic fields inside the university, and the relationship with external units such as government, enterprise and communities (Edwards, 2003). University governance is the framework and process of authorized decision-making, which has equivalent importance for the intrinsic and extrinsic university stakeholders (Gayle et al., 2003).

According to stakeholder theory, all involved with interests should jointly participate in governance. The interested affiliated persons to the university can be divided into four layers: 1. First Layer: Core stakeholders, including faculty, students and administrators. 2. Second Layer: Important stakeholders, including alumni and financial allocation. 3. Third Layer: Indirect stakeholders, including affiliated person having contract with the school, such as the scientific research fund providers,

industrial-university cooperation, loans providers. 4. Fourth Layer: Marginal stakeholders, including the local communities and social public (Boatright, 2002). Birnbaum (1991) suggested that in school governance, the senate is efficient, depending on the type of organizational model the university is attributed to. These findings suggest the influence of university administrative performance is subject to the administrative effectiveness of the administrator, while the effectiveness of teachers participating in administration is affected by the effectiveness of various meetings held in universities.

In sum of the aforementioned, the major stakeholders of administrative performance satisfaction consists of faculty and administrators related to core stakeholders, because the members participating in decision and meetings in school consists of teachers and school administrative supervisors. The following hypotheses are drawn: The school BOD is the highest decision-making authority with supervision over key school issues such as development in academic affairs, financial management, fund implementation, and president school effectiveness. The BOD have influence on the administrative performance through the president's execution of academic affairs. Hence, the administrative performance satisfaction is subject to influence from the BOD effectiveness, meeting effectiveness, and administrative effectiveness. Administrative satisfaction is measured on two dimensions: administrative operation satisfaction and meeting effectiveness satisfaction. BOD effectiveness is divided into planning and degree of investment required from the BOD for the development of academic affairs and financial management, as well as the administrative supervision on the academic affairs. Meeting effectiveness is divided into procedural performance of important meetings, attendance rate and the efficacy of president hosting the meetings. Administrative performance is divided into degree of requirement for the effectiveness of administrative affairs in individual administrative supervisors and other administrative supervisor.

H1: The BOD effectiveness has direct impact on the administrative performance satisfaction

H2: Meeting effectiveness has direct impact on the administrative performance satisfaction

H3: Administrative effectiveness has direct impact on the administrative performance satisfaction

Administrative Performance Satisfaction and External Performance Satisfaction

The quality of school performance requires an external evaluation mechanism apart from the measurement of internal administrative management systems. Under the certification or accreditation requirement, external assessment is conducted by external groups or teams in compliance with the performance requirement (Su Jinni, 1997). School performance is measured by external evaluation mechanism. School performance in this study is defined as external performance that includes assessment performance, MOE grants and teaching excellence grants and recruitment effectiveness. To promote the development of various universities, the MOE should periodically organize the assessment and announce the results as the reference for government grants. Hence, the assessment mechanism of MOE undergoes involves an in-field visit and evaluation of universities through professional assessment agencies, prepared in the form of assessment report. The administrative performance satisfaction for each school not only affects the smoothness of daily operations of academic affairs but also the effectiveness of in-field assessments. Hence, the administrative performance satisfaction affects the assessment of external performance.

The main personnel related to administrative satisfaction consist of faculty and administrators because members participating in decision-making and meetings in school include faculty and on-campus administrative supervisors. Administrative performance satisfaction is subject to influence from BOD effectiveness, meeting effectiveness and administrative effectiveness. External performance such as the MOE grant and assessment project evaluation provide a basis for fund allocation and evaluation through the various assessment mechanism. The recruitment effect is the index for comprehensive school performance. Moreover, external performance satisfaction is affected by administrative effectiveness inside the school. School administration is subject to monitoring from the school BOD and supervision from competent authorities, which could be represented or affected by administrative performance

satisfaction. Hence, the study further examines the intermediary effect of administrative performance satisfaction in addition to exploring the direct impact from individual variables. The following hypotheses are examined:

H4: Administrative performance satisfaction will have direct impact on external performance satisfaction

H5: BOD effectiveness has a direct impact on external performance satisfaction
H5-1: BOD effectiveness through administrative performance satisfaction has a direct impact on external performance satisfaction

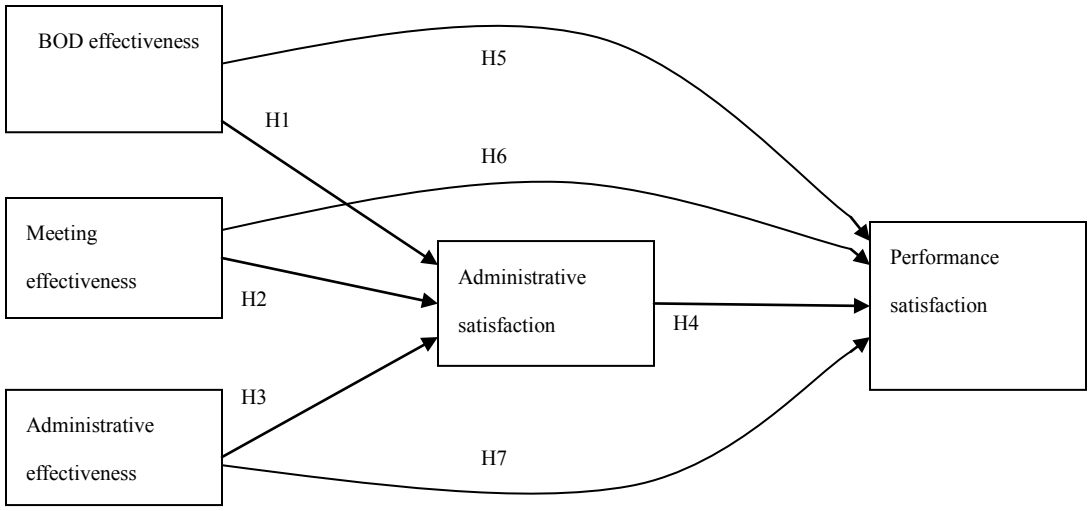
H6: Meeting effectiveness has a direct impact on external performance satisfaction
H6-1: Meeting effectiveness, through administrative performance satisfaction, has a direct impact on external performance satisfaction

H7: Administrative effectiveness has a direct impact on the external performance satisfaction
H7-1: Administrative effectiveness, through administrative performance satisfaction, has a direct impact on the external performance satisfaction

The Study Framework of University Management Team and School Performance

The study framework shown in Figure 1 is constructed from research hypotheses H1 to H7. The study applies corporate governance and university governance. The first section discusses the BOD structure and operations as well as school performance relevance in private universities. The study also analyzes the establishment of schools and correlation between the different BOD models and structures. The second section discusses the cognition of supervisors from administrative and academic units toward the university governance mechanisms operation and school performance. The former applies more objective data to analyze the structure and operations of private university BOD and school performance relevance, while the latter applies the views from internal unit supervisors toward the university governance mechanisms operation and school performance.

Figure 1: The Relevance Research Framework between the University Management Team and School Performance



This figure shows the research framework of this paper and the relevance between the university management team and school performance.

DATA AND METHODOLOGY

The hypothesis testing capability of SEM and the exclusion of independent variables with significant liner coincidence involves one variable as the dependent variable of another variable and coincidentally the independent variable of other variables. This allows the analysis of more complex casualties than regular path analysis (Joreskog and Sorbom, 1993). SEM can be tested through Chi-square tests to verify the fitness between the overall theoretical model and data. Testing through the significance of a specific path through the t value or the sequential chi-square difference test is also possible. SEM consists of two parts. One is the descriptive latent variables without being able to be directly observe the structural equation model between each other. The other is the measurement model between the manifest variables directly observed to describe the latent variables (Hair et al., 1998). To incorporate the research framework, the latent exogenous variable is preliminarily defined as the BOD effectiveness (ξ_1), meeting effectiveness (ξ_2), administrative effectiveness (ξ_3), and latent endogenous variable into administrative satisfaction (η_1) and performance satisfaction (η_2). Latent exogenous variable (X) and latent endogenous variable (Y) combine theories and interview experiences to develop the 7-point Likert scale questionnaire with the survey. The operational definitions of variables are described below:

The school BOD acts as the decision-making center, where the chairman executes the academic affairs and is held responsible to the BOD. University faculty must focus on their foremost important task: providing high-quality teaching and generating high-quality scholarship (Middaugh, 2001; Trow, 1996). BOD effectiveness refers to supervisory operations of academic affairs and administration, including specified planning, investment, financial management, and requirements for effective fund implementation and teaching and research efficacy.

Meeting effectiveness refers to the execution of important school meetings while the academic affair meeting refers to the necessary meetings stipulated by University Law. The academic affairs meeting is the ultimate decision-making meeting inside the universities. With the exception of academic affairs meetings, the study discusses other important meeting including administrative meetings, budget meetings, staff consultative committee, and student recruitment meetings. The attendance rate of personnel related to the meeting, meeting efficiency, and the effectiveness of resolved projects execution are applied in the testing of meeting effectiveness. The chairperson usually serves as the key individual of important school meetings to implement school concepts. Hence if president hosting can guide the meeting resolution as well as the efficiency and effects of meeting hosting, become the variables of discussion for this study.

Administrative effectiveness refers to whether school administrators meet the requirements for administrative performance in processing general procedures of administrative affairs. The degree of individual effort invested in organizational tasks reveals work performance including: follow standard operating procedures, overcome barriers, provide mutual supports and assistance when other peers encounter problems, complete work following the instructions, to be equipped with dedicated and responsible attitudes, and emphasis and abidance with matters related to safety and health in work (Borman and Motowidlo, 1993). The evaluating index for performance includes efficiency, efficacy and quality (Browning, 1997; Elizabeth, 1996; Donna, 1996). Hence, administrative effectiveness includes individual administration, execution effects, and self-requirement in coordination with other departments. Administrative requirement refers to the supervisor's cognitive attitudes towards other administrative supervisors engaged in school administrative affairs.

Administrative satisfaction refers to satisfaction with school administrative performance, including administrative operating satisfaction and meeting effect satisfaction. The administrative operations refer to the evaluation of administrative efficiency, effectiveness and the rationalization of fund use; whereas meeting satisfaction refers to the satisfaction with various important meeting effects.

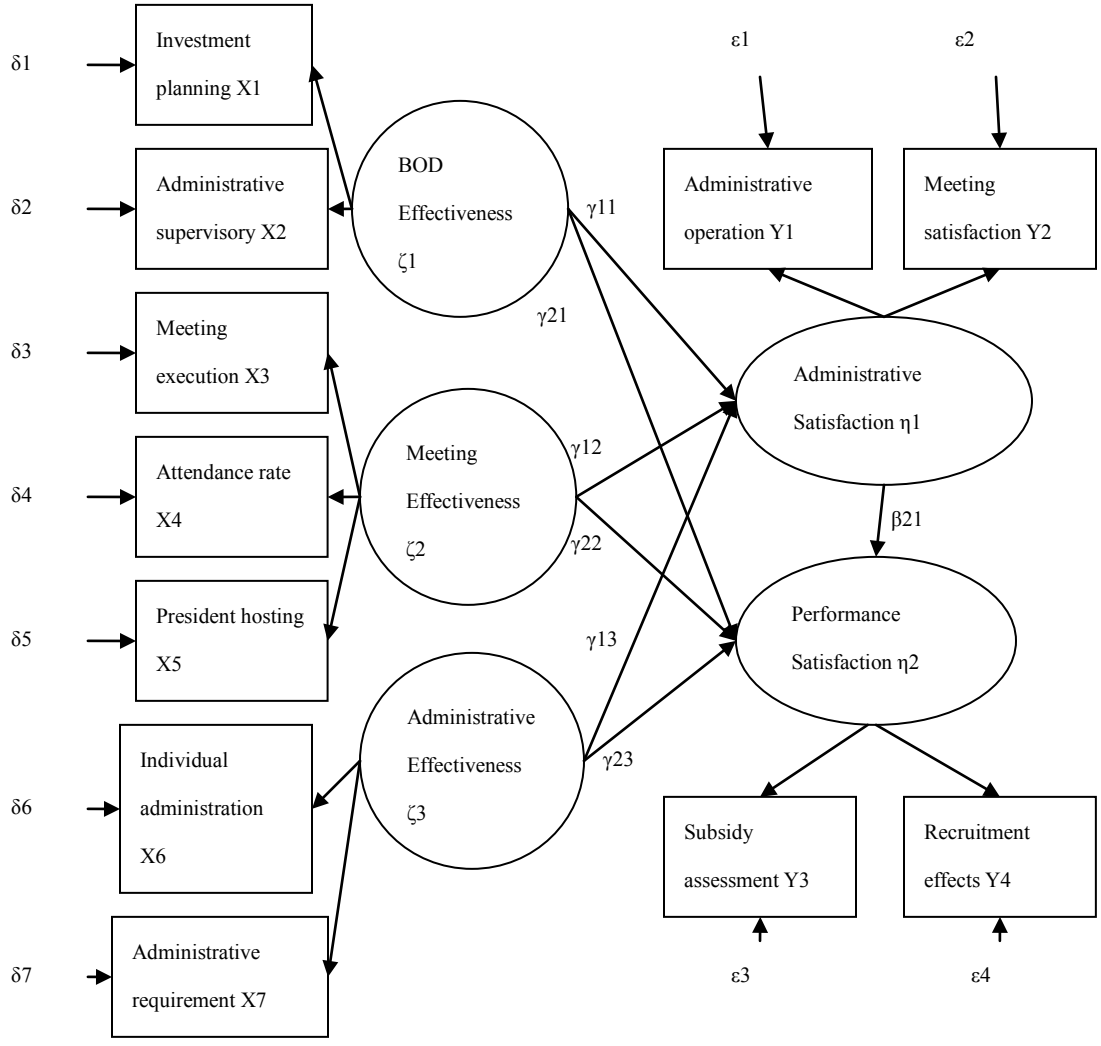
Performance satisfaction refers to schools accepting assessment results, the Ministry of Education Grant and satisfaction with student recruitment performance, including subsidy assessment and recruitment

effects. Subsidy assessment refers to the latest school assessment results and the satisfaction to this year's Ministry of Education subsidy and teaching excellence grant. The student recruitment effect refers to the satisfaction to the results of student recruitment.

The research objects of the survey consists of BOD members in private universities including the directors and BOD secretary, as well as the academic and administrative supervisor such as the chairman, vice chairman, dean of academic affairs, dean of student affairs and dean of general affairs, college deans, chief secretary, other class one supervisors, and college directors. The operational modeling for university governance mechanism and school performance are shown in Figure 2.

The sample includes a 97 schools in the 2010 academic year including 33 general private universities, 3 general private colleges, 34 private technology universities, and 27 private technical colleges. Thirteen schools were randomly sampled for pre-testing, including 6 private universities (Tunghai University, Feng Chia University, Hu Jen Catholic University, Chinese Culture University, Asian University,

Figure 2 the Operational Model for University Governance Mechanism and School Performance



This figure shows the SEM Operational model for university governance mechanism and school performance of this paper.

Chang Jung Christian University) and seven private technology universities (Chia Nan University of Pharmacy and Science, St. John's University, China University of Technology, Chaoyang University, Southern Taiwan University, Transworld University, Overseas Chinese University). To improve the recovery rate, the survey was mailed and handed out with assistance from the staff in relevant schools. Pretest questionnaires were issued and recovered between early July and mid-August 2011. A total of 168 questionnaires were issued and 88 recovered providing an overall response rate of 50%. Fourteeen questionnaires were excluded for incomplete answers for analysis. Hence, the total of valid questionnaires for analysis was 74. The pre-test questionnaire was subject to confirmatory factor analysis. The analysis referred to the comments provided by respondents from the pre-test questionnaires and the overview of the current school supervisors participating in the BOD, to modify the questionnaire and develop formal questionnaires for further analysis and discussion.

The formal questionnaires were issued and recovered between October and December, 2011. The questionnaires were distributed to academic supervisors, administrative supervisors and BOD members of 97 private universities. Each school was limited to 25 questionnaires. If the school contains less than 25 administrative and academic units, the subjects include all supervisors of administrative and academic units. BOD members were limited to 3 questionnaires per school. The questionnaires were delivered by post service, a total of 2,644 questionnaires were issued and 662 were recovered with a recovery rate of 25%, deducting the 43 questionnaires that were incomplete for analysis and elimination of 228 questionnaires with excessively high-consistency. Hence the final sample includes 391 observations.

To ensure the representativeness and integrity of questionnaire content, instructors taking part-time administrative work offered comments for revision and the questionnaires were modified according to the results of pre-test questionnaires respondent comments, to develop formal questionnaires in compliance with content validity. The questionnaires adopted the Likert scale. To determine the reliability of the questions Cronbach's α coefficient was calculated. For this measure 0.8 reliability coefficient implies high reliability and 0.7 indicates acceptable reliability (Wortzel,1979). Table 1 shows the Cronbach's α coefficients fall between 0.777~0.916, indicating the variables are in line with internal consistency.

Table 1 Reliability Analysis of Measurement Variables

Latent variables	**BOD Effectiveness ζ1**		**Meeting Effectiveness ζ2**			
Manifest Variables	Investment planning	Administrative supervisory	Meeting execution	Attendance rate	President hosting	
	X1	X2	X3	X4	X5	
Cronbach's α	0.839	0.868	0.916	0.821	0.820	
Latent variables	Administrative Effectiveness ζ3		Administrative Satisfaction η1		Performance Satisfaction η2	
Manifest Variables	Individual administration	Administrative requirement	Administrative operation	Meeting satisfaction	Subsidy assessment	Recruitment effects
	X6	X7	Y1	Y2	Y3	Y4
Cronbach's α	0.871	0.909	0.908	0.887	0.777	0.898

BOD Effectiveness: Effectiveness of BOD's supervisory on president's execution. Meeting Effectiveness: Effectiveness of execution on important meetings resolution. Administrative Effectiveness: Effectiveness of administrative affairs Administrative Satisfaction: Satisfaction on performance of administrative affairs. Performance Satisfaction: Satisfaction on external performance. Investment planning: Investment planning in the future. Administrative supervisory: BOD's supervisory on president's execution. Meeting execution: Effect and efficiency of important meetings. Attendance rate: Attendance rate of important meetings. President hosting: Effect and efficiency of President hosting on important meetings. Individual administration: Requirement of administrative performance by themselves. Administrative requirement: Requirement of administrative performance by superintendent. Administrative operation: Satisfaction on administrative operation. Meeting satisfaction: Satisfaction on meeting resolution execution. Subsidy assessment: Satisfaction on subsidy and assessment. Recruitment effects: Satisfaction on recruitment effects.

The 389 valid responses (2 missing samples) include 130 general private universities and 259 private technical and vocational colleges, which underwent fitness test with the following results, $\chi^2 = 2.16 < \chi^2_{0.05} = 3.841$, accepting sample allocation fitting population allocation. For the gender aspect, male accounts for 83.64% and female accounts for 16.36%. The service seniority, where 11-15 years account for 21.85%, followed by 16-20 years, accounting for 21.34%, 21~25 years accounting for 14.91%, within 5 years accounting for 12.08%, over 26 years accounting for 9.25%. The current positions: BOD members account for 2.85%, president and vice-president account for 8.05%, dean of academic affairs, dean of student affairs and dean of general affairs account for 12.21%, dean of college accounts for 10.38%, and department head accounts for the majority of up to 46.75%; other level supervisors' account for 16.10%, and chief secretary accounts for 3.64%.

Table 2 Test of Assumption of Normality

Latent variables	Manifest Variables	Coefficient of Skewed	Coefficient of Kurtosis	Coefficient of Skewed	Coefficient of Kurtosis
BOD Effectiveness	Investment planning	-0.955 ~ -0.838	0.219 ~ 0.659	-0.781	0.705
	Administrative supervisory	-0.755 ~ -0.507	0.346 ~ 0.745		
Meeting Effectiveness	Meeting execution	-0.816 ~ -0.500	-0.114 ~ 0.833	-0.612	0.064
	Attendance rate	-0.847 ~ -0.456	-0.423 ~ 0.436		
	President hosting	-0.925 ~ -0.571	0.067 ~ 0.944		
Administrative Effectiveness	Individual administration	-0.582 ~ -0.302	-0.209 ~ 0.633	-0.421	-0.204
	Administrative requirement	-0.342 ~ -0.280	-0.418 ~ 0.027		
Administrative Satisfaction	Administrative operation	-0.659 ~ -0.538	-0.006 ~ 0.077	-0.629	0.193
	Meeting satisfaction	-0.740 ~ -0.617	0.312 ~ 0.769		
Performance Satisfaction	Subsidy assessment	-0.580 ~ -0.106	-0.773 ~ -0.017	-0.235	-0.070
	Recruitment effects	-0.654 ~ -0.462	-0.086 ~ 0.208		

Notes: BOD Effectiveness: Effectiveness of BOD's supervisory on president's execution. Meeting Effectiveness: Effectiveness of execution on important meetings resolution. Administrative Effectiveness: Effectiveness of administrative affairs Administrative Satisfaction: Satisfaction on performance of administrative affairs. Performance Satisfaction: Satisfaction on external performance. Investment planning: Investment planning in the future. Administrative supervisory: BOD's supervisory on president's execution. Meeting execution: Effect and efficiency of important meetings. Attendance rate: Attendance rate of important meetings. President hosting: Effect and efficiency of President hosting on important meetings. Individual administration: Requirement of administrative performance by themselves. Administrative requirement: Requirement of administrative performance by superintendent. Administrative operation: Satisfaction on administrative operation. Meeting satisfaction: Satisfaction on meeting resolution execution. Subsidy assessment: Satisfaction on subsidy and assessment.
Recruitment effects: Satisfaction on recruitment effects.

EMPIRICAL RESULTS

The variables in this study must meet the normality assumptions before undergoing structural equation modeling analysis. The normality test with an absolute value of skewness S coefficient of less than 3 and the absolute value of kurtosis K coefficient of less than 10 (kline, 1998) was used to carry out the testing for the various in the study. The test results are shown in Table 2. The absolute values of skewness S for the manifest variables of the study fall between 0.106 ~ 0.955, and the absolute value of kurtosis K coefficient falls between 0.944 ~ 0.017, meeting the requirements for normality assumptions.

Testing for Overall Model Fitness

SEM was applied for analysis and the optimal sample quantity for analysis, as identified with LISREL software, generally fell between 50~500. A smaller sample size will result convergence failure(Hayduk, 1989). The overall modeling Goodness of Fit Index is an extrinsic modeling quality test, whereas the approval of overall modeling fitness testing implies validity in the overall modeling. The results are shown in Table 3, where the χ^2 ratio of the overall sample of 2.884 is smaller than the standard value of 3, and the alternative indices RMSEA is 0.07 in line with the testing standard of smaller than 0.08. The Goodness of Fit Index GFI is 0.96 which is greater than the testing standard of 0.9. The Adjusted Goodness of Fit Index (AGFI) is 0.92 and greater than 0.9, indicating a good modeling fit. The Normed Fit Index (NFI) is 0.98, and the Incremental Fit Index (IFI) is 0.99, which are all greater than 0.9. indicating excellent Modeling fitness (Bentler & Bonett,1980). The Parsimony Normed Fit Index (PNFI) is 0.61 and greater than 0.05, CN is 221.3 and greater than 200; reflecting the Root Mean Square Residual (RMR) value for Fitted Residual Variances. Average Covariance Value is 0.032, SRMR value as 0.031 and smaller than 0.05, indicating an excellent modeling fitness (Bentler & Bonett, 1980; Bogozzi & Yi, 1988).

Testing for Intrinsic Model Quality

The intrinsic model quality test for the various SEM samples for this study is shown in Table 4, where the square means (SMC) indices of individual manifest variables relative to the R^2 value of manifest variables and latent variables, are mostly greater than 0.5. However, the meeting effectiveness to attendance ratio is 0.35, the administrative effectiveness to individual administration is 0.44 and performance satisfaction to auxiliary assessment is 0.45, are all smaller than 0.5; which implies that the intrinsic quality does not completely meet the standards for intrinsic modeling quality in SEM.

The reliability value (ρ) of all latent variables fall between 0.645～0.878 and are greater than 0.6, indicating that the Cronbach's α coefficient of observatory indices attributed to each latent variable contains relatively high reliability. The construct validity measurement of SEM models measures if the different manifest variables can effectively measure the "convergent validity" of the same latent variable as well as if manifest variable designed for a specific latent variable can distinguish the "discriminate validity" in the manifest variable of other latent variables. Convergent validity refers to the average variance extracted value from the latent variable observed. The higher the average variance extracted value, the higher reliability and convergent validity of the latent variable.

Fornell & Larcker(1981) proposed a standard value greater than 0.5 can represent a high explanatory power of average variance for latent variables by each manifest variable. Table 4 shows the average variance extracted value of the study samples falls between 0.712～0.889, indicating the manifest variables can measure a considerable degree of latent variables (Sharma,1996). With regard to discriminate validity, Espinoza (1999) suggested the average variance extracted value for a certain latent variable must be greater than the square of correlation coefficients for any paired latent variable in off diagonals, in order to possess discriminate validity capability. Table 5 shows the average variance extracted value for the latent variables in diagonals, which are greater than the square of correlation coefficients for any paired latent variable in off diagonals and have sufficient discriminate validity between each other.

Table 3: Test of Overall Model Fit

Fitting Index	Fitting Index and Standard	Test Indices	Model Fit Judgment	Fitting Index	Fitting Index and Standard	Test Indices	Model Fit Judgment
Absolute fit				Incremental fit			
χ^2	p>0.5	98.06(p=0.00)	No	NFI	>0.9	0.98	Yes
RMR	<0.5	0.032	Yes	RFI	>0.9	0.97	Yes
SRMR	<=0.5	0.031	Yes	IFI	>0.9	0.99	Yes
RMSEA	<0.08	0.07	Yes	NNFI	>0.9	0.98	Yes
GFI	>0.9	0.96	Yes	CFI	>0.9	0.99	Yes
AGFI	>0.9	0.92	Yes				
Parsimonious fit							
PNFI	>0.5	0.61	Yes	CN	>200	221.3	Yes
PGFI	>0.5	0.49	No	χ^2 ratio	<3	2.884	Yes

χ^2: Minimum Fit Function chi-square. RMR: Root Mean Square Residual. SRMR: Standardized RMR. RMSEA: Root Mean Square Error of Approximation. GFI: Goodness of Fit Index. AGFI: Adjusted Goodness of Fit Index. NFI: Normed Fit Index. RFI: Relative Fit Index. IFI: Incremental Fit Index. NNFI: Non-Normed Fit Index. CFI: Goodness of Fit Index. PNFI: Parsimony Normed Fit Index. CN: Critical N. PGFI: Parsimony Goodness of Fit Index. χ^2ratio: chi-square for Independence Model with 34 Degrees Freedom.

Table 4 Test of Intrinsic Model Quality

Latent variables	**BOD Effectiveness ζ1**		**Meeting Effectiveness ζ2**		
Manifest Variables	**Investment Planning**	**Admin. Supervisory**	**Meeting Execution**	**Attendance Rate**	**President Hosting**
	X1	X2	X3	X4	X5
SMC	0.64	0.61	0.92	0.35	0.51
Lambda Loading	0.80	0.78	0.96	0.60	0.72
CR	0.769		0.810		
AVE	0.812		0.712		
Latent variables	Administrative Effectiveness ζ3		Administrative Satisfaction η1		Performance Satisfaction η2
Manifest Variables	**Individual Admin.**	**Admin. Requirement**	**Administrative Operation**	**Meeting Satisfaction**	**Subsidy Assessment**	**Recruitment Effects**
	X6	X7	Y1	Y2	Y2	Y4
SMC	0.44	0.63	0.71	0.86	0.45	0.5
Lambda Loading	0.66	0.80	0.84	0.92	0.67	0.71
CR	0.696		0.878		0.645	
AVE	0.762		0.889		0.739	

BOD Effectiveness: Effectiveness of BOD's supervisory on president's execution. Meeting Effectiveness: Effectiveness of execution on important meetings resolution. Administrative Effectiveness: Effectiveness of administrative affairs Administrative Satisfaction: Satisfaction on performance of administrative affairs. Performance Satisfaction: Satisfaction on external performance. Investment planning: Investment planning in the future. Administrative supervisory: BOD's supervisory on president's execution. Meeting execution: Effect and efficiency of important meetings. Attendance rate: Attendance rate of important meetings. President hosting: Effect and efficiency of President hosting on important meetings. Individual administration: Requirement of administrative performance by themselves. Administrative requirement: Requirement of administrative performance by superintendent. Administrative operation: Satisfaction on administrative operation. Meeting satisfaction: Satisfaction on meeting resolution execution. Subsidy assessment: Satisfaction on subsidy and assessment. Recruitment effects: Satisfaction on recruitment effects. Lambda Loading: Factors Loading. CR: Reliability value. AVE: Average variance extracted value.

Testing for Path Analysis

Table 6 shows direct effects. The DOB effectiveness to administrative performance satisfaction is 0.16 with a positive significant impact. H1 is accepted. The BOD effectiveness has a direct impact on administrative performance satisfaction. The meeting effectiveness to administrative performance satisfaction is 0.84 with a positive significant impact. H2 is accepted. Meeting effectiveness has a direct impact over administrative performance satisfaction. The administrative effectiveness over administrative performance is -0.08 without a significant impact. H3 is rejected. Therefore the BOD investment and supervisor over the development of academic affairs results in a significant positive impact on the satisfaction of school administrative performance. Internal school meeting effectiveness includes the effectiveness of various meetings, attendance rates and the effectiveness of president hosting meeting also results in significant positive impact on the satisfaction of school administrative performance.

Table 5 Discriminate Validity

	BOD Effectiveness	**Meeting Effectiveness**	**Administrative Effectiveness**	**Administrative Satisfaction**	**Performance Satisfaction**
BOD Effectiveness	0.812				
Meeting Effectiveness	0.327	0.712			
Administrative Effectiveness	0.335	0.436	0.762		
Administrative Satisfaction	0.322	0.574	0.330	0.889	
Performance Satisfaction	0.215	0.226	0.207	0.327	0.739

BOD Effectiveness: Effectiveness of BOD's supervisory on president's execution. Meeting Effectiveness: Effectiveness of execution on important meetings resolution. Administrative Effectiveness: Effectiveness of administrative affairs Administrative Satisfaction: Satisfaction on performance of administrative affairs. Performance Satisfaction: Satisfaction on external performance.

Direct Effectiveness is reported in Table 6. Administrative performance satisfaction to external performance satisfaction is 0.81 with a significant positive impact. H4 is accepted. The administrative performance satisfaction has a direct impact on external performance satisfaction, which shows that satisfaction for school administrative performance enhances the effectiveness of external performance satisfaction. The BOD effectiveness to external performance is 0.18 without significant impact. H5 is rejected. The BOD effectiveness has a direct impact on external performance satisfaction. The meeting effectiveness to external performance satisfaction is -0.52 with a significant negative impact. H6 is accepted. Meeting effectiveness has a direct impact over external performance satisfaction. The administrative effectiveness to external performance is 0.37 without significant impact. Hence H7 is rejected. Administrative effectiveness has a direct impact on external performance satisfaction. The hypothesis path coefficient for the study is shown in Figure 3.

The direct effect of Table 6 includes BOD effectiveness, meeting effectiveness and administrative effectiveness, which has indirect influence on the external performance satisfaction through administrative performance satisfaction. BOD effectiveness to external performance satisfaction validity through administrative performance satisfaction is 0.13 without a significant impact. H5-1 is rejected. BOD effectiveness has a direct impact on external performance satisfaction through administrative performance satisfaction. Meeting effectiveness to external performance satisfaction through administrative performance satisfaction is 0.68 with a significant positive impact. H6-1 is accepted. Meeting effectiveness has a direct impact on external performance satisfaction through administrative performance satisfaction. Administrative effectiveness to external performance satisfaction through administrative performance satisfaction is -0.06 without significant impact. H7-1 is rejected. Administrative effectiveness has a direct impact on external performance satisfaction through

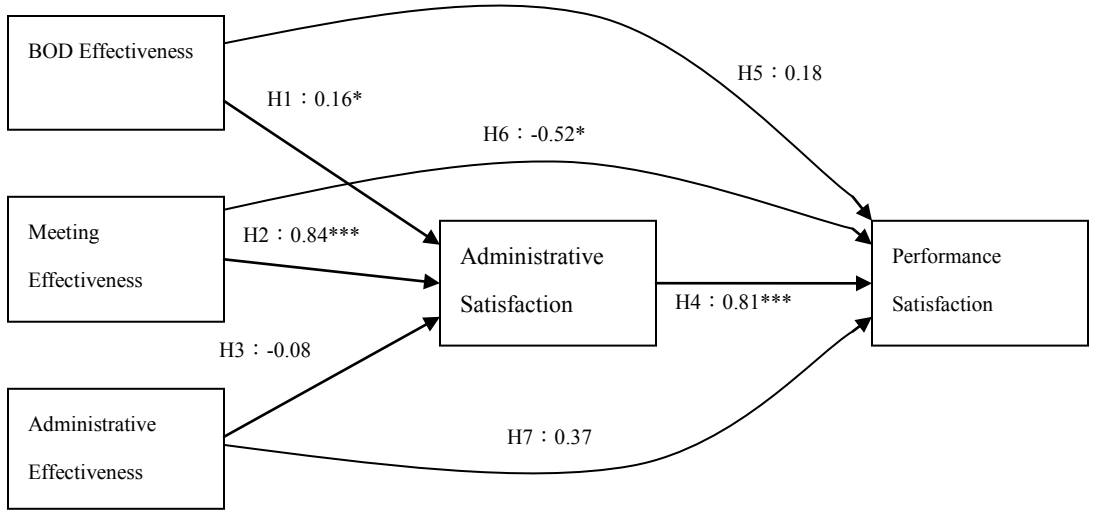
administrative performance satisfaction. The total values of effectiveness shows that BOD effectiveness and meeting effectiveness can improve the effectiveness of external performance satisfaction through administrative performance satisfaction.

Table 6: The Hypothesis Path Coefficient

Hypothesis Path	Latent Variables	Dependent Variables	Direct Effect	T	Indirect Effect	T	Total Effect	T
H1	BOD Effectiveness	Administrative Satisfaction	0.16*	2.04	NA		0.16*	2.04
H2	Meeting Effectiveness	Administrative Satisfaction	0.84***	8.67	NA		0.84***	8.67
H3	Administrative Effectiveness	Administrative Satisfaction	-0.08	-0.68	NA		-0.08	-0.68
H4	Administrative Satisfaction	Performance Satisfaction	0.81***	4.44	NA		0.81***	4.44
H5	BOD Effectiveness	Performance Satisfaction	0.18	1.35	0.13	1.84	0.31*	2.35
H6	Meeting Effectiveness	Performance Satisfaction	-0.52*	-2.31	0.68***	3.58	0.16	1.24
H7	Administrative Effectiveness	Performance Satisfaction	0.37	1.91	-0.06	-0.65	0.31	1.64

*BOD Effectiveness: Effectiveness of BOD's supervisory on president's execution. Meeting Effectiveness: Effectiveness of execution on important meetings resolution. Administrative Effectiveness: Effectiveness of administrative affairs Administrative Satisfaction: Satisfaction on performance of administrative affairs. Performance Satisfaction: Satisfaction on external performance. Investment planning: Investment planning in the future. Administrative supervisory: BOD's supervisory on president's execution. Meeting execution: Effect and efficiency of important meetings. Attendance rate: Attendance rate of important meetings. President hosting: Effect and efficiency of President hosting on important meetings. Individual administration: Requirement of administrative performance by themselves. Administrative requirement: Requirement of administrative performance by superintendent. Administrative operation: Satisfaction on administrative operation. Meeting satisfaction: Satisfaction on meeting resolution execution. Subsidy assessment: Satisfaction on subsidy and assessment. Recruitment effects: Satisfaction on recruitment effects. Lambda Loading: Factors Loading. CR: Reliability value. AVE: Average variance extracted value. ***, **, and * indicate significance at the 0.001, 0.01 and 0.05 levels respectively.*

Figure 3: The Research Hypothesis Path Coefficient Diagram for University Governance Mechanism Operations and School Performance



*This figure shows the Research hypothesis path coefficient diagram for university governance mechanism operations and school performance. ***, **, and * indicate significance at the 0.001, 0.01 and 0.05 levels respectively.*

CONCLUSION

This paper discusses the internal governance management team of universities and the cognition of school performance satisfaction. School performance requires an external evaluation mechanism in addition to measurement for the administrative management system within the school. External assessment is based on external certification or accrediting requirements. External assessment is conducted by external groups, or teams, to insure compliance with performance requirements (Su Jinni, 1997). Hence, school performance applies external evaluation mechanism measurements such as school assessment results and the MOE approved grants and the recruitment results.

The study investigates the influence of BOD effectiveness, meeting effectiveness and administrative operational effectiveness to administrative performance. Next we examine the influence of administrative performance over external performance in order to establish the research framework of university governance. The study further applies a SEM model to understand the influence of various variables for administrative performance and the external performance.

The empirical studies show that the BOD operational effectiveness and the internal important meeting attendance rate have significant positive relation with execution effectiveness and school administrative performance satisfaction. Administrative performance satisfaction of the school and school performance satisfaction have a significant positive relation. The administrative performance satisfaction of school has a significant positive relation with the school performance satisfaction. Internal important meeting attendance rate and execution effectiveness have significant negative relation with the school performance satisfaction. However, its intermediary effect through the administrative performance satisfaction of the school enhances satisfaction towards school performance with a positive effect. This indicates that cognition towards administrative performance satisfaction affects the effects of school performance satisfaction.

The results of the empirical study shows how the university governance management team of private universities enhance school performance and administrative performance satisfaction. The study provides a reference for universities, the academic field and educational competent authorities towards the university governance mechanism.
SEM is the confirmed linear structural relation based on combining factor analysis and path analysis. It can concurrently process casualty between multiple dependent variables and independent variables. SEM verifies the model of theories. This paper discusses the relevance of the university governance mechanism for school performance. Most previous studies are qualitative research (e.g., Duquette and Stowe, 1993; Campbell, 1990; Browning, 1997; Elizabeth, 1996; Donna, 1996). We note a limitation of the study is that school performance judged by questionnaire respondents may differ from actual school performance.

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MARKET ORIENTATION IN LOCAL GOVERNMENT THROUGH THE ANALYSIS OF MUNICIPAL WEBSITE CONTENT: A FRAMEWORK FOR ITS MEASUREMENT

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ABSTRACT

Increased competition between cities requires them to adopt concepts and methods that have been used by the private sector, such as market orientation, strategic management, marketing, human resources management, competitive advantage or the definition of a competitive image and brand, etc. The aim of this study is to analyze the market orientation in Spain's regional capital cities by examining the content of their municipal websites. Local governments are increasingly represented on the Internet. The Internet enables them to combine elements of a town hall, tourist information bureau, chamber of commerce, business directory, shopping mall and local newsmagazine. This study also analyses whether, as a result of market orientation in management, the cities studied have fostered marketing strategies, such as the segmentation strategy, brand strategy, or city internationalisation, and it proposes a standard framework for measuring the city's market orientation by examining the content of the municipal website.

JEL: M31

KEYWORDS: Market Orientation, Local Government, Websites, Competitive Advantages.

INTRODUCTION

One of the most important phenomenons in the late twentieth century was the globalization of the international economy. This process was made possible by the development of world trade and elimination of trade barriers, in addition to the new communication technologies that have increased the chances of entering larger, faraway markets. Hence, the world has become a "global village" in which ideas are available anywhere and anytime and products and capital flow in a flexible and dynamic manner. Faced with a global economy and as integration processes intensify, the role of cities and competition among them has become more significant. Cities face the challenge of being able not only to manage the resources at their disposal, but also to attract new resources, forcing local authorities to make decisions that optimize their intervention styles, in order to thus achieve greater competitiveness at the regional, national, and/or international levels.

This situation has forced cities to adopt business management principles, concepts and tools, such as market orientation, strategic planning, marketing, human resource management, the search for differentiation, definition of an adequate image, brand and positioning and, in short, a number of competitive advantages that allow them to meet the demands of all their target audiences and face the competition. In this vein, the adoption of market orientation is considered equivalent to developing a competitive advantage for the organization that is based on identifying, creating value and achieving customer satisfaction.

Research studies such as those conducted in the business world on market orientation, which are widely discussed in marketing literature, are also needed in the area of public management, more specifically, research on the market orientation of local public administrations. On the basis of this approach, this paper aims to analyze the market orientation of a cluster of Spanish cities that are the capitals of their autonomous regions through the analysis of their municipal website content.

The analysis considered a set of variables representing the different dimensions that shape market orientation. The presence of local governments on the Internet is growing and the advantages it offers as a marketing tool (Küster, 2002; Currás and Küster, 2005), such as accessibility to information, offering relevant information, complaints management, low cost and customer service, are considerable, although research on the role it plays in urban management has not been studied in depth (Sicilia and Pérez, 2007). In this study we propose a standard measurement framework to measure a city's market orientation through its municipal website content.

The next section summarizes the literature review of the main authors who have studied the Market Orientation. The data and methodology section analyses the market orientation in major Spanish cities on the basis of their municipal website content. From this analysis the variables to be considered in modelling the measurement of the city's market orientation through the content of the municipal website are obtained. The last section concludes this paper.

LITERATURE REVIEW

The implementation of the marketing philosophy and principles in cities requires market-driven planning, which involves an orientation in all actions towards the different target audiences, rather than towards service offerings, as in the past. This means focusing on achieving greater competitiveness, ascertaining the city's competitive advantage and ensuring that this advantage is sustainable in the long term. A review of the literature on market orientation reveals the existence of a multiplicity of views and approaches in its study, although the most recent works tend to synthesize them all into no more than four. Thus, authors such as Cervera *et al*. (1999) or Tuominen and Möller (1996) consider these four approaches - cognitive, behavioural, cultural and market orientation - on the basis of the theory of resources and capabilities. The importance of an organization's providing itself with this market orientation approach will involve developing processes for collecting, interpreting, disseminating and using market information on customers, competitors, distributors and suppliers.

These processes are carried out in a more systematic and predictable manner in organizations that have a greater degree of market orientation (Martín Armario *et al.,* 2002). Furthermore, adopting a market orientation makes organizations capable of developing responses that best meet customers' current needs and desires and allows their future needs and desires to be anticipated (Kohli and Jaworski, 1990; Narver and Slater, 1990).However, the proliferation of studies on market orientation in the business world has not occurred to the same degree as it has in other areas of activity. Thus, the public administration has barely developed any market orientation studies and only a few studies that focus on this issue exist. Within the context of local government, market orientation appears as "Public Service Orientation" to mean "*a philosophy that guides local authorities, who try to tackle the challenge of developing new patterns of more sensitive. It is based on the simple idea that local authorities should provide services for and with people, not simply to them*"(Walsh, 1989) and this must be reflected in organizations' systems, structure, processes, and culture. This philosophy and the actions consistently developed from both a theoretical and practical standpoint consider the conditions needed to introduce the concept of marketing in the public arena, as well as the resulting market orientation of its institutions, to thus reflect the two essential features of any public organization: being a *service provider* entity and being a *public institution*. (Cervera, 2004).

On the basis of this situation, the analysis of market orientation at the municipal level can be conducted along the lines of Kohli and Jaworski's basic model (1990) of market orientation from a behavioural perspective. This model has also been applied in the field of local governments and its consequences on citizen participation has been analyzed (Cervera, 2004). According to this model, the core of this orientation in the profit and not-for-profit, private and public sectors rests on three pillars: *generation of information* from the market that makes it possible to understand their needs, *dissemination* of that

information to share that understanding and lastly, *responsiveness* to the information in order to satisfy market needs. The three dimensions considered for analyzing market orientation from a behavioural perspective have been thoroughly analyzed by different authors and the main conclusions with respect to each are shown in Tables 1, 2 and 3.

Table 1: Generation of Information

GENERATION OF INFORMATION	
► Collection and analysis of information on the current and future needs of the cities' different target audiences. ► Collection and analysis of information on factors external to the organization that have an impact on the current and future needs of the city's target audiences. ► Collection and analysis of information on actions by the competition that influence the current and future needs of the city's different target audiences.	
Study	**Generating information from the market for its understanding.**
Cowell (1981)	Understanding of the publics' points of view and improvement in the impact and quality of the authorities' decisions in such a way that the approaches of the government and approaches of the citizens it serves are combined.
Kerley (1994); Burns (1992); Blackman (1994); Severijnen (1994)	Knowledge of citizens' demands (Kerley, 1994), desires (Burns, 1992) and needs (Blackman, 1994) when the information provided by voting mechanisms is not considered sufficient (Severijnen, 1994); the localization of resources and definition of objectives (Blackman, 1994); evaluation of the political programmes (Severijnen, 1994), helping to establish performance indicators sensitive to citizens' satisfaction, as well as performance monitoring in relation to these indicators and review of the quality of services (Burns, 1992); and lastly, the provision of information to help implement the organizational change needed (Burns, 1992; Severijnen, 1994) in order to achieve more consumer-oriented institutions.
Blackman (1994)	In addition to information about the needs of the public and the environment, the need to search for information on their satisfaction must be considered. The actions that must be undertaken to satisfy citizens can only be determined by establishing public action and quality indicators that contrast with the users' point of view.
Kohli and Jaworski (1990); Clarke and Stewart (1988)	For the sake of completeness, collection methods must be formal and informal and developed by all members of the organization (Kohli and Jaworski, 1990). Local authorities should also provide quantitative and qualitative information on their markets (Clarke and Stewart, 1988) that comes from not only citizens, but also from public employees themselves.

Analysis of the different authors and main conclusions of the Generation of Information dimension, corresponding to Kohli and Jaworski's behavioural perspective of market orientation (1990). Source: in-house based on Cervera, A. (2004)

Table 2: Dissemination of Information

DISSEMINATION OF INFORMATION	
► Dissemination throughout the organization of information on the current and future needs of the market, the environment and the competition, doing so through vertical and horizontal flows between departments and within the departments themselves. ► Establishment of appropriate coordination mechanisms to ensure the generation of, dissemination of and responsiveness to information that integrates and orients all departments and their staff towards the market.	
Study	**Dissemination of information to share an understanding of the market**
Kohli and Jaworski (1990)	Various methods are proposed for disseminating information throughout an organization, using methods such as letters, newsletters and formal meetings, etc., as well as various other informal methods through both horizontal and (ascending or descending) vertical information flows.
Varadajan and Clark (1994); Crittenden, Gardiner and Stam (1993); Walker and Ruekert (1987); Masiello (1988)	The hierarchical conceptualization of the strategy at different levels of the organization generates interactions and overlaps among these levels (Varadajan and Clark, 1994), depending on the effective implementation of the coordinated work of the various functional groups (Crittenden, Gardiner and Stam, 1993). This implementation is essential to the organization's positive performance in general and the marketing function in particular (Walker and Ruekert, 1987) as well as to the achievement of a market orientation that allows it to respond to their customers' needs (Masiello, 1988).
Solutions suggested by the literature to minimize possible points of interfunctional conflict:	
Ruekert, Walker & Roering (1985)	Organizational designs favouring integration, such as mixed structures and the decentralization of authority.
Carroad and Carroad (1982)	Team building and transfer of staff to various functions for a limited time, matrix-type structures and the implementation of evaluation systems that reflect shared interests.
Clare and Sanford (1984)	Development of interdepartmental communication, with actions such as seminars, conventions and group interaction mechanisms
Jackson and Shapiro (1979)	Creation and implementation of models of integration and adjusment of functions.
Saghafi, Gupta and Sheth (1990); Lichtenthal & Wilson (1992)	Market orientation of functions other than marketing, so that "each employee must include an element of marketing in his activity."

Analysis of the different authors and main conclusions of the Dissemination of Information dimension, corresponding to Kohli and Jaworski's behavioural perspective of market orientation (1990). Source: in-house based on Cervera, A. (2004)

Table 3: Responsiveness to Information

RESPONSIVENESS TO INFORMATION	
► Development of plans (or design of the response).	
► Implementation of such plans (or implementation of the response).	
Study	**Responsiveness to information in order to satisfy market needs.**
Walsh (1989)	Identifies four similar dimensions in relation to the local government organizations' capacity of responsiveness to the public: access, quality, choice, participative control. Clarke and Stewart (1987);
Clarke and Stewart (1987); Grayson (1994)	Adds the quality of service provided, access, and choice, as well as other dimensions such as the modification of performance evaluation measures and the promotion of citizenship.

Analysis of the different authors and main conclusions of the Responsiveness to Information dimension, corresponding to Kohli and Jaworski's behavioural perspective of market orientation (1990). Source: in-house based on Cervera, A. (2004)

The variables that make up each of the dimensions must be specified on the basis of the dimensions, to thus conduct the analysis of market orientation from the Spanish cities' municipal website content.

DATA AND METHODOLOGY

The research conducted aims to analyze the market orientation of the capital cities of Spain's different regions. To achieve this, the content provided by each municipality's official website was used as a source. The use of the Internet and new information technologies in general as a marketing tool has been the object of numerous studies (Ju-Pak, 1999, Wilkie and Kollmann, 1998; Alet, 2001; Küster, 2002; Currás and Küster, 2005). However, from the field of marketing in urban management, research studies on the Internet's role as an environment for exchanging market information are not so numerous (Sicilia and Pérez, 2007).

From this perspective, the dimensions offered by the websites as a marketing tool (Küster, 2002; Currás and Küster, 2005) are given below:

Accessibility: The possibility offered by the website for accessing information. In the case of a municipality's official website, it enables the city's different constituencies to obtain the desired information.

Obtaining relevant information: refers to the fact that the website can provide information of interest to users. This dimension depends on the degree of knowledge it has of the target publics' needs. Aspects such as the degree of detail of the information, its updating, useful life of the information and the exclusivity thereof are included in this characteristic.

Handling complaints: the possibility offered by the Internet to handle complaints and claims quickly and efficiently makes this medium a customer-oriented and therefore, marketing tool.

Cost advantages (Sicilia and Pérez, 2007): these websites offer a wealth of information at a low cost. It is only necessary to have a domain in which to post information for the different target audiences.

Customer Service: The website is designed to provide customer service, this medium being a suitable tool for analyzing the dimensions of the market orientation of the management of both business organizations and, in this case, cities. Furthermore, this medium, which is accessible round the clock from any point in the world, increases the amplitude of communication with the urban market.

The methodology for collecting information on the cities under study is based on an analysis of content (Bigné, 1999) and its specific application to the analysis of websites (Dholakia and Rego, 1998;

Rodriguez, 2002; Bellman *et al*, 2006). To achieve this, the target population was first designated and the sample selected.

In this case, the target populations were the official municipal websites of the Spanish cities that are capitals of their respective regional communities. A total of 18 cities were analyzed: Madrid, Barcelona, Las Palmas de Gran Canaria, Tenerife, Pamplona, Santander, Santiago de Compostela, Valencia, Vitoria, Saragossa, Logroño, Toledo, Oviedo, Merida, Murcia, Valladolid, Seville and Palma de Majorca for Spain's 17 regions (Las Palmas de Gran Canaria and Santa Cruz de Tenerife share being the Canary capital), which represents 100% of the population under study. Secondly, we defined the unit of analysis, which was the city's official municipal website. Next, the variables under study were quantified by means of at least two content coders (Bigné, 1999). The information was collected using the same computer, same browser and same Internet connection to thus guarantee equal speed. In addition, the information was confirmed by those responsible for municipal management through communication via the e-mail address available on the Web, in cases when the contents analyzed were not completely clarified.

This study analyzed 14 variables (see Table 4) corresponding to the three dimensions of Kohli and Jaworski's market orientation model (1990). The variables corresponding to the three dimensions analyzed on the municipal website were quantified and the variables defined as mixed or scale, which allowed for their statistical analysis; the same statistical techniques were applied as those used to analyse the numeric variables. Hence, e.g., the number of opinion polls variable will take the value of one for municipalities that conducted from zero to ten surveys, a value of two for municipalities that conducted from eleven to twenty surveys and a value of three for the municipalities that conducted more than twenty surveys. The remaining variables were defined in a similar manner. The variables analyzed were:

Generation of Information is the first dimension to consider in the market orientation model. In this paper, Generation of Information involves rating the municipal management of the collection and analysis of information on the current and future needs of citizens, businesses, investors and visitors as the cities' target public. It also involves collecting and analyzing information on other competing cities, which may influence the current and future needs of the city's target public. On the basis of this approach, the following variables were considered: number of opinion polls conducted, number of municipal networks to which the city belongs, incidents, complaints and suggestions through the municipal website, number of online surveys on the service provided through it and citizen participation on the website.

The Dissemination of Information dimension for a city's different target publics, which allows the information generated to be shared, was analyzed by means of the following variables: number of municipal periodicals, number of councils, number of languages on the municipal website, number of languages on the tourism website.

The implementation of a response requires the use of management tools and instruments such as strategic planning processes in the different areas of management, as well as the use of marketing strategies and response actions, such as market segmentation or the search for differentiation and proper positioning. In this context, we analyzed the following variables as Responsiveness to Information: number of segments into which the tourism website is divided, number of plans in place, including the Strategic Plan (SP), number of segments into which the municipal website is divided, number of social networks to which the municipality belongs and public/private collaboration between the municipality and the city's major private stakeholders.

Also included as a variable to be analyzed was the municipal budget for each city in question, to the extent that available financial resources may explain differences in behaviour between the cities.

Table 4: Study Variables

	Study Variables	Type of Variable
1	2011 municipal budget	Mixed (scale)
	Variables corresponding to the "Generation of information" dimension	
2	Nº of opinion polls conducted	Mixed (scale)
3	Nº of municipal networks to which the city belongs	Mixed (scale)
4	Incidences, complaints and suggestions through the municipal website	Mixed (scale)
5	Nº of on-line surveys on services provided by the website	Mixed (scale)
6	Citizen participation on the website	Mixed (scale)
	Variables corresponding to the "Dissemination of information" dimension	
7	Nº of municipal periodicals	Mixed (scale)
8	Nº of councils	Mixed (scale)
9	Nº of languages on the municipal websites	Mixed (scale)
10	Nº of languages on the tourism websites	Mixed (scale)
	Variables corresponding to the "Responsiveness to information" dimension	
11	Nº of segments in which the tourism website is divided	Mixed (scale)
12	Nº of plans underway including the strategic plan (SP)	Mixed (scale)
13	Nº of segments into which the municipal website is divided	Mixed (scale)
14	Nº of social networks to which the municipality belongs	Mixed (scale)
15	Public/Private collaboration between the municipality and the city's main private stakeholders	Mixed (scale)

A total of 15 variables corresponding to the three dimensions of Kohli and Jaworski's market orientation model (1990) were analysed. Also included as a variable to be analyzed was the municipal budget of each city under study. Source: in-house. Data processing: Dyane version 4.

RESULTS

The cluster analysis was performed using Johnson's algorithm, the complete linkage method, which is best suited to small samples such as this case, with 18 cities and 15 variables.

The first analysis obtained Cluster 1, which is made up of the cities of Barcelona and Madrid. Cluster 2 is formed by the cities of Las Palmas de Gran Canaria, Murcia, Logroño, Santa Cruz de Tenerife, Santander, and Merida. Cluster 3 includes the cities of Oviedo, Toledo, Santiago de Compostela, Valencia and Valladolid. Lastly, Cluster 4 is formed by the cities of Palma de Mallorca, Pamplona, Seville, Vitoria and Saragossa (see Figure 1). The variance explained by the participation in the four clusters is 61.88%. (See Table 5).

Table 5: Variance of the Variables Explained by the Partition

Sum of the squares of all the simple variables	168.61
Sum of the intracluster squares (remaining variance)	64.27
Sum of the intercluster squares (explained variance)	104.34
% of variance explained by the partition into 4 clusters	61.88%

The cluster analysis presents a variance explained by the participation in the four clusters of 61.88 %. Source: in-house. Data processing: Dyane version 4.

Table 6 shows the cross tabulation of mean values, which is designed to check for differences between the mean values of the variables used, calculated for the total sample, and for each of the groups generated in the "cluster", which are considered as a column or independent variable.

To determine whether these differences are significant or not, we used the Snedecor's *F* statistic with (c-1) and (n-c) degrees of freedom, which allows the null hypothesis to be tested, i.e., the non-difference between means. As shown in Table 6, with variables number 1 (2011 municipal budget), 5 (number of online surveys), 6 (public participation), 7 (number of municipal periodicals), 9 (number of languages on the municipal website), 10 (number of languages on the tourism website), 12 (number of plans underway), 14 (number of social networks to which the municipality belongs), the differences between the means of the cluster are significant for a level of significance ($p < 0.05$), i.e., indicating the rejection of

the null hypothesis (no difference between means). For the same level of significance, the other variables are not significant.

Table 6: Cross-Tabulation of Standard Deviations and Means of the Variables in the Clusters Generated (With Snedecor's F Proof / ANOVA Table)

	Clusters Originated by the Partition		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Snedecor's F
Nº	Identification of variables	Nº of integrants Statistics	18	2	6	5	5	
1	2011 Municipal budget	Mean:	1.78	**6.00** +	1.00 -	1.20	1.60	F(3. 14) = 31.98
		Std. Dev.	1.62	1.00	0.00	0.40	0.80	p = 0.0000
2	Survey – G.Information	Mean:	1.28	**1.50** +	1.00 -	1.40	1.40	F(3. 14) = 1.14
		Std. Dev.	0.45	0.50	0.00	0.49	0.49	p = 0.3655
3	Networks - G.Information	Mean:	1.44	1.50	1.17 -	**1.80** +	1.40	F(3. 14) = 0.56
		Std. Dev.	0.76	0.50	0.37	0.98	0.80	p = 0.6529
4	Incidence - G.Information	Mean:	1.17	1.00	1.17	**1.40** +	1.00 -	F(3. 14) = 1.07
		Std. Dev.	0.37	0.00	0.37	0.49	0.00	p = 0.3930
5	Survey - G.Information	Mean:	1.06	**1.50** +	1.00	1.00	1.00 -	F(3. 14) = 4.15
		Std. Dev.	0.23	0.50	0.00	0.00	0.00	p = 0.0268
6	Cit. Part - G.Information	Mean:	1.61	1.00 -	1.83	**2.00** +	1.20	F(3. 14) = 7.56
		Std. Dev.	0.49	0.00	0.37	0.00	0.40	p = 0.0030
7	Periodicals – D. Information	Mean:	1.33	**3.00** +	1.00	1.00 -	1.40	F(3. 14) = 9.92
		Std. Dev.	0.75	1.00	0.00	0.00	0.49	p = 0.0009
8	Councils - D. Information	Mean:	1.67	**2.00** +	2.00	1.40	1.40 -	F(3. 14) = 1.17
		Std. Dev.	0.67	1.00	0.58	0.49	0.49	p = 0.3575
9	Lenweb - D. Information	Mean:	1.89	1.50	1.33 -	1.40	**3.20** +	F(3. 14) = 14.54
		Std. Dev.	0.94	0.50	0.47	0.49	0.40	p = 0.0001
10	LenTuris D. Information	Mean:	2.89	3.50	1.33 -	**4.00** +	3.40	F(3. 14) = 34.99
		Std. Dev.	1.20	0.50	0.47	0.00	0.49	p = 0.0000
11	Tur. Seg. - R. Information	Mean:	1.72	1.50 -	**1.83** +	1.80	1.60	F(3. 14) = 0.18
		Std. Dev.	0.65	0.50	0.90	0.40	0.49	p = 0.9104
12	Plans - R. Information	Mean:	2.17	**4.00** +	1.50 -	2.00	2.40	F(3. 14) = 5.26
		Std. Dev.	1.01	0.00	0.76	0.63	0.80	p = 0.0122
13	SegWeb - R. Information	Mean:	1.28	1.00 -	1.17	**1.60** +	1.20	F(3. 14) = 1.28
		Std. Dev.	0.45	0.00	0.37	0.49	0.40	p = 0.3193
14	Social Nets. R. Information	Mean:	1.33	**2.00** +	1.00	1.00 -	1.80	F(3. 14) = 5.33
		Std. Dev.	0.58	0.00	0.00	0.00	0.75	p = 0.0116
15	CPP - R. Information	Mean:	1.56	1.50	**1.83** +	1.40	1.40 -	F(3. 14) = 0.89
		Std. Dev.	0.50	0.50	0.37	0.49	0.49	p = 0.4709

+ : Cluster with the highest mean; - : Cluster with the lowest mean Source: In-house. Data processing: Dyane version 4
This table shows the cross tabulation of mean values, which is designed to check for differences between the mean values of the variables used, calculated for the total sample and for each of the groups generated in the "Cluster".

Based on the analysis of the content of the municipal websites of the cities analyzed, this table shows that Cluster 1, comprising the cities of Barcelona and Madrid, has the highest mean in the following variables: municipal budget, number of opinion polls conducted, number of on-line surveys, number of municipal periodicals, number of councils, implementation of plans and membership in social networks, giving equal weight to the three dimensions of Kohli and Jaworski's behaviour model of market orientation (1990).

Cluster 2, comprising the cities of Las Palmas de Gran Canaria, Murcia, Logroño, Santa Cruz de Tenerife, Santander, and Merida, has the highest mean in the following variables: number of segments into which the tourism website is divided and public-private partnership between the municipality and the city's main private stakeholders. Both of these variables belong to the Responsiveness to Information dimension in the behavioural model.

The cities in Cluster 3, made up of Oviedo, Toledo, Santiago de Compostela, Valencia and Valladolid, have the highest mean in the following variables: number of municipal networks to which the city belongs, incidents, complaints and suggestions through the municipal website, citizen participation webpage, number of languages on the tourism website and number of segments into which the municipal

website is divided. Although these variables cover the three dimensions of the behavioural model of market orientation, the Generation of Information dimension has the highest representation.

Cluster 4 is composed of the cities of Palma de Mallorca, Pamplona, Seville, Vitoria and Saragossa and is not characterized by higher means in almost any of the variables analyzed, which correspond to the three dimensions of Kohli and Jaworski's behavioural model of market orientation (1990).

This study proposes a framework for measuring market orientation through the content of the municipal website. The variables that allow the measurement of market orientation based on the three dimensions of Kohli and Jaworski's behavioural perspective (1990) and allow to classify them in relation to the target public to which they are aimed (Resident, Tourist and Investor), are shown in the next table:

Table 7: Variables to Be Considered in Modelling the Measurement of the City's Market Orientation through the Content of the Municipal Website

Panel A: Other Variables																		
	Var. A			**Var. B**				**Var. C**										
	Nº of inhabitants in the city			Regional GNP				Municipal budget										
CITIES																		
Panel B: Generation of Information																		
	Opinion Polls Conducted			MembershipiIn Municipal Networks			Incidences, Complaints and Suggestions			On-Line Surveys of Services Provided Through the Website			Citizen Participation on the Website					
	C	T	I				C	T	I	C	T	I	C					
CITIES																		
Panel C: Dissemination of Information																		
	Municipal Periodicals			Information on Councils			Use of Different Languages for the Information on the Website			Services Provided to Different Target Publics Through the Internet			Updated Municipal Budget Available					
	C	T	I	C			C	T	I	C	T	I	C					
CITIES																		
Panel D: Responsiveness to information																		
	Strategic Plan Underway (*) Action Plans			Social Networks to Which the City Belongs			Public/Private Collaboration (P.P.C.)			Presence of the Different Target Publics in the Website Segments								
	C	T	I	C	T	I	C	T	I	C	T	I						
CITIES																		

Panel A shows the variables to be considered in modelling the measurement of the city's market orientation through thecontent of the municipal website when they do not belong to the behavioural model. Source: in-house. Panel B shows the variables to be considered in modelling the measurement of the city's market orientation through the content of the municipal website when they belong to the Generation of Information dimension of the behavioural model. Source: in-house. Panel C shows the variables to be considered in modelling the measurement of the city's market orientation through the content of the municipal website when they belong to the Dissemination of Information dimension of the behavioural model. Source: in-house. Panel D shows the variables to be considered in modelling the measurement of the city's market orientation through the content of the municipal website when they belong to the Responsiveness of Information dimension of the behavioural model. Source: in-house. (*) Strategic Plan in place: Whether or not the strategic objectives covers action lines and focal points for each one of the city's different target publics must be verified. The city's different target publics : C= Citizen, residents, T= Tourist, Visitor, I= Investor, businesses

CONCLUDING COMMENTS

This paper aims to analyze the market orientation of a cluster of Spanish cities that are the capitals of their autonomous regions through the analysis of their municipal website content. The analysis considered a set of variables representing the different dimensions that shape market orientation. The variables were collected during the year 2011, and the cluster analysis, to classify them, was performed using Johnson's algorithm, the complete linkage method, which is best suited to small samples such as this case, with 18 cities and 15 variables.

The investigation of the 18 Spanish regional capital cities, based on the analysis of a cluster of fifteen variables representing Kohli and Jaworski's behavioural perspective of market orientation (1990), allows for the verification of four clusters that are differentiated in terms of the importance they attach to the different dimensions of market orientation based on the analysis of the municipal website content.

Cluster 1 (Barcelona and Madrid) gives equal weight to the three dimensions analyzed. They are also the cities with the largest budgets. Cluster 2 (Las Palmas de Gran Canaria, Murcia, Logroño, Santa Cruz de Tenerife, Santander and Merida), focuses on seeking responsiveness to market needs and places more importance on the responsiveness dimension than the information dimension.The cities in Cluster 3 (Oviedo, Toledo, Santiago de Compostela, Valencia and Valladolid) seek to understand the needs of their target public, which involves placing a higher priority on the Generation of Information dimension. Cluster 4 (Palma de Mallorca, Pamplona, Seville, Vitoria and Saragossa), is characterized by the low means in the variables analyzed. These cities adopt a loosely defined role with respect to the dimensions.

In this study, we propose a framework for measuring market orientation through the content of the municipal website, in which we distributed the variables that allow us to measure market orientation in the three dimensions of Kohli and Jaworski's behavioural perspective of market orientation (1990); it also allowed us to classify the variables in relation to the target public to which they are aimed (Resident, Tourist and Investor).

The paper has a natural limitation due to the limited number of cities considered (regional capital cities in Spain). For future research, we aim to expand the number of cities to be analyzed and differentiate the cities within each dimension by the actions they aim at their respective target publics, taking into account the variables and the model template proposed.

ANNEX

Annex 1: Table of the Municipal Websites Used in the Analysis

MUNICIPALITY OF BARCELONA www.bcn.es	MUNICIPALITY OF S. DE COMPOSTELA www.santiagodecompostela.org
MUNICIPALITY OF LAS PALMAS DE GRAN CANARIA www.laspalmasgc.es	MUNICIPALITY OF SANTANDER www.ayto.santander.es
MUNICIPALITY OF LOGROÑO www.logro-o.org/	MUNICIPALITY OF VALENCIA www.valencia.es
MUNICIPALITY OF MADRID www.munimadrid.es.	MUNICIPALITY OF VALLADOLID www.ava.es
MUNICIPALITY OF MÉRIDA www.merida.es	MUNICIPALITY OF VITORIA www.vitoria-gasteiz.org
MUNICIPALITY OF MURCIA www.murcia.es	MUNICIPALITY OF SARAGOSSA www.zaragoza.es
MUNICIPALITY OF OVIEDO www.oviedo.es	MUNICIPALITY OF SANTA CRUZ DE TENERIFE www.sctfe.es
MUNICIPALITY OF PALMA DE MALLORCA www.a-palma.es	MUNICIPALITY OF SEVILLE www.sevilla.org
MUNICIPALITY OF PAMPLONA www.pamplona.net	MUNICIPALITY OF TOLEDO www.ayto-toledo.org

This table includes the names and e-mail addresses of the municipal websites used in the analysis of content. Source: In-house.

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THE RELATIVE EFFICIENCY OF JORDANIAN PUBLIC HOSPITALS USING DATA ENVELOPMENT ANALYSIS AND PABON LASSO DIAGRAM

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ABSTRACT

This study aims at investigating and measuring the relative efficiency of public hospitals performance in Jordan, during the period (2006-2008), using DEA and Pabon-Lasso Diagram. The results indicate that the average efficiency of those hospitals is varied and ranges between (73%) to (100%). The average of the relative efficiency of the sample hospitals over the study period is 94%. Of 15 hospitals, the number of efficient hospitals increased from 7 in 2006 to 9 in 2007, but decreased to 8 in 2008. The results are compared with old efficiency scores of the same hospitals reported in the literature. This comparison leads to signify that the efficiency of public sector hospitals in Jordan is varied over time, due to decreasing public expenditures on health care per capita. However, the results concerning ratio analysis in explaining efficiency are inconsistent; implying that these institutions are either having poor management or they treat long stays diseases.

JEL: C61, C67, D02, H11, H51, I12

KEYWORDS: Hospitals, Efficiency, DEA, Pabon Lasso, Jordan.

INTRODUCTION

The concept of performance brings together the concepts of quality, efficiency and effectiveness. Hospitals, amongst other organizations, need to know how well they are performing and to have effective means of assessing and improving the quality of care they are providing. This requires measures that are meaningful, interpretable, and of demonstrable value in helping to improve performance (Thomson et al., 1997). Estimating efficiency in the medical field is more difficult than in other fields since the output (health gain, cure or marginal health improvement) is difficult to measure, due to the non-parametric measurable characteristics of hospitals' products. Performance indicators for hospitals are important for internal management to evaluate and improve various hospital functions and for external stakeholders like investors, insurers, patients and public.

This study provides evidence on the performance efficiency of fifteen public hospitals in Jordan during the period (2006-2008), using a multi-criteria non-parametric analysis technique known as Data Envelopment Analysis (DEA), as well as plotting the results on the Pabon Lasso graph to interpret efficiency. It aims at identifying the relatively efficient hospitals and the relatively inefficient ones, based on DEA. In addition, the results will be compared with Al-Shammari's (1999) results of the same fifteen public hospitals 20 years ago (1991-1993). The Pabon Lasso model has also proved to be one of the most useful for comparing the performance of different hospitals. The results of this study are expected to be beneficial to policy makers and the relevant hospital management to develop an assessment system to measure performance of their hospitals.

The remainder of the study is presented as follows: Part II reviews the theoretical background of the study, including: performance measurement, hospital efficiency, ratios, and DEA. Part III reports the Jordanian health sector as the institutional background of the study. While part IV is devoted to the data, methodology, empirical results and analysis of the findings. Finally, part V concludes the study and provides recommendations.

LITERATURE REVIEW AND BACKGROUND

There are different models of hospital performance assessment. These are (WHO, 2003) (1) the Balanced ScoreCard (BSC), which integrates four performance dimensions: financial dimension, customer dimension, internal business process and learning and growth. This model is adopted by Canadian hospitals (Chan and Ho, 2000). Ba-Abaad (2009) provides a review of literatures employed this model. (2) The Danish Model which focuses on (a) a clinical perspective, such as admission, assessment, investigation, evaluation, discharge, follow-up; (b) the patient's perspective comprising information, communication, coordination, continuity, patients´ rights, patient safety; and (c) an organizational perspective, including public information, leadership, human resources, research , education and risk management; and (3) Quality Indicator Project (Maryland Hospital Quality Indicator Project (MHA QI Project®), which is a clinical, outcomes-based research project that allows health care industry participants to understand and improve their performance at their facility. It is a complex model as it incorporates hundreds of measures making it the largest performance quality analysis program available.

There is no consensus about the appropriate performance measurement approach in the health services (Veillard et al., 2003). The most common models are based on ratio analysis and Pabon-Lasso diagram, accounting methods, and frontier approaches (Mohammed, 2004). These are explained in the followings.

Ratio Analysis and Pabon Lasso Diagram

Ratio measurements include the number of outpatient visits per doctor or nurse; or in the case of inpatient care, average length of stay, bed occupancy and turnover rates.

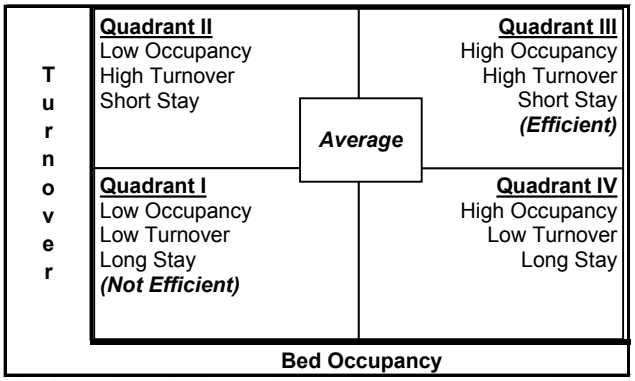
There are three main hospital indicators to assess performance (Sherman, 1984). These are (1) Bed Occupancy Rate (BOR), which measures the percentage of beds occupied by the patients in the year, reflecting the efficiency in the use of hospital resources. (2) Bed Turnover Rate (BTR), which measures the average number of inpatients per bed in the year, as an indicator of the efficiency of hospital resource use. (3) Average Length of Stay (ALOS), which measures the average duration of inpatient hospital admissions (mean number of days from admission to discharge).

Pabon Lasso (1986) developed a method of graphical analysis that allows an easier combination of these three hospital efficiency indicators for meaningful comment on the efficiency with which hospitals are operating. Pabon Lasso graph is a technique that interprets hospital efficiency using such indicators, which is a common practice among hospital managers around the world. Pabon-Lasso diagram, see figure 1, utilizes such ratios of hospitals for comparison (Bahadori et al., 2011), to plot the hospitals in the four quadrants of the figure.

In figure 1, Quadrant I is characterized by low bed occupancy rate (BOR) and low bed turnover (BTO) and therefore under-utilization. This may be related to a higher number of beds than needed and/or a low demand for hospitalization. Low (BTO) and low (BOR) indicate a surplus of hospital beds relative to the existing demand. Quadrant II is characterized by a higher than average (BTO) and a lower than average (BOR). This may be related to a higher number of beds than needed and/or unnecessary hospitalizations, and/or a high number of normal deliveries. High BTO and low BOR characterize the unnecessary

hospitalizations, an oversupply of beds, or using beds for simply observing patients. Quadrant III is characterized by an efficient utilization of resources, since the occupancy and turnover ratios are higher than the average. High BTO and high BOR characterize hospitals that have reached an appropriate level of efficiency, with relatively few vacant beds at any time. Quadrant IV is characterized by a higher than average bed occupancy and a lower than average turnover. A high proportion of severe patients and or a high proportion of long term cases, and or unnecessary long stay may cause this situation. The area near the centre is where average hospitals are located. Hospitals have low BTO and high BOR are serving patients with serious, chronic illnesses or have an unnecessarily long average length of stay (Pabon Lasso, 1986).

Figure 1: Pabon-Lasso Diagram



This figure shows the four quadrants Pabon Lasso Diagram. These quadrants are formed by the intersection of the average bed occupancy rate (BOR) and the average bed turnover rate (BTO) for the same category of hospitals. Source: Pabon Lasso (1986).

Plotting the hospitals according to occupancy and turnover makes sense only if the hospitals have similar characteristics. Public hospitals are likely to accept more complicated cases than private hospitals and therefore they should be considered separately. Once the hospitals with the same characteristics are plotted on the Pabon Lasso graph, it is possible to group them in the four quadrants and to rank them according to average, lower or higher than average utilization. However, efficient utilization should be interpreted with caution. Variation within the same category of hospitals distorts the average. In addition, efficient utilization does not equate to performance in terms of standard and quality of care (Govender et al., 2004).

Accounting Methods

Accounting methods provide unit cost estimates of, for example, admissions, bed-days, surgical procedures and outpatient visits. The main advantage of this method is that the average service cost estimates are often used in the financial analysis documents such as National Health Accounts (Barnum and Kutzin, 1993).

Statistical methods use ordinary least square (OLS) regression analysis that can handle multiple inputs and outputs that hospital efficiency analysis requires. However, these variables are not directly useful in identifying inefficiencies within a hospital (Sherman, 1984).

DEA Model

Frontier approaches include Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA). The choice of measurement method depends largely on the audience, the use of the estimates and the data available (Mohammed, 2004).This study will use DEA.

DEA is an efficiency measurement procedure developed by Charnes, Cooper and Rhodes (1978) to evaluate the efficiency of public sector non-profit organizations. It is a linear programming based model which evaluates the relative efficiency of decision making units (DMUs), with multiple inputs and outputs. DMUs refer to the collection of firms, departments, divisions or administrative units with the same goals and objectives, and which have common inputs and outputs. DEA identifies a subset of efficient "best-practice" DMUs and for remaining DMUs, the magnitude of their non-efficiency is measured by comparing to a frontier constructed from the efficient DMUs. In short, DEA provides management with information regarding the relatively best practice hospitals in the observation set and locates the relatively inefficient hospitals by comparison with the best practice ones. In addition, it indicates the magnitude of these inefficiencies.

The DEA approach constructs a hypothetical composite unit which is the best-practice unit made up of a subset of units that should be emulated by a given inefficient unit in order to improve the efficiency of its operation. That is, the performance of each DMU is measured relative to the performance of all other DMUs. The unit being evaluated can be judged relatively inefficient if the composite unit requires less input to obtain the output achieved by the unit being evaluated, or judged relatively efficient if the composite unit requires as much input as the unit being evaluated. DEA results help in identifying the relatively inefficient DMUs and providing insights into ways to improve productivity of these relatively inefficient units while maintaining or even increasing the volume of services provided by DMUs (Coelli et al., 2005).

DEA is an advantageous hospital efficiency measure over other measures, mentioned above, because it is consistent with the economic theory in that it locates inefficiencies rather than measuring efficiency based on averages. Also, it can simultaneously consider multiple inputs and multiple outputs, and direct management's attention toward the particular factors that exhibit the greatest effect on operational efficiency. In addition, it does not require a common measurement unit for the factors. Finally, it can determine where resources might best be applied in order to reduce inefficiencies (Rutledge et al., 1995).

Overview of Health System in Jordan

Health care services in Jordan are supplied by the following providers (MOH, 2006, 2007 and 2008): (1) The public sector, including the Ministry of Health (MOH), the Royal Medical Services (RMS) for the military and their dependents, the Jordan University Hospital (JUH) and King Abdullah University Hospital (KAUH) of Jordan University of Science and Technology (JUST). (2) The private sector, and (3) the international and charitable sector. Table 1 provides key data about the demographic and health related ratios during the period (2004-2008).

It can be seen from table 1 that life expectancy has increased from 71.5 years in 2004 to 73 years in 2008; and infant mortality rate has decreased from 22 per 1000 live birth in 2004 to 19 in 2008. In addition, the numbers of health care staff has improved during the period 2004-2008. For example, physicians (dentists) increased from 22.4 (7.3) per 10000 population in 2004 to 24.9 (8.7) in 2008. Similar trends are shown with nurses and pharmacists figures.

MOH is the main institutional source of primary and hospital care in Jordan. According to the MOH (2008), MOH operates an extensive primary care network, consisting of 240 Peripheral health clinics, 375 primary health centers, 416 maternal and child health clinics, 68 comprehensive health centers, 313 dental clinics, and 12 chest disease centers. Table 2 presents some data about hospitals and the main ratios during the period (2004-2008).

Table 1: Key Data about the Demographic and Health Related Ratios During the Period (2004-2008)

Country Demographic and Health Data	**2004**	**2005**	**2006**	**2007**	**2008**
Population	5,350,000	5,485,000	5,600,000	5,723,000	5,850,000
Adult Male Illiteracy Rate (%of15+Years of Age)	5.6	4.8	5.1	4.3	4.1
Adult Female Illiteracy Rate (%of15+Years of Age)	15.1	13.1	13.7	11.6	11.4
AVERAGE	**10.3**	**9**	**9.3**	**7.9**	**7.7**
Crude Birth Rate (Per 1000 Population)	29	29	29.1	29.1	28
Population Growth Rate	2.6	2.5	2.3	2.2	2.2
Average Persons Per Family	5.4	5.4	5.4	5.4	5.4
Total Fertility Rate	3.7	3.7	3.7	3.6	3.6
Life Expectancy at Birth (Years) Male	70.6	70.6	70.6	71.6	71.6
Life Expectancy at Birth (Years) Female	72.4	72.4	72.4	74.4	74.4
AVERAGE	**71.5**	**71.5**	**71.5**	**73**	**73**
Crude Death Birth (Per 1000 Population)	7	7	7	7	7
Infant Mortality Rate (Per 1000 Live Birth)	22	22	22	19	19
Maternal Mortality Rate (Per 100,000 Live Birth)	41	40.3	41	41	N/A
Dependency Ratio (%)	70.4	70.4	68.2	68.4	68.2
Unemployment Rate (%)	12.5	14.8	14	13.1	12.7
Physician (Per 10,000 Population)	22.4	23.5	24.5	26.7	24.9
Dentist (Per 10,000 Population)	7.3	7.6	8.2	8.5	8.7
Nurse (All Categories) (Per 10,000 Population)	32.5	29.4	33	33.6	33.2
Pharmacist (Per 10,000 Population)	12.6	12.9	12	14.1	13.2

This table shows some general population and health statistics in Jordan during the period 2004-2008. Source: MOH (2008)

Table 2: Hospitals and its Related Ratios during the Period (2004-2008)

Hospitals and Health Centers Data	**2004**	**2005**	**2006**	**2007**	**2008**
Hospital Numbers	97	98	101	103	103
Hospital Beds	9,820	10,079	11,049	11,043	11,200
Ministry of Health Hospital Beds	3,606	3,638	4,235	4,250	4,333
Royal Medical Services Hospital Beds	1,801	1,917	2,119	2,131	2,129
Jordan University Hospital Beds	540	536	531	531	522
King Abdulla University Hospital Beds	304	388	457	489	504
Private Sector Hospital Beds	3,569	3,600	3,707	3,642	3,712
Hospital Utilization					
Hospital Bed Per 10,000 Population	17	17	19	18	18
Admission Per 1,000 Population	122	128	130	140	142
Average Occupancy Rate (%)	63.3	64.1	60.9	63.7	65.1
Average Length of Stay (Days)	3.3	3.2	3.2	3.1	3.2
Average Death Rate (%)	1.4	1.5	1.4	1.5	1.4
Ministry of Health Centers					
Comprehensive Health Centers	53	57	58	64	68
Primary Health Centers	349	368	370	377	375
Peripheral Health Centers	250	238	243	238	240
MCH Centers	365	385	406	416	419
Chest Disease Centers	12	12	12	12	12
Dental Clinics	260	274	274	285	313
Ministry of Health Budget of the Total Government Budget (%)	6	5.7	6.1	5.6	7.4
Per Capita of GDP (Jordanian Dinar)	1,515.6	1,662.4	1,805.1	1,966.7	2,425.6

This table shows some hospital and health centers statistics and ratios in Jordan during the period 2004-2008. Source: MOH (2008)

Table 2 exhibits that hospital numbers (beds) in Jordan increased from 97 (9820) in 2004 to 103 (11200) in 2008. This growth represents more than the population growth, hence hospital utilization indicators have improved significantly. This is due to the increasing budget of the Ministry of Health from 6% of the total government budget to 7.4%. However, this ratio is still less than that in the developed countries.

DATA AND METHODOLOGY

This section starts by reporting the data used in the study, then presenting the results of DEA efficiency scores, Pabon Lasso graph and, finally, discussing the results.

The Data

Annual data were collected from Annual Statistical Reports published by the MOH for 15 public hospitals for the period (2006-2008). Hospitals are shown in the tables and are coded with letters (A, B, C, D... O). Hospital A is the largest public hospital in Jordan, B is the second largest and so on. Since DEA operates better when the number of DMUs exceeds the number of the combined total of inputs and outputs by at least twice (Drake and Howcroft, 1994), 3 inputs and 3 outputs are selected for the 15 hospitals.

The input data, shown in table 3, are: (1) The annual number of bed days, which is the number of beds multiplies by 365 day; (2) Number of physicians per year, which includes all physicians who are full-timers, no part-timers are employed; and (3) Number of health personnel per year, such as nurses, lab technicians, physical therapists and pharmacists, who are full-timers, no part-timers are employed.

Table 3: Inputs Data for Each Hospital in Each Year during the Period (2006-2008)

Hospital Code & Name / Outputs	Bed Days			Physicians			Health Personal		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
A (Al-Basheer)	338,720	338,720	336,165	558	621	557	1,619	1,479	1,425
B (Princess Basma)	73,730	73,730	73,730	220	214	245	499	536	592
C (Al-Zarqa)	109,500	109,500	109,500	183	204	219	466	445	451
D (Al-Husein/Salt)	55,480	55,480	55,480	176	156	170	392	379	388
E (Al-Mafraq)	21,900	24,090	27,375	36	36	37	214	26	216
F (Jarash)	49,275	49,275	49,275	49	48	46	276	282	303
G (Ma'an)	44,530	47,815	47,815	34	33	35	160	205	191
H (Al-Iman/Ajloun)	38,325	38,325	38,325	45	44	42	254	260	281
I (Al-Karak)	50,005	45,625	45,625	85	93	101	313	309	344
J (Al-Tutanjee / Madaba)	47,085	47,085	47,815	98	10	105	280	275	292
K (Al-Ramtha)	22,265	22,265	37,960	45	43	45	254	175	232
L (Al-Shunah-South)	17,155	17,520	17,520	35	37	32	119	114	127
M (Ghor Al-Safi)	22,630	29,930	29,930	38	37	43	135	138	154
N (Abu-Obaidah)	16,790	16,790	16,790	32	35	34	161	154	157
O (Mua'th Bin Jabal)	11,680	11,680	29,930	30	36	34	144	146	155
TOTAL	**919,070**	**927,830**	**963,235**	**1,664**	**1,647**	**1,745**	**5,286**	**4,923**	**5,308**

This table shows the input ratios for 16 public hospitals in Jordan during the period 2006-2008.

Table 3 reveals that the total bed days, number of physicians and health personnel in the 15 public hospitals increased from 919070, 1664 and 5286 in 2006 to 963235, 1745 and 5308 in 2008, in that order. The output data, reported in Table 4, are: (1) The annual number of patient days; (2) Number of minor surgical operations per year; and (3) Number of major surgical operations per year. Table 4 demonstrates that the total patient days, minor and major operations in the 15 public hospitals increased from 656057, 21122 and 17625 in 2006 to 656976, 21284 and 19411 in 2008, respectively.

Table 4: Outputs Data for Each Hospital in Each Year during the Period (2006-2008)

Hospital Code & Name / Outputs	Patient Days			Minor Operations			Major Operations		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
A (Al-Basheer)	235,316	243,798	241,378	6,375	5,750	5,875	7,419	8,041	8,477
B (Princess Basma)	61,883	61,848	67,714	425	158	117	1,516	1,332	1,443
C (Al-Zarqa)	83,087	68,123	80,940	5,575	5,177	5,957	2,354	1,629	2,690
D (Al-Husein/Salt)	38,891	39,435	40,752	1,851	264	2,874	1,726	1,629	1,598
E (Al-Mafraq)	15,699	1,648	18,300	405	403	254	149	144	102
F (Jarash)	30,068	30,590	28,277	1,041	1,159	992	490	610	556
G (Ma'an)	28,274	28,763	28,452	176	246	308	380	402	407
H (Al-Iman/Ajloun)	26,442	28,235	27,701	843	895	811	313	360	373
I (Al-Karak)	29,335	29,625	30,369	671	1,084	1,079	963	1,105	1,351
J (Al-Tutanjee / Madaba)	32,518	31,478	31,878	1,596	1,374	1,400	1,241	1,326	1,285
K (Al-Ramtha)	26,442	11,215	12,600	843	613	631	481	372	449
L (Al-Shunah-South)	10,582	12,750	12,239	150	73	89	120	217	175
M (Ghor Al-Safi)	16,866	20,259	20,372	407	402	453	161	3,231	285
N (Abu-Obaidah)	12,234	11,840	10,602	452	338	246	177	170	144
O (Mua'th Bin Jabal)	8,420	8,864	5,402	312	348	198	135	179	76
TOTAL	**656,057**	**628,471**	**656,976**	**21,122**	**18,284**	**21,284**	**17,625**	**20,747**	**19,411**

This table shows the output ratios for 16 public hospitals in Jordan during the period 2006-2008.

The Pabon Lasso model is also applied to assess the performance of the fifteen public hospitals in Jordan. This type of analysis is used for quick identification of poorly performing hospitals and finding appropriate strategies to correct the inefficiency. The indicators were also derived from the Annual Statistical Reports published by the MOH for 15 hospitals for the period (2006-2008). The indicators are presented in Table 5.

Table 5 illustrates that the total number of admissions in the 15 public hospitals increased from 206809 in 2006 to 656976 in 2008. While the mortality rate of 1.3% did not changed, the occupancy rate (bed turnover ratio) decreased from 72.4% (87.5%) in 2006 to 65.5% (82.8) in 2008, correspondingly.

RESULTS

This study uses DEA online software to obtain the results. The DEA efficiency scores for the 15 hospitals in each year during the period (2006-2008) are documented in table 6.

In table 6, the relatively efficient best-practice hospitals are given an efficiency score of 100%, while the relatively inefficient ones are given efficiency score less than 100%.

In 2006, 8 of the 15 hospitals have inefficiencies in one or more aspects of their operations. The distribution of inefficient hospitals over efficiency scores ranged from 78.9% to 99.9%. The relatively most inefficient hospital with 78.9% efficiency score indicates that efficient hospitals can obtain at least the level of each output that this hospital obtained by having available no more than 78.9% of input resources required by such hospital. This also means that this hospital should be able to produce its actual output level with 78.9% of the available resources, i.e. or using 21.1% less of each input.

Table 5: Ratio Indicators of Each Hospital in Each Year during the Period (2006-2008)

Hospital Code & Name / Outputs	No. of Admissions			Mortality Rate %			Occupancy Rate (OCC) %		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
A (Al-Basheer)	66,733	74,646	73,467	2.0	2.1	1.9	96.3	72.0	73.1
B (Princess Basma)	16,467	16,351	18,028	1.3	1.6	1.1	83.9	85.1	91.6
C (Al-Zarqa)	26,861	22,296	28,607	1.7	1.3	1.4	75.9	62.2	73.3
D (Al-Husein/Salt)	15,103	15,389	15,705	2.1	1.6	1.7	70.1	69.3	73.3
E (Al-Mafraq)	5,229	5,042	5,001	3.2	3.0	3.6	71.7	69.8	70.5
F (Jarash)	12,651	13,166	11,957	1.4	1.2	1.5	61.0	62.1	57.2
G (Ma'an)	6,680	7,010	6,675	0.9	0.4	0.5	63.5	62.0	59.3
H (Al-Iman/Ajloun)	9,881	10,614	10,625	1.5	1.1	1.2	96.0	73.3	72.1
I (Al-Karak)	10,648	10,996	11,156	1.5	1.5	1.3	58.7	62.4	66.4
J (Al-Tutanjee / Madaba)	10,955	10,960	11,085	1.7	1.6	1.6	69.6	66.9	66.5
K (Al-Ramtha)	6,778	6,267	6,926	0.5	0.6	1.1	58.0	51.2	40.0
L (Al-Shunah-South)	3,650	4,089	4,141	0.1	0.3	1.0	61.7	72.8	69.7
M (Ghor Al-Safi)	5,300	6,081	6,175	0.5	0.5	0.5	74.5	67.7	67.9
N (Abu-Obaidah)	4,450	4,278	4,263	0.4	0.7	0.3	72.9	70.5	63.0
O (Mua'th Bin Jabal)	3,417	4,101	2,350	0.5	0.6	0.4	72.1	75.9	39.0
TOTAL/AVERAGE	**206,809**	**213,293**	**218,169**	**1.3**	**1.2**	**1.3**	**72.4**	**68.2**	**65.5**

Hospital Code & Name / Outputs	Length of Stay (LOS)			Bed Turnover Ratio (TIN) %		
	2006	2007	2008	2006	2007	2008
A (Al-Basheer)	3.5	3.3	3.3	71.9	80.2	81.6
B (Princess Basma)	3.8	3.8	3.8	81.3	82.2	89.0
C (Al-Zarqa)	3.1	3.0	2.8	89.5	74.8	95.0
D (Al-Husein/Salt)	2.6	2.6	2.6	99.4	98.5	103.3
E (Al-Mafraq)	3.0	3.2	3.7	87.3	79.7	70.6
F (Jarash)	2.4	2.3	2.4	93.6	97.5	88.4
G (Ma'an)	4.2	4.1	4.3	54.7	55.2	51.0
H (Al-Iman/Ajloun)	2.7	2.7	2.6	94.0	101.2	101.2
I (Al-Karak)	2.8	2.7	2.7	77.7	84.4	89.3
J (Al-Tutanjee / Madaba)	3.0	2.9	2.9	85.7	84.4	84.7
K (Al-Ramtha)	1.9	1.8	1.8	111.4	104.6	80.2
L (Al-Shunah-South)	2.9	3.1	3.0	77.7	85.3	86.3
M (Ghor Al-Safi)	3.2	3.3	3.3	85.4	74.1	75.3
N (Abu-Obaidah)	2.7	2.8	2.5	96.9	93.0	92.5
O (Mua'th Bin Jabal)	2.5	2.2	2.3	106.6	128.4	53.0
TOTAL/AVERAGE	**3.0**	**2.9**	**2.9**	**87.5**	**88.2**	**82.8**

This table shows hospital ratios for the sample that will be used in Pabon Lasso Diagram during the period 2006-2008.

However, the number of inefficient hospitals decreased in 2007 to 6 hospitals. Four of the inefficient hospitals in 2006 increased their scores in 2007. Nevertheless, in 2008, inefficient hospitals increased to 7 hospitals, with 4 hospitals remained relatively inefficient during the period of the study. Unexpectedly, one hospital witnessed a sharp decrease in its efficiency score in 2008 with a score of 28%.

The results are almost consistent with Al-Shammari (1999), who measured the same 15 sample hospitals during the period 1991-1993. He reported that the number of inefficient hospitals decreased from 8 in 1991 to 6 hospitals in 1992 and further to 4 inefficient hospitals in 1993. In addition, comparing the efficiency of the same hospital between 1993 (Al-Shammari, 1999) and 2008 (this study) shows that the number of efficient hospitals decreased from 11 in 1993 to 8 hospitals in 2008; and, consequently, the average efficiency score dropped from 98% in 1993 to 90% in 2008. In fact, 6 hospitals (A, C, D, F, G

and I) maintain their 100% score of efficiency; 2 hospitals (B and H) improved their efficiency scores; and 7 hospitals (E, J, K, L, M, N and O) deteriorated their efficiency scores, particularly 3 hospitals (M, N, and O) which were fully efficient in 1993.

This result might be explained by that the level of fixed and working capital investments in the public hospitals had not been enough to match the higher level of population growth rate. While the annual population growth rate is around 3%, government expenditures on public health care and hospitals is remain almost constant, taking into consideration the inflation rate in health care materials and supplies.

Table 6: DEA Efficiency Scores for Each Hospital in Each Year during the Period (2006-2008)

Hospital Code & Name	DEA Efficiency Scores			
	2006	**2007**	**2008**	**AVERAGE**
A (Al-Basheer)	100.0%	100.0%	100.0%	**100.0%**
B (Princess Basma)	100.0%	100.0%	100.0%	**100.0%**
C (Al-Zarqa)	100.0%	100.0%	100.0%	**100.0%**
D (Al-Husein/Salt)	100.0%	100.0%	100.0%	**100.0%**
E (Al-Mafraq)	**94.9%**	**88.0%**	**89.8%**	**90.9%**
F (Jarash)	100.0%	100.0%	100.0%	**100.0%**
G (Ma'an)	100.0%	100.0%	100.0%	**100.0%**
H (Al-Iman/Ajloun)	**99.9%**	100.0%	100.0%	**100.0%**
I (Al-Karak)	**85.8%**	**93.3%**	100.0%	**93.0%**
J (Al-Tutanjee / Madaba)	100.0%	100.0%	**97.2%**	**99.1%**
K (Al-Ramtha)	**89.2%**	**77.1%**	**72.9%**	**79.7%**
L (Al-Shunah-South)	**78.9%**	**93.2%**	**89.4%**	**87.2%**
M (Ghor Al-Safi)	**98.2%**	100.0%	**95.5%**	**97.9%**
N (Abu-Obaidah)	**94.2%**	**92.3%**	**79.3%**	**88.6%**
O (Mua'th Bin Jabal)	**90.5%**	**99.8%**	**28.1%**	**72.8%**
AVERAGE	**95.4%**	**96.2%**	**90.1%**	**93.9%**

This table shows hospital efficiency scores as a product of DEA computation during the period 2006-2008.

Efficiency Scores

In addition to the identification of inefficient hospitals and their efficiency reference set, the DEA online software provides additional insights on how to improve the efficiency of the hospital. Table 7 provides the results that pertain to either the potential reduction in the usage of inputs (-) or the potential increase in the production of outputs (+) to increase efficiency for each inefficient hospital during the period (2006-2008).

Table 7 suggests that, to improve the efficiency, practices (in Al-Mafraq, Al-Karak, Al-Tutanje/Madaba, Al-Ramtha, Al-Shuna-South, Ghor Al-Safi, Abu Obaidah and Muath Bin Jabal hospitals) should work either to reduce the inputs of bed days, physicians and health personnel, and/or to increase the potential output of patient day, and minor and major operations.

Pabon Lasso Diagram

Pabon Lasso graph divides hospitals into 4 categories, as shown in Figure 1. The results for the 15 hospital performance assessment by Pabon Lasso are shown in Figure 2. The three graphs show that it is more useful to compare the indicators of the hospitals with one another than the indicators of each hospital used in isolation.

Table 7: The Potential Reduction in the Usage of Inputs and/or Increase the Outputs for Each Inefficient Hospital during the period (2006-2008)

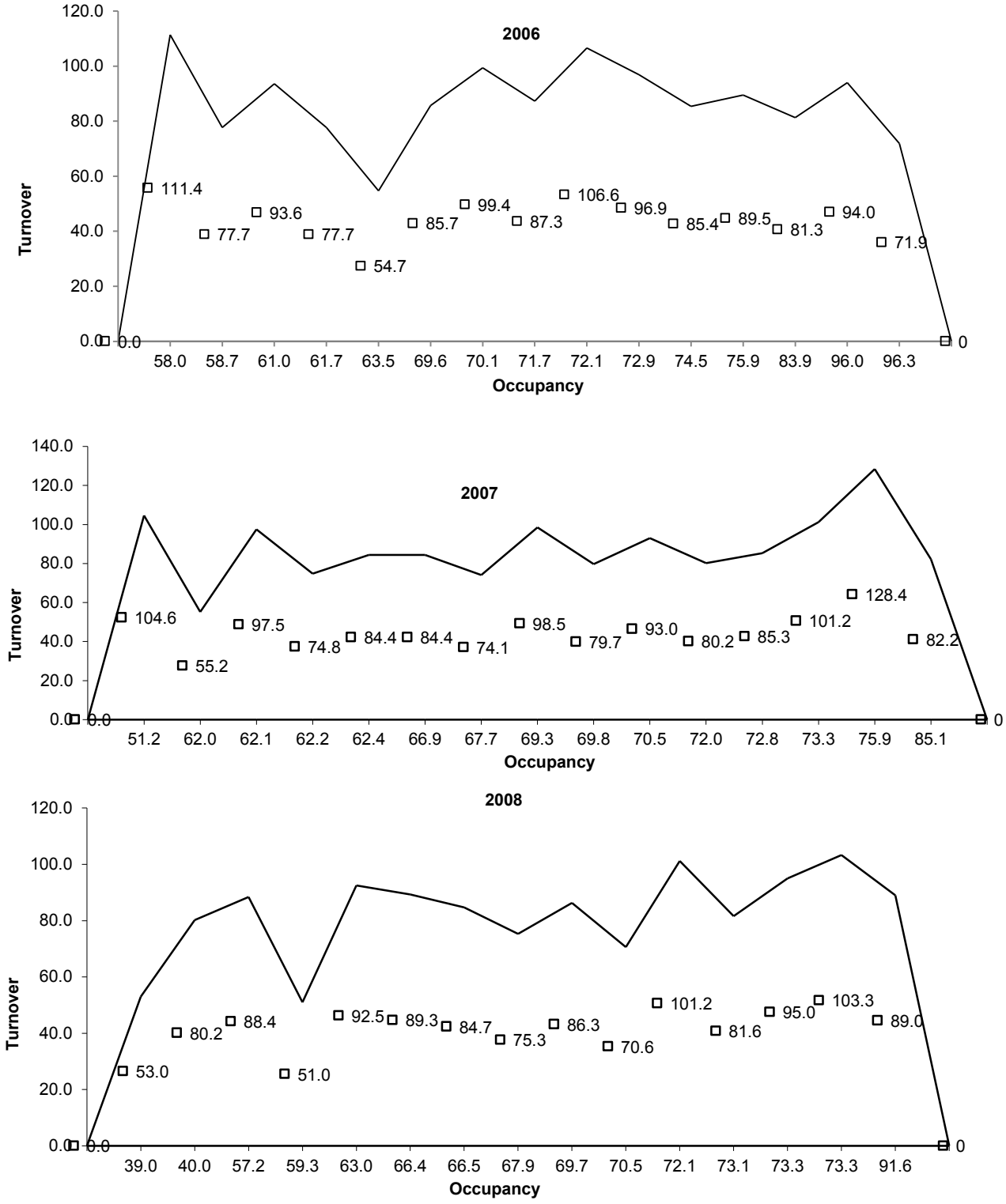
Hospital Code & Name	INPUTS								
	Bed Days			Physicians			Health Personal		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
A (Al-Basheer)									
B (Princess Basma)									
C (Al-Zarqa)									
D (Al-Husein/Salt)									
E (Al-Mafraq)	-5%	-12%	-10%	-5%	-12%	-14%	-59%	-35%	-16%
F (Jarash)									
G (Ma'an)									
H (Al-Iman/Ajloun)									
I (Al-Karak)	-14%	-7%		-14%	-7%	0%	-32%	-27%	
J (Al-Tutanjee / Madaba)			-3%			-3%			-3%
K (Al-Ramtha)	-11%	-23%	-53%	-10%	-22%	-27%	-31%	-46%	-67%
L (Al-Shunah-South)	-22%	-7%	-11%	-21%	-7%	-11%	-44%	-7%	-11%
M (Ghor Al-Safi)	-2%		-4%	-2%		-4%	-30%		-4%
N (Abu-Obaidah)	-6%	-8%	-21%	-5%	-8%	-21%	-54%	-30%	-39%
O (Mua'th Bin Jabal)	-10%	-1%	-74%	-19%	-8%	-72%	-60%	-78%	-72%

Hospital Code & Name	OUTPUTS								
	Patient Days			Minor Operations			Major Operations		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
A (Al-Basheer)									
B (Princess Basma)									
C (Al-Zarqa)									
D (Al-Husein/Salt)									
E (Al-Mafraq)				154%	1%	83%	194%	64%	162%
F (Jarash)									
G (Ma'an)									
H (Al-Iman/Ajloun)									
I (Al-Karak)	2%			32%					
J (Al-Tutanjee / Madaba)	0%		2%						
K (Al-Ramtha)	11%		4%						
L (Al-Shunah-South)				15%	153%	161%	140%	24%	27%
M (Ghor Al-Safi)				176%		13%	197%		97%
N (Abu-Obaidah)				50%			91%	52%	41%
O (Mua'th Bin Jabal)							65%	63%	35%

This table shows the potential reductions in the inputs and/or increase the outputs for each inefficient hospital during the period (2006-2008). (-) indicates potential reduction in the usage of inputs, (+) potential increase in the production of outputs, and (shaded cell) indicates efficient use of the designated variable.

Efficient hospitals in this study fall into Zone 3 of the Pabon Lasso graph. These institutions can reach an ideal level of performance through appropriate service management and conforming to the current admission and hospital stay standards. However, hospitals that fell into Zone 4 with high average long stay ratio and low (BTO). A situation that felt to be due mainly to the nature of the diseases treated in these centers. Broad strategies for enhancing the performance of Zone 4 hospitals include a shift towards outpatient services and efforts to overcome shortages and improve management.

Figure 2: Pabon Lasso Graph for the 15 Hospitals for Each Year during the Period (2006-2008)



These figures show Pabon Lasso diagrams for the 15 public hospitals in years 2006, 2007 and 2008, respectively. TIN is bed turnover ratio and OCC is the occupancy rate. The alphabetical letters (A, B, C …,and O) in the diagrams are designated for hospital names as identified in the tables above.

Nevertheless, hospitals that fell into Zone 1 indicate poor performance and inefficient usage of resources. One short-term strategy to address this problem could include a halt to hospital expansion for the time being. At the same time, every effort should be made to identify and correct factors contributing to the present state of poor efficiency. Finally, those hospitals that fall in Zone 2 are characterized by excess bed supply, unnecessary bed supply and the use of beds for patient observation.

CONCLUDING COMMENTS

This study aimed at measuring the relative efficiency of public hospitals performance in Jordan, during the period (2006-2008). It employed a non-parametric mathematical programming model (DEA) to measure hospital efficiency, and a graphical analysis (Pabon-Lasso Diagram) to interpret efficiency. The study used 3 input variables: the annual number of bed days, number of physicians per year and number of health personnel per year; and 3 output variables: the annual number of patient days, number of minor surgical operations per year and number of major surgical operations per year, for 15 public hospitals in Jordan for the period (2006-2008).

The results indicate that the average efficiency of public hospitals in Jordan during the period (2006–2008) is varied and ranges between (73%) to (100%). The average of the relative efficiency of the sample hospitals over the study period is 94%. Of 15 hospitals, the number of efficient hospitals increased from 7 in 2006 to 9 in 2007, but decreased to 8 in 2008.

The results are compared with Al-Shammari (1999), who measured the same 15 sample hospitals. This comparison leads to signify that the efficiency of public sector hospitals in Jordan is varied over time, due to decreasing public expenditures on health care per capita, in real not nominal values. On the other hand, the analysis shows that large hospitals strongly outperform small and medium ones in terms of efficiency. This might lead to conclude that hospital size is a determinant of efficiency.

However, the results concerning ratio analysis in explaining efficiency implies that efficient hospitals fall into Zone 3 of the Pabon Lasso graph. Inefficient hospitals fell into Zone 1, 2 and 4. This inconsistency implies that these institutions are either having poor management or they treat long stays diseases.

Efficiency scores show how close hospitals to using their maximum performance capacity. Thus, it is recommended that inefficient public hospitals need to improve their efficiency and performance, by either (1) appropriate service management, (2) conforming to the current admission and hospital stay standards, (3) shift towards outpatient services, and/or (4) encourage resources employment efficiency by better handing expenses.

Due to the limitations of the variables included in the model, the results of the study should be taken with cautious. Quality of health care inputs, i.e. staff and equipments, and health care outputs and satisfaction are among the missing factors in the model. Future research is recommended to incorporate these factors into the model. We recommend use of the DEA technique in assessing and measuring performance of hospitals because it can be used regardless of their types and seeks to address the limitations of other models. However, more research employing advanced DEA modeling should be devoted to analyze the impact of other regulatory-specific and hospital-specific variables on efficiency such as quality of health care services.

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ECONOMIC ASSESSMENT OF THE USE OF SOLAR ENERGY IN KUWAIT

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ABSTRACT

In Kuwait, the current method of generating electricity using conventional power plants cannot provide beneficiaries with adequate service unless more plants are constructed. In addition to their high cost, these plants cause environmental damage, creating the need to investigate sources of clean energy. This study assesses the technical and economic feasibility of implementing Photovoltaic (PV) solar energy in residential houses in Kuwait. Data and information were collected and the appropriate PV system was selected according to cost and PV specifications. Next, the equivalent annual costs of the PV system with various discount rates were estimated together with the cost per kWh both for new and existing houses. Third, the annual reduction of CO_2 emissions resulting from implementing grid-tied PV systems was calculated. Taking into consideration the financial savings from CO_2 reduction, the cost per kWh was estimated and compared with the current cost. The purported discount rate adopted by the Kuwaiti government's long term plan is 6.7%. However, a range of discount rates from 0% to 20% was applied and results obtained. The results showed that with a 6.7% discount rate the annual savings on energy costs for a new house and a previously constructed hose were KD 745 and KD 653 respectively. The results also revealed the payback periods for the PV system for these houses are 7 and 7.4 years respectively. We concluded that integrated PV (BIPV) solar energy is economical and technically feasible in Kuwait when the discount rate is equal to, or less than, the break-even point of 10.36%.

JEL: N7

KEYWORDS: BIPV, Equivalent Annual Cost, Payback Period, Renewable Energy, and Solar Energy.

INTRODUCTION

Energy consumption in Kuwait is increasing at an 8% yearly rate (Alotaibi, 2011). Population growth has resulted in the need for new infrastructure, especially in forms of electricity and water. This has doubled the loads of electrical power plants, and creates challenges to find alternative sources of electrical power. Residential buildings consume a high percentage of electricity and can reach 70% of total production during the summer (MEW, 2010). The current method used to produce electricity cannot effectively provide beneficiaries with acceptable service throughout the year, unless more new conventional power plants are constructed (Al-Faris, 2002). Conventional power plants are major oil consumers. The consumption in these plants alone would reach 26.5% of total Kuwaiti oil production by 2020. With the oil production rate of 2008, all the produced oil would consumed locally by 2027 (Alotaibi, 2011).

Kuwait is considered one of the highest carbon dioxide emitters for each person in the world (30.2 ton a person). This occurs mostly because of gases emitted from conventional electricity plants (UN data, 2010). Emissions of toxic gas from traditional power generators, which run on fossil fuels, are harmful to the environment and humans alike. Because of these circumstances, there is a growing interest in renewable and eco-friendly energy sources such as solar. Solar energy is a renewable energy sources that can be a partial substitute for fossil fuel thereby avoiding most of the negative impact of fossil fuels

(Kumar and Tiwari, 2009). Photovoltaic (PV) technology is proven and easy to use and the global PV market is predicted to increase substantially in the future (Hoffmann, 2006).

LITERATURE REVIEW:

There are several reasons to strengthen the research results and to decrease future risks when utilizing PV technology. Efficient and accurate data from recent studies will help overcome any unexpected entries to the PV in the future. Efficiency of the solar modules is increasing while manufacturing and selling prices are decreasing (Al-Salaymeh, et al., 2010). The average estimated payback time (EPBT) is from 3.25 to 4.5 years for most silicone types of solar (Seng, et al., 2008). The prices of BIPV can be effected by many causes. Sunny and clear locations are more compatible with the PV Modules, which can lessen the cost and increase the PV modules efficiency. Choosing locations and orientations with higher incident solar irradiance can be a key for PV technology applications (Laleman, et al., 2011), and (Hoffmann, W., 2006). Kuwait's annual solar irradiation estimated at 2,100–2,200 kW/m^2 a year (Ramadhan, et al., 2011). The size of the PV directly effects both the cost and the technical factors. The larger the PV the more feasible it is both technically and economically. Cost reductions resulting from larger production volumes affect feasibility (Zahedi, 2006).

Fossil fuel prices influence solar energy preference. The higher the fossil fuel prices the higher the utility tariff cost and production cost of conventional electricity. This in turn encourages the trend toward intensive use of solar energy. Grid-tied PV have a total cost far lower than the off-grid PV or standalone PV, because of added batteries, battery chargers, and a current regulator (Al-Salaymeh, et al., 2010)].

Depletion of all sources of fossil fuel within an average of 50 years forces us to invest more heavily in sustainable sources of energy like solar (Kumar S., 2009). CO2 emission has a cost subtracted from the BIPV cost. 33 US$/ton of CO2 mitigation represents the monetary value of one carbon credit for mitigation of 1 ton of CO2 emission (Chel, et al., 2009). The use of PV power can significantly reduce the summer demand peaks where the load for midday air-conditioning demand increases (Rüther, et al., 2008). From economic analysis, the life cycle cost of PV energy is lower than the life cycle cost of conventional electricity in some regions. PV has significant advantages when there are no utility cables, because cabling is expensive and installation can be a time consuming process (Bhuiyan, et al., 2000). Small-scale rooftop applications (1-100 kW) do not take up new land, which could be a huge advantage considering high urban population density in Kuwait. In comparison to large-scale PV plants, there is no need for more transmission lines, lowering both the cost and time of installation. When small-scale PV become economically viable, they can considered a rather low risk long-term investment (Zahedi, 2006).

DATA AND METHODS

Kuwait is a desert country with a clean, hot and dry climate. From the NASA clearness index, K_T, the average yearly reading for Kuwait over a twenty-year period is 0.59, which represents clear skies almost year long. For values above 0.5, the location has clear skies most days of the year (Islam, et al., 2009). The maximum yearly total global solar radiation matches a tilt angle of 30°, which is equal to Kuwait's latitude. The PV arrays for a proposed PVsystem should have the same orientation, 30° angle facing south (Al-Hasan, et al., 2004). The maximum annual sun hours for Kuwait are 9.2 hours daily. With average peak hours of 7.5 daily, average solar radiation of 5.5 kW/m^2 . The diffused radiation of 1.6 kW/m^2, where only 1 kW/m^2 would normally needed to activate the solar cell to its maximum power (Alnaser et al., 2004).

Al-Mumin and Al-Mohaisen (2008) showed the average roof area of a typical Kuwaiti house is 308.3 m2, as shown in Fig.1. The average Kuwaiti house consists of two and a half floors, and consumes an average of 166.25 MW/yr (MEW, 2009). The latest MEW report (2010) stated there are 375,529 houses or

residential consumers. The cost of producing electricity in Kuwait is 34 Fills/kWh ($0.12/kWh) (Ramadhan and Nasseeb, 2011).

Figure 1: First Column Represents the Average Roof Surface Area of Kuwaiti Houses

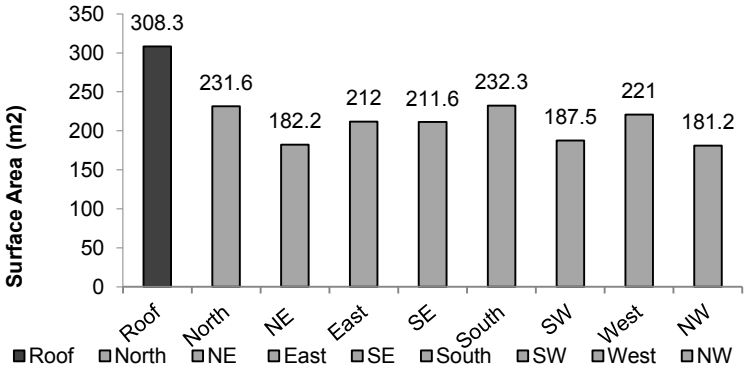

Figure (1) showed the average roof areas of the Kuwaiti residential houses of 308.3m^2 with all facades average areas considered . (Source: Al-Mumin and Al-Mohaisen, 2008)

Selecting the proper module depends on several issues. Maximum efficiency, minimum area, lowest cost modules are desirable. The specification data of four different types of PV modules (Samsung, 2011, DMSOLAR, 2011, SinoSolar 2011 and BestSun 2011) are collected. Hadi (2011) analyzed these data and concluded the BestSun156P300-72 module is the most suitable for Kuwait. Table 1 presents the main comparison features between the four modules, some specific data for each module and the comparison results.

Electricity supply in Kuwaiti uses 3-phase power, which leads us to select a model TLS-ZB 40kW inverter unit. The cost of the inverter is $8,810, with a twenty-year manufacturer's warranty (Tresstech, 2011).

Table 1: Comparison of Four Different PV Modules

Features	Samsung LPC241SM	DM Solar DM-280M2-3	SinoSolar SA260-96	BestSun 156P300-72
Cell Type	Mono-crystalline	Poly-crystalline	Mono-crystalline	Poly-cristalline
Efficiency	15.06%	14.40%	NA	15.6%
Module Output Wattage	241	280	260	300
Module Price $	582	518	429	465
Price/Watt $	2.41	1.85	1.65	1.55
NOCT	46+2C	47+2C	NA	46+2C
Weight	18.6 Kg	23.2KG	NA	13 Kg
Temp. Cycling	-40 to +85C	-40 to + 90C	NA	-40 to +85C
Roof Area m2	308.3	308.3	308.3	308.3
Occupied Area (ms)	1.60066	1.940352	1.659	1.940352
Total AAPM plus shade	2 m2	2.3 m2	2 m2	2.3 m2
No. of Modules	154	134	154	134
System Power Watt	37,114	37,520	40,040	40,200
Cost of Modules $	89,444.74	69,412	66,066	62,310

Table (1) represents a comparison of four PV Modules; BestSun156P300-72 is the chosen Module for number of reasons. It has the highest Efficiency of 15.6%, the highest manufacturing power of 300 Watt, and the lowest cost by watt $1.55.

BOS of a PV consists of all the technical and engineering parts. It mainly consists of an inverter to transform the direct current (DC) power from the PV array into a form of alternating current (AC) electricity that can combined with, and connected to, the electric utility grid. It also involves support structures and the cost of labor for the PV installation. The BOS accounts for 30% to 40% of the cost of the PV. In some studies, 35% is chosen as the average BOS cost of the PV. Usually, the cost of the

inverter, is the second most expensive part added to the module cost, thus decreasing the BOS cost from 35% to 25% (Ayompe, et al., 2010).

RESULTS

Estimating the PV Initial Cost

The roof area of the average residential house is 308.3m^2. Each module of the selected model BestSun156 P300-72 occupies 2.3m^2 including the shaded area between module panels. We compute the number of modules per PV system as follows = total roof area / area of a single module= 308.3m^2 / 2.3m^2 = 134 modules per house. The initial cost of one module with 300-watt peak output power = $ 465 (Table 1). The initial cost of all modules= $465 * 134 = $62,31. The initial cost of the inverter is$8,810/system (Tresstech, 2011).

The BOS Initial Cost and Total PV System Initial Costs per House is computed as follows:

System initial cost = modules initial cost + inverter initial cost + BOS initial cost (1)

Its assumed that the cost of BOS equals 25% of the system cost (Rigter and Vidican, 2010). Let x = the initial cost per system in equation (1). Then x = $62,310 + $8,810 + 0.25x $\rightarrow$ 0.75x = 71,120 and x = 71,120 / 0.75 = 94,826.7. BOS initial cost = $94,827 * 0.25 = $23,707 per house. Thus the total PV system initial costs *Ai* = $94,827 / house

Estimating the Equivalent Annual Cost (EAC) of The PV System

The cost of operations and maintenance (O&M) is estimated next. We use the following equation (Park, 2009):

AAOM = P*(1+*f*)n (2)

Where: *AAOM* is the average annual cost of operation and maintenance, *P* is the present O&M cost (System data manual) = $500, *f* is the annual inflation rate expected = 3.24% (InflationData.com, 2011), and *n* is the system estimated useful life =20 years. Then, *AAOM* = $688.40

The Total Equivalent Annual Costs (EAC) is estimated as follows:

$$EAC = Ai + AAOM \quad (3)$$

Where: *EAC* is total system equivalent annual cost, *Ai* is the equivalent annual cost of the system initial cost at certain discount rate (*i*) and is derived from the following equation:

$$Ai = P * CRF \quad (4)$$

Where: *P* is the system initial cost, *CRF* is the capital recovery factor and is obtained from the following equation:

$$\boldsymbol{CRF} = \left[\frac{\boldsymbol{i}\times(\boldsymbol{1}+\boldsymbol{i})^{\boldsymbol{n}}}{(\boldsymbol{1}+\boldsymbol{i})^{\boldsymbol{n}}-\boldsymbol{1}}\right] \quad (5)$$

Where: i is the discount rate and n is the system useful life, assumed to be 20 years.

The purported discount rate adopted by the Kuwaiti government's long-term plan is 6.7%. However, discount rates from 0% to 20% applied are. The resulting *EAC*s in US$ and Kuwaiti Dinars (KD) given in Table (2).

Table 2: *EAC* of BIPV with Different Discount Rates

Discount rate	Initial cost ($)	The Capital Recovery Factor *CRF*	Initial cost per/year ($)	O&M/year ($)	System *EAC*	
					($)	(KD)
0%	94,827	0.05	4,741.3	688.4	5,432.0	1,514.4
5%	94,827	0.0802	7,609.1	688.4	8,297.6	2,313.4
6%	94,827	0.0872	8,267.4	688.4	8,961.2	2,496.9
6.7%	94,827	0.0922	8,743.3	688.4	9,431.8	2,629.6
10%	94,827	0.1175	11,138.3	688.4	11,826.7	3,297.3
15%	94,827	0.1598	15,149.7	688.4	15,838.1	4,415.7
20%	94,827	0.2054	19,473.3	688.4	20,161.7	5,621.1

*Table (2) shows the equivalent annual cost (EAC) which equal to the initial cost multiplied by the capital recovery factor at certain discount rate added to it the average operating and maintaining cost of the PV system during its lifespan. * 1US dollar = 0.2788 Kuwaiti Dinar (KD) ** 1 Kuwaiti Dinar (KD) = 3.586 US dollars*

System Annual Output Power (AOP) and Cost Per kWh

Table (3) shows the cost/kWh at several discount rates in US cents and KF. The annual output power is estimated using the following equation (Ramadhan and Nasseeb, 2011)

$$AOP \text{ in Kuwait} = \text{average insolation /m2/yr} * \text{module efficiency} * \text{modules area} \quad (6)$$

The average annual solar insolation for Kuwait = 2,080 kWh/m^2/yr (Ramadhan and Nasseeb, 2011 & Alnaser, et al., 2004), The module efficiency is 15.6% (BestSun, 2011). The area occupied by 134 modules is 134 * 1.94 m2 (Table 1) = 259.96 m^2

AOP in Kuwait = 2,080 kWh/m^2/year * 0.156 * 259.96 m^2 = 84,351.8 kWh/yr. So the cost of electricity per kilowatt hours is calculated using the following equation:

$$Cost\ of\ electricity\ per\ kWh = EAC/AOP \quad (7)$$

Cost of electricity per kWh (at 0% discount rate) $= \frac{1{,}514.4\ KD}{84{,}352 KW/yr} = 18$ KF/kWh

1KD=1000 Kuwaiti Fils (KF)

System Net Cost After Deducting the CO2 Cost/kWh

Table 4 shows the net system cost per kWh at several discount rates. CO_2 emission has a cost; this cost ranges widely, depending on several factors (Roberto, 2010). In this study the average cost of CO_2 emission is $30/ton (Ramadhan and Nasseeb, 2011; Chel, et al.; 2009; Johnson and Keith, 2004). The amount of CO_2-e prevented by the use of solar energy is given (EPA, 2011) as:

$$Annual\ amount\ saved\ of\ CO2\ per\ kWh = 7.18*10\text{-}4\ metric\ tons\ CO2/kWh \quad (8)$$
$$= (7.18 \times 10^{-4}) \text{ metric tons CO2 per kWh} \times 84{,}351.8 \text{ kW} = 60.6 \text{ metric tons/house/year}$$

Cost of CO_2 saved by the PV system = 60.6 * \$30 =\$1,818/house (KD 507/house)

Cost of CO_2 saved per kWh = Annual cost of CO_2 / PV system annual output power = \$1,818 / 84,351.8 kWh = \$0.022/kWh (KF 6.1/kWh)

Net cost per kWh (at zero interest rate) = EAC per kWh – CO_2 cost per kWh = 18 – 6.1 = KF 11.9 /kWh

Table 3: Cost per kWh for the BIPV System At Different Discount Rates

Discount rate		0%	5%	6%	6.7%	10%	15%	20%
System EAC	US $	5,432	8,298	8,956	9,432	11,827	15,838	20,161
	KD	1,514	2,313	2,497	2,630	3,297	4,416	5,621
System AOP (kWh/house)		84,352	84,352	84,352	84,352	84,352	84,352	84,352
Cost/kWh	US Cent	6.4	9.8	10.6	11.2	14.0	18.8	23.9
	KF	18.0	27.4	29.6	31.2	39.1	52.3	66.6

*Table (3) represents the PV System cost per Kilowatt at different discount rates in both Kuwaiti Fills (KF) and US Cents (US ¢). * 1US dollar = 0.2788 Kuwaiti Dinar (KD) ** 1 Kuwaiti Dinar (KD) = 3.586 US dollars*

Cost Comparisons between PV and Current Systems

The current electricity cost in Kuwait is 34 KF/kWh (Ramadhan and Nasseeb, 2011). The discount rate adopted by the Kuwaiti government's long term plan is 6.7%. The cost per house at a 6.7% discount rate using PV system is 2,123.5 KD/house. The current annual cost equals Cost/kWh * Annual PV system output = 34 * 84,351.8 = 2,868 KD/year. So the annual saving per house equals 2,868 – 2,123.5 =744.5 KD/house.

Table 4: Cost Comparisons between PV & Current Cost for a New House

Discount rate	PV system cost/kWh	PV System annual cost/house	Conventional cost/kWh	Conventional annual cost/house	Cost Differences KF/kWh	PV Annual output power	Annual Cost differences KD/house
0%	11.9	1,007.7	34	2,868	22.1	84,351.8	1,860.3
5%	21.4	1,807.3	34	2,868	12.6	84,351.8	1,060.7
6%	23.6	1,990.8	34	2,868	10.4	84,351.8	877.2
6.7%	25.2	2,123.5	34	2,868	8.8	84,351.8	744.5
10%	33.1	2,791.2	34	2,868	0.9	84,351.8	76.8
10.36%	34.0	2,868.0	34	2,868	0.0	84,351.8	0.0
15%	46.3	3,909.6	34	2,868	-12.3	84,351.8	-1041.6
20%	60.6	5,115.0	34	2,868	-26.6	84,351.8	-2247.0

Table (4) shows the final cost comparisons between the PV system and current system per kWh and per house per year for several discount rates.

Figure 2: Cost Differences per kWh between PV and Conventional Systems

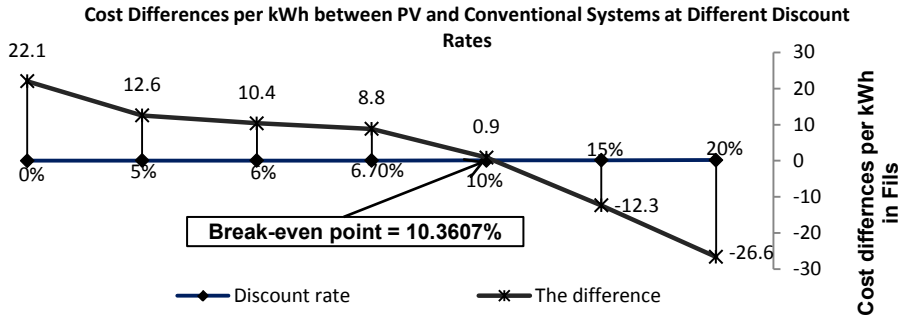

Figure (2) shows the cost differences of the kWh between PV system and conventional system at different discount rates.

Figure 3: Annual Cost Differences per House at Different Discount Rates

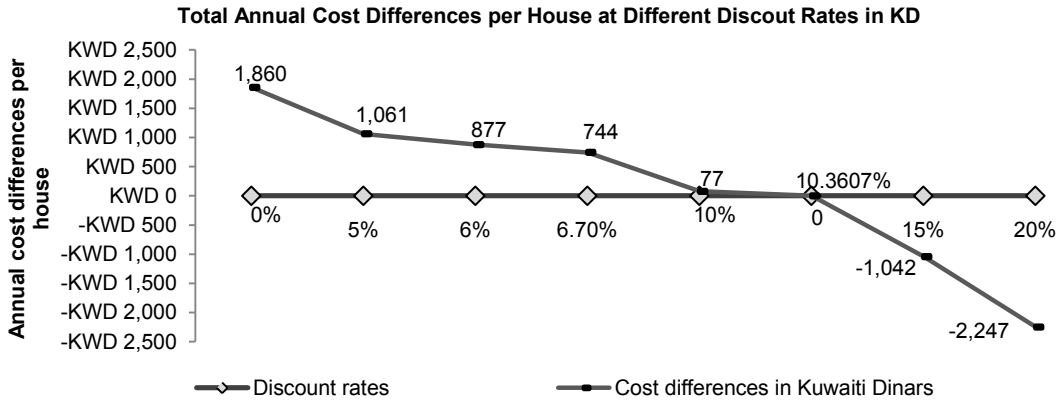

Figure (3) shows the annual cost differences per house at different discount rates. It is shown that the PV system is economically feasible when the discount rate is less than or equal to the break-even point of 10.36% discount rate.

System Pay-Back Period for Newly Constructed Houses

The estimated payback period (PBP) for newly constructed houses is given as (Chel and Tiwari, 2011):

The system PBP = (system total annual cost per house at certain discount rate * system lifespan in years) / current annual cost of electricity per house

Where: system annual cost at 0% discount rate is 1,007.7 KD, system lifespan is 20 years and current annual cost of electricity per house is 2,868 KD/house/yr.

PBP at 0% discount rate = $\frac{\mathbf{1{,}007.7KD \times 20}}{\mathbf{2{,}868KD}}$ = 7 years

PBP at several discount rates is given in Figure (4). It is shown that at 6.7% discount rate the PBP is 14.8 years, and at the break-even discount rate of 10.36% it is 20 years.

Figure 4: PBP of PV System for Newly Built Houses

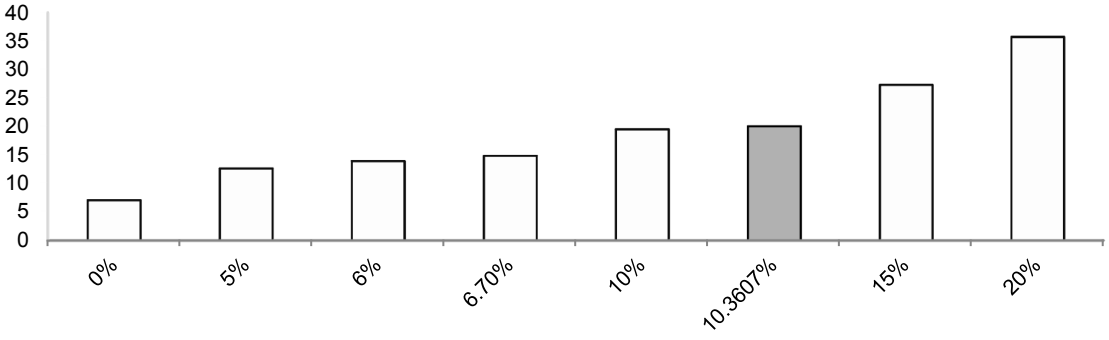

Figure 4 shows the estimated payback period of the PV at assumed discounted rates.

PV System for Previously Built Houses

The only difference between performing a BIPV system on a newly built and a previously built house is the cost of the BOS unit. The infrastructure of previously built houses does not adapt the PV system

directly. Some adaptations are needed to the main utility box and installing new wiring conduits, to cover all extra costs. The estimated BOS initial cost of the previously built house is estimated to be 15% more than the BOS cost of a new house. The same method used for estimating the cost for newly built houses is used. The net cost/kWh is calculated for several discount rates. The results showed the net cost is 12.5 and 24.6 KF/kWh for 0.0% and 6% discount rates respectively. The results also revealed that with a 6.7% discount rate, annual saving for a previously built house is KD 653. The PV is economically probable when the discount rate is less than or equal to the break-even point of 9.82% discount rate. The payback periods are 7.4 and 15.5 years at 0% and 6.7% respectively.

CONCLUSIONS

Because of the extensive use of conventional power plants, Kuwait is considered one of the highest carbon dioxide emitters for each person in the world at 30.2 ton/person a year. A PV system would reduce the country's emissions by almost twenty three million tons each year. The sunny climate of Kuwait creates excellent conditions for increasing the peak hour power of the PV system, which in turn lowers the cost of the BIPV.

Considering the financial savings of the CO_2 decline resulting from using the new PV system, the EAC of the BIPV is lower than the EAC of the current conventional source of energy. At a 6.7% discount rate, the estimated cost/kWh of the BIPV for a new house is 25.2 KF, while for a previously built house it is 26.3 KF. The current conventional electricity cost is 34 KF/kWh. The annual savings, therefore, of BIPV for newly and previously built houses are 744 and 635 KD/house respectively.

The estimated payback periods of the BIPV, with 6.7% discount rate, for newly and previously built houses are 14.8 and 15.4 years respectively; at a 0.0% rate, they are 7 and 7.4 years respectively. These are shorter than the twenty-year lifespan of the BIPV. BIPV solar energy is economically and technically feasible in Kuwait when the discount rate is equal to, or less than, the break-even point of 10.36% for new houses and 9.82% for existing houses.

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CHANGE FACTORS DRIVING MANAGEMENT DEVELOPMENT NEEDS: EMPIRICAL EVIDENCE FROM PAKISTAN

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ABSTRACT

The paper explores the impact of external and internal organizational changes on competence development needs of managers in Pakistan. The study examines internal and external developments in the business environment. It provides a detailed analysis of the impact of these change drivers on Pakistan business organizations. Additionally, the research examines the influence of these change drivers on theoretically derived competence classes by performing multivariate analysis. The findings indicate, in the context of the external environment, the global & national economic situation, government policies, political instability, energy crisis and above all technological changes affect the business organizations in Pakistan. The internal environmental examination reveals that workplace changes, technological innovation, and changes in HRM and HRD policies influence competence development needs of managers. This paper provides useful information to policy makers and business practitioners regarding changes taking place in Pakistan. The knowledge generated with this research may assist in re-designing the business education curriculum and ignite re-thinking of human resource management and development strategies in Pakistan.

JEL: M1, M12

KEYWORDS: Pakistan, Drivers of Change, Growth, Competence Management

INTRODUCTION

In THE 21st century, the most formidable challenge for developing countries like Pakistan is to attract foreign direct investment for sustainable economic development. Foreign direct investment is the most critical factor needed for improvement in social and economic outlook of the country. In Pakistan, there are many factors responsible for the poor economic development including political instability, deteriorating law and order and the energy crisis. Besides governance, political and economic issues, a major problem lies with human resource development in the country (Hussein, 2005a; Hussein, 2005b; Qureshi, 2009). In Pakistan's case, there is dearth of academic research on competencies needed by managers to perform their jobs effectively. Moreover, the internal and external developments aspects for business organizations and job demands of the managers are still unknown, and their specific influence on competence development needs of future managers is also ambiguous.

This research reports the initial findings of internal and external factors that organizations should consider in developing their business policies. Additionally, a causal model showing the influence of these changes, referred to as change drivers, on competence classes determines competence development manager needs in Pakistan. The findings in this paper are based on the results of the first phase of a survey conducted as a part of a large project. The remainder of the paper is organized in four sections a) Literature review, b) Research Methodology, c) Research Results and d) Discussion and Conclusion. The third section (c) discusses the drivers for change, with respect to their frequency counts.

LITERATURE REVIEW

In recent times, competence management has attracted interest from the research community and practitioners (Soderquist, 2010). The concept of competence is diversified and multidimensional covering a wide range of issues from different fields of research in management. Competence management is discussed and analyzed from individual and organizational perspectives. From an organizational perspective competence management is seen as the "organization's ability to integrate different streams of technologies and exploit their distinctive strength to achieve comparative competitive advantage in the market" (Prahalad & Hamel, 1990) p. 90). The term "core competence" is often used when the concept is analyzed from an organizational perspective. The other stream of research focuses on studying competence management from an individual perspective. The beginning of the competence movement from an individual perspective can be traced back to the work of David McClelland in early 1970. In one of his attempts to improve recruitment and selection procedures, he identified behavioral characteristics and personality traits causally related to on job performance. Similarly, Richard Boyatzis (1982) conducted a large scale study to identify management competencies that differentiate between successful and average performers. The research here is pivotal for further research in the field of competence management. Since then, competence management has emerged as a key concept and area of research in organizational behavior literature.

Although competence management is a fundamental and critical concept in the management arena, the idea is new and in the early stages of development and acceptance in Pakistan. One important reason is that in organizational practice, utilization of competence-based management perspective to manage and develop employees lacks a set of evidences. Particularly, in educational institutions, competence-based courses and programs are not in place. Also, management development professionals have not realized the value of competence management in improving HR processes and performance. The knowledge shows that competent human resources can play a significant role in developing an economy towards its maximum potential. This backdrop calls for devising and implementing coherent and comprehensive human resource development strategies based on current management development needs (Hussein, 2005a; 2005b). The organizations in Pakistan are hesitant in investing in human resource development because of risks and uncertainties associated with continuous changes taking place in the business environment (Bhattacharya & Wright, 2005). One possible solution to this problem is internal and external developments for developing human competence strategies to ensure maximum and stable return on this strategic asset (Bhattacharya & Wright, 2005). It is imperative to appreciate the developments in the internal and external organizational environment to develop human resource strategies that addresses the current management development needs. The idea of competitive based strategy was first coined by Michael Porter in early 80s (Porter, 1979a, 1979b).

The classification of competencies based on an underlying set of assumptions and theoretical perspective is a common world-wide practice. The arrangement and grouping of similar sets of qualities, traits, behaviors and attitudes under a larger category increases theoretical and practical understanding and makes it easier to conceptualize its meaning (Boyatzis, Goleman, & Rhee, 2000; Marelli, Tondora, & Hoge, 2005; Viitala, 2005; Woodruffe, 1993). To further the argument, Jacobs (1989) classifies competencies into two major categories "soft and hard competencies". Management scholars, however, critiqued the development of these two categories on the assertion that it is difficult to differentiate between soft and hard competencies limiting their practical implications (Woodruffe, 1993). The recent literature asserts and backs the argument by providing a strong support for categorization of competencies based on skills, knowledge, behaviors and personal traits (Bartlett & Ghoshal, 1997; Le Deist & Winterton, 2005; Ley & Albert, 2003; Marelli, Tondora, & Hoge, 2005; Mühlbacher, 2007; Mühlbacher, Nettekoven, & Putnova, 2009). Additionally, the recent empirical work on competence by Mühlbacher (2007) has signified five competence classes, a) Methodological competencies b) Self dispositive competencies c) Social competencies d) Leadership competencies and e) Personal competencies. These

five competencies cover a wide range of skills and knowledge from individual to group level. In a related research Kaufeld (2006), categorized competencies into a) Professional b) Methodological c) Social and d) Self competence (Kaufeld, 2006) based on similar logic of differentiating into knowledge, skills, and personality traits. The professional and methodological competencies having close proximity with each other shall be placed under one class (Mühlbacher, Nettekoven, & Putnova, 2009). Our research expands the knowledge by adapting a similar pattern of classification and categorizing competencies based on a) knowledge, b) skills, and c) personal attributes. Following are the six competence classes illustrated in table 1 that form the basis for coding of empirical data.

Table 1: Six Competence Classes

Competence Class	Feature
Methodological Class	Technical and subject specific knowledge and skills.
Self -Dispositive Class	Ability to use personal resources and know how in more efficient and effective manner.
Social Competence Class	Social level skills need to maintain healthy business relationship with different business stakeholders
Business Management Class	The set of behaviors and skills considered to be generic and much needed to accomplish common and routine managerial tasks
Leadership Class	The cluster consisting of behaviors and characteristics that are needed to motivate and influence behavior of subordinates.
Personal Competencies	The core personality attributes and characteristics.

Note: The table shows broad features of competence classes. There are six competence classes and the key differences are given.

RESEARCH METHODOLOGY

A survey questionnaire was employed as the data collection instrument. In order to determine the needs of managers, respondents were asked to describe tasks and competencies required to accomplish their present and future job responsibilities. Respondents were requested to assign percentage weightings to each task and competency. This objective assessment of opinion provides quantification of qualitative data. Data regarding competencies was coded against the predefined theoretically derived competence classes as given in Table 1. In the survey, practicing managers were also asked to mention internal and external factors referred to as drivers of change anticipated to mostly affect their organizations and job competencies. Respondents were required to rank each of the factors according to the magnitude of their influence. They were also asked to mention whether it is an opportunity or threat to their job or organization. In the data coding process, internal and external factors were grouped together into a larger category based on relevance and similarity. The research mainly made use of data collected from two major business cities, a) Rawalpindi and b) Islamabad. The empirical data collected through an open ended questionnaire was coded and analyzed with regard to competence development needs of managers in Pakistan. The research sample statistics are given in Table 2.

The data analysis was performed by utilizing different programs and techniques. First, the data was analyzed with the perspective of competence development needs of mangers. In order to analyze the trend of competence classes over a period of time, a paired sample t-test was performed. In the analysis of the impact of internal and external developments on six competence classes, only significant relationships were taken into account for further interpretation. In order to determine the significant factors included in the causal model, the Tetrad III program was used to develop a theoretical model. This theoretical model was then tested in AMOS 18.

Table 2**:** Research Sample Statistics

Geographical Area	**Pakistan**
Methodology	Questionnaire (Open ended format)
Procedure	Random Sampling, Self-administrated Survey in 2009
Research Population	Practicing Managers working in Pakistan
Sample Size	500
Response Size (Usable questionnaire)	158 (31.6 %)

The table shows descriptive statistics of the research sample. In total approx 5 hundred questionnaire were distributed and only 158 were received that were usable for final analysis.

RESULTS

Table 3 shows the trend of six competence classes over a time. From the initial analysis of competence classes it is evident that methodological and social competence classes are currently in the development phase.

Table 3: Trend of Competence Classes

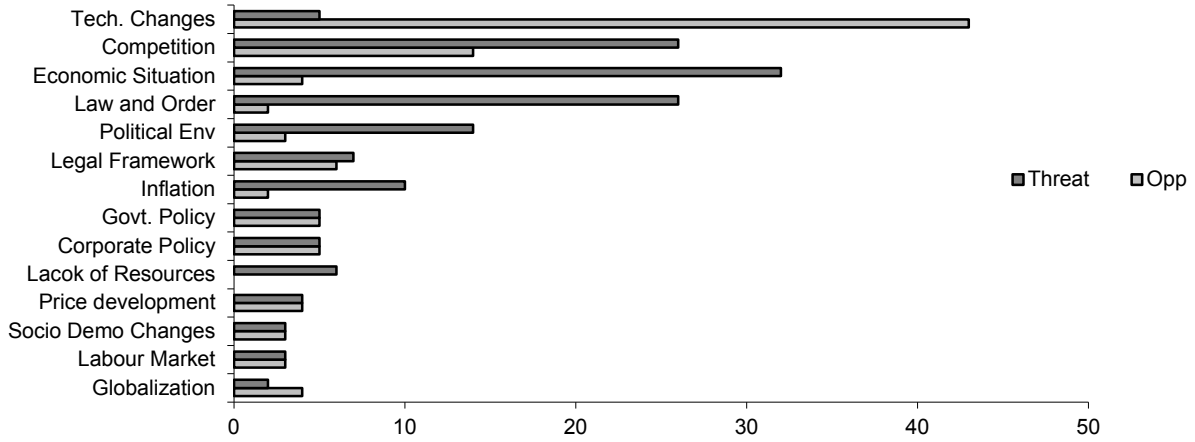
Competence Classes	**Mean**	**T Value**	**sig (2-tailed)**
Methodological Present	31.297	-0.217	0.829
Methodological Anticipate	31.765		
Business Present	12.721	-0.323	0.747
Business Anticipate	13.284		
Self Dispositive Present	4.936	-0.122	0.903
Self Dispositive Anticipate	5.094		
Social Present	24.905	3.931**	0.000
Social Anticipate	16.278		
Leader Present	4.519	-2.70**	0.019
Leader Anticipate	7.930		
Personal Present	9.202	-1.309	0.192
Personal Anticipate	11.088		

*The table shows mean difference between present and anticipated perception regarding competence classes. In order to determine the significance difference in mean values of the competence classes paired sample t-test was applied. The significance level of 10 percent was used instead of 5 percent level keeping in view the nature of study which is exploratory in nature. ** indicate significance at 10 percent level.*

The value of the methodological class increases slightly in the future. Social class occupies second place in current competence needs. Social competence class shows significant decline at the 10 percent level. Its mean value decreases sharply almost by 8 percent. The value of personal competence class gains focus in the future with increase in the mean value. Interestingly, leadership class that comprise of competencies essential for influencing behavior and motivating subordinates, show noticeable change at 10 percent significant level. With this increase in value, leadership class moves above the self-dispositive class in the future. The self-dispositive class also shows an increasing trend and occupies last position in future rankings. The business management class, consisting of management behaviors needed to accomplish routine managerial tasks, shows a marginal increase. The competence classes demonstrates relatively stable patterns. With regard to future expectations, the configuration of competence classes appears to be similar to some extent. The self dispositive and leadership classes switch their position in future rankings.

Initially the results regarding internal and external drivers of change are analyzed with respect to their frequency of mention. Figure 1 provides an overview of external changes anticipated to influence business practices. Approximately 246 external drivers of change are mentioned, 98 are perceived as an opportunity and 148 are considered potential threats. In Pakistan, the most immediate and biggest threats to business organizations in the external environment are the law and order situation, political instability, and deteriorating economy. These three factors are well connected to each other. Political uncertainty and poor law and order are major hurdles for economic progress. When investors sense uncertainty they are reluctant to invest in the country. From economic perspectives, inflation is seen as a threat. Interestingly market based competition is the third most important negatively perceived factor. In external environment, the most significant development is technical changes which are viewed optimistically. Pakistani mangers consider technological advancement and innovation critical for business success. In the future, organization adaptation to technology and introduction of innovation in service and products will mainly determine competitiveness in a dynamic business environment. Globalization is also viewed optimistically albeit with low frequency of mention. However, socio-demographic changes are perceived both positively and negatively.

Figure 1: External Drivers of Change

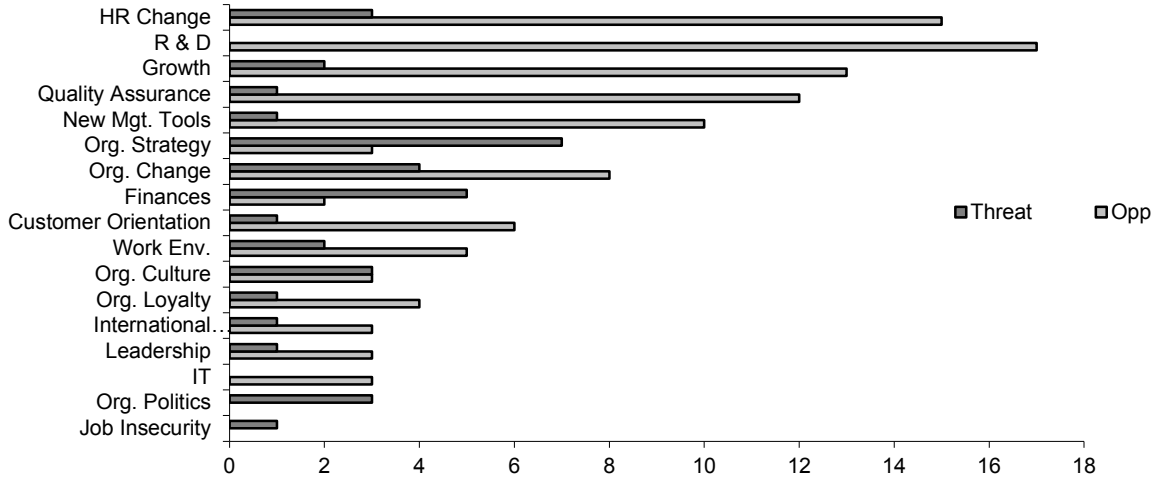


This figure shows perception of managers regarding anticipated external drivers of change. The perception as opportunity and threat is mentioned with respect to frequency of count. Sample size n = 158, frequency of mention is approx 246

Internal factors are mostly evaluated optimistically. In the internal environment, a total 143 internal drivers of change are recognized of which 107 are perceived positively and only 36 as a threat. Figure 2 illustrates the frequency of mention in terms of opportunity and threat regarding internal changes. Interestingly HR changes and policies are evaluated positively. In recent years significant changes in HR practices and policies are derived by multinational companies (Khilji, 2001). In this context, changes at the work place is considered favorable from an employment perspective. However, organizational politics is anticipated to be a potential threat for management performance. Undoubtedly, organizational politics create destructive competition and de-motivate competent managers. In a highly politicized work environment employees mostly put their efforts towards non productive work activities and use their social contacts for personal gains. Interestingly, an effort to introduce new products and services through active R & D is considered critical for success in a fast changing business environment. It is encouraging that practicing managers view it quite optimistically. This is apparently connected with the highly positive evaluation of technological changes in the external environment. This suggests the need to place emphasis on re-innovation and re-engineering of business processes. In particular the use of IT is perceived as an opportunity and is essential for smooth transition from manual to automated work process. In this context, organizational change and favorable work environment are perceived as great

opportunities for growth. Despite dilapidated economic conditions, multinational companies see enormous growth potential and investment opportunity in the telecom and energy sector.

Figure 2: Internal Drivers of Change



This figure shows perception of managers regarding anticipated internal drivers of change. The perception as opportunity and threat is mentioned with respect to frequency of count. Sample size n = 158, frequency of mention is approx 143

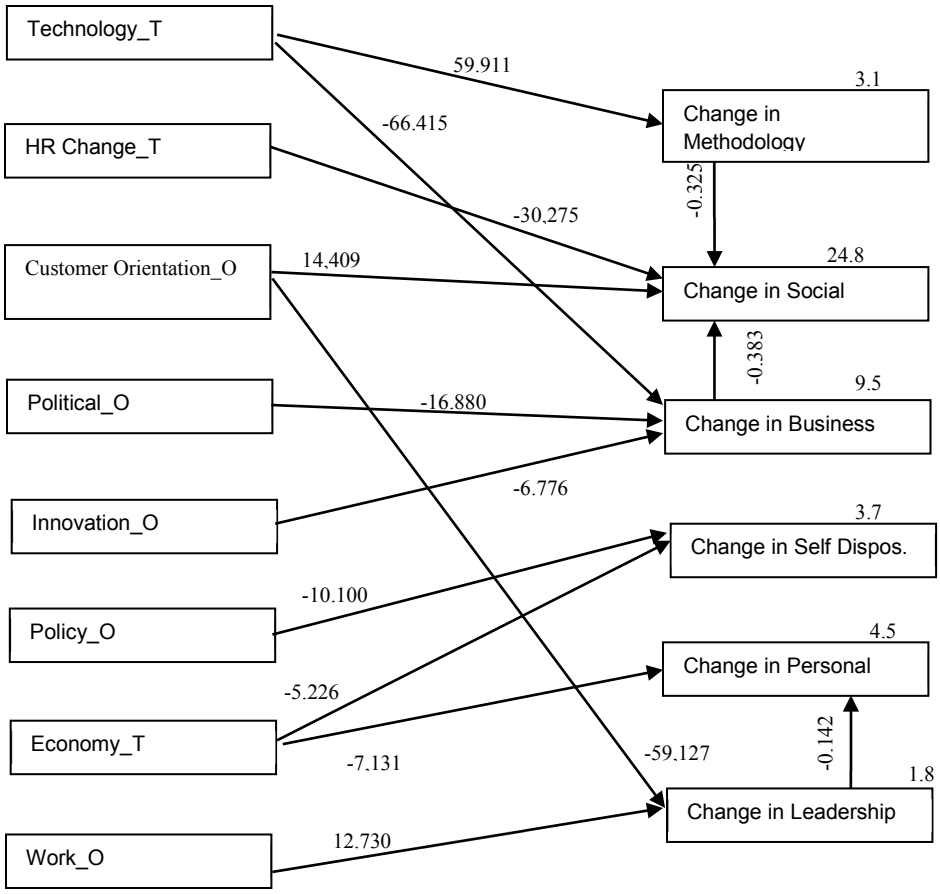
After preliminary analysis of drivers of change, the influence of these developments on competence development needs of managers is tested. The causal model illustrated in Figure 3 shows the influence of only significant internal and external factors on competence classes. The causal model evidently points to the sensitivity of Pakistani managers towards issues influenced by political economy and technological changes. It is apparent from the causal model that perception of external developments as a threat mainly influences management development needs. Interestingly, from Figure 3, it is evident that factors which were ranked high in terms of opportunity or threat seem to be irrelevant in determining changing competencies.

The methodological competencies show minor increases, primarily due to only one factor in the external environment; technological changes if it is perceived negatively. The strong negative perception of technological changes results in increases of 59.911 percentage points. Rapid advancement in technology often puts pressure on managers to equip themselves with appropriate skills. This mainly shifts the focus of managers to attain proficiency in specific trades and functions in order to retain competitiveness and performance. The positive influence of technological change as a threat and the inverse relationship of social competence class together explain 3.1 percent of the variation in methodological class.

A surprising connection is found between negative perception of HR changes and social competence classes. In this case, perception of HR as a threat results in change in social competence class by -30.275 percent. Optimistic evaluation of customer orientation results in positive changes in social competence class by almost by 14.409 percentage points. This change points to a transition from inner traditional organizational perspectives towards market based orientation. It is critical for employees to have strong social skills to develop meaningful and profitable customer relationships in a market based economy.

Interestingly, the business management class reacts to three external factors. Technological changes if it is perceived as a threat results in decreases in the business management class almost by -66.415 percent. The optimistic viewpoint regarding changing political scenarios causes a negative change of -16.880 percent. Similarly, perception of innovation as an opportunity results in a -6.776 percent change in business management class. These three external developments, with negative influence of social competence class, together explain 9.5 percent of the variation in business management class.

Figure 3**:** Causal Model of Competence Development in Pakistan



This figure shows influence of drivers of change on competence classes. O represents opinion as opportunity and T represents perception as threat with respect to change factor. The direction of arrow shows influence of drivers of change on competence classes. The arrow from one competence class to other shows dependency between classes. The value given on arrow lines representing β coefficient and value above competence class representing R^2.

Self-dispositive competencies are influenced by two external factors namely government policy and economy. In case of a negative perception of the economy, a decline in value by -5.226 percent is observed while a positive perception towards the political situation results in a -10.10 percentage change. These two issues are well connected to each other. Government policies provide an idea about the economic priorities consequently determining the economic position. If the business community feels comfortable with the government policies they will be willing to invest in the market and plan their business activities accordingly. These two factors together explain 3.7 percent variation in the self-dispositive class. The personal competence reacts sensitively to negative perceptions of the economy which cause a -7.131 percent change. This might be linked to the reason that in time of crises, managers find little chance of getting ahead and making progress despite considerable efforts and hard work. This one external factor, along with the inverse relationship of leadership class, accounts for 4.5 percent variation in personal competence class. Finally, leadership competence responds to positive perception of the work environment. In case of a positive evaluation of the work environment, there is 12.730 percent change in leadership class occurred. This might be associated with the fact that shifting focus towards more collaborative work environment requires active participation from top leadership. The inverse relationship with personal competence class and work environment, if they are perceived positively, explains 1.8 percent variation in leadership class.

This preliminary assessment provides a snapshot of relationship between drivers of change and competence classes. This causal relationship might have a different picture and more holistic view with the passage of time and with the increase of sample size as planned in future. In order to test the validity of causal model different tests were applied. The chi square test, with the value of $\chi 2/df = 1.66$ (Cmin = 129 and df =78), provides indication to fitness of model (see Joreskog & Sorbom, 1993). The other criteria of model fit, the goodness of fit indices (GFI = 91.3), the adjusted goodness of fit indices (AGFI = 88.4), and Root Mean Square Error of Approximation (RMSEA = 0.065) also fall in acceptable limits.

Discussion

The analysis reveals interesting findings that can serve as guidelines for policy makers and human resource practitioners. The results allow managers aiding to prepare themselves for upcoming challenges. The literature review reveals that most studies in competence management have been conducted in western countries that have relatively strong institutional infrastructure and economies. Therefore, it raises questions when we begin to apply managerial practices and competencies from one culture to other without considering the local context (Chong, 2008; Hofstede, 1980). This study with this backdrop attempts to explore management practices and competencies in developing countries like Pakistan. Analysis of changing competence management is needed to respond to developments in the business environment (Mühlbacher, Nettekoven, & Putnova, 2009).

In this regard, the initial findings suggest that the competence class shows relatively stable patterns. The methodological competencies remain in fashion while social competencies lack focus in the future but remain critical for the success of mangers. This suggests keeping focus on training programs aimed at developing social skills. Business management competencies marginally increase in absolute value but their importance remains similar over time. This endorses the notion that management jobs need generic competencies and skills because of similar job natures as well as tasks and responsibilities managers perform in management positions (Yeung, 1996). Leadership class increases significantly in value suggesting a strong need for leadership development programs in organizations.

The findings regarding drivers of change indicate that Pakistani managers are more sensitive to technological, political and economic issues. Developments on these grounds will predominantly determine the competence requirement of future managers. Pakistani mangers are more concerned about deteriorating economic conditions and are anxious to adapting emerging technologies. In general, internal drivers of change are evaluated very positively and seen in an optimistic manner. This also points toward need for change in organizational structure, systems, and policy to become more innovative, flexible, and adaptable to market changes. In particular, work place changes and conducive work environment require specialized training programs designed for young mangers preparing them to take leadership roles more effectively. If we interpret the highly positive evaluation of technology, with the influence of negative perception of technological advancement on changing composition of methodological class, we can infer the great demand and significance for professional and IT skills in the future.

CONCLUSION

This research points to several factors that contribute to slow economic growth such as political instability, power shortages, safety and security, low levels of foreign investment and a lack of focus on human resource development strategy. Particularly, for a developing economy like Pakistan, the significance of human resource management and development cannot be understated. In Pakistan, considering the current crises situation, organizations must focus on managerial performance through effective management development strategy. The results provide evidence to conclude that, in Pakistan, the application of individual competence management is in the initial stage in both education and organizational practice. The findings suggest paying attention and focusing on managerial competence so that issues relating to managerial performance can be addressed. In particular, the results indicate that

internal and external developments have influence on determining management competencies. Therefore, due consideration must be given in designing training programs.

Despite its usefulness, this study has some limitations. Data was mainly collected from two major cities of Pakistan. Therefore, the results can not be generalized to larger population. In the sample, the independent industrial context was not taken into account while in practice each factor has varied impact on different industries. Moreover, we can not be definitive about the findings as they are based on the perception of practicing managers. The results provide estimates of probable future scenarios and their likely impact on competence development needs of managers in Pakistan. In the future, research using close ended format questionnaires, based on items elicited from present findings, can be used to judge the perception of practicing managers. Further research also needs to be done on large samples in various industries in Pakistan for developing independent causal models of management development needs in each sector.

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YIELD CURVE INVESTING: OPTIMIZING RISK-ADJUSTED RETURNS

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ABSTRACT

This paper investigates how recent changes in market interest rates have affected risk-adjusted returns. Returns are adjusted for duration, a measure of interest rate risk. Prior to the 2007 - 2008 rate decrease, one-year Treasuries offered the best risk/return tradeoff. As a result of the rate decrease, short rates dropped much more than longer rates, rendering the one-year Treasury less competitive. After 2008, the five and seven year Treasury maturities offer the best risk-adjusted returns.

JEL: E43

KEYWORDS: Yield Curve, Duration, Interest Rate Risk, Maturity, Mean Reversion, Risk-Adjusted Return

INTRODUCTION

This paper tracks the relatively low rates of the past forty months, December, 2008 through March, 2012, in contrast with the relatively high rates of the preceding forty months, August, 2005 through November, 2008. The Treasury yield curve has experienced significant change over this time period.

Its changing slope and position has created different risk/return profiles across the maturity spectrum. Prior to the steep rate decline of 2007 – 2008, one-year Treasuries offered nominal returns exceeding three percent, with very little interest rate risk, while thirty-year Treasuries offered little additional yield but with significantly greater interest rate risk. Over the seven year period reviewed, the spread between one and thirty year Treasuries has widened from under 50 basis points to over 300 basis points. Now with rates a whisker above zero, the one-year Treasury offers little return. Longer yields offer significantly higher yields, but with increasing interest rate risk. The question addressed in this paper is at what term-to-maturity the risk/return profile optimized.

The literature on Treasury bond investing strategies largely focuses on the expected future shape of the yield curve, and related trading strategies. This paper focuses specifically on the recent change in optimal risk/return tradeoff caused by a dramatically changed yield curve. The literature on "mean reversion" and "riding the yield curve" trading strategies, as well as the use and limitations of duration, inform this work. After a review of the literature regarding yield curve investing strategies and limitations, methodology and modeling is reviewed, followed by findings, conclusions, and suggestions for further research.

LITERATURE REVIEW

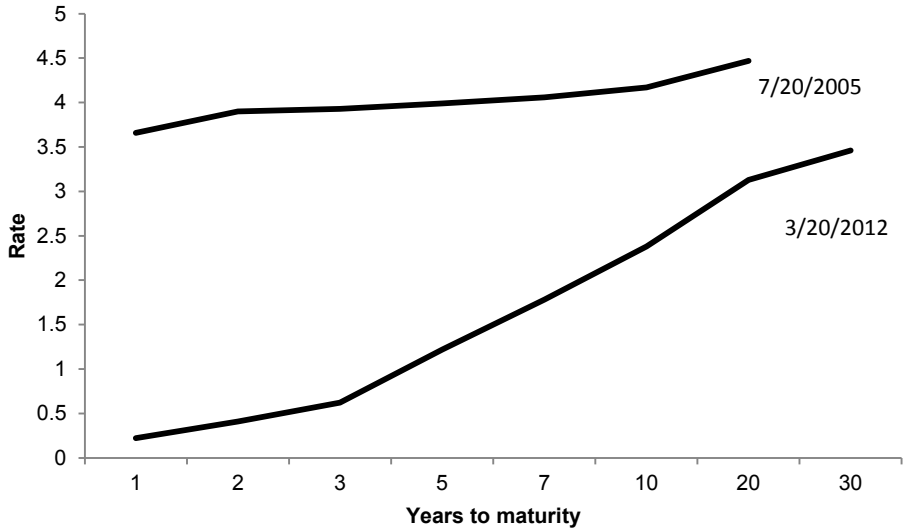
The Treasury yield curve is used as a gauge of market interest rates because Treasury bonds have no perceived credit risk. The yield curve often is used as a barometer to gauge future interest-rate directions and changes. It's also used to help establish investment portfolio strategies.

Additionally, the Treasury yield curve is used in the fixed-income arena to price marketable securities. Obligations of government-sponsored enterprises such as Fannie Mae and Freddie Mac frequently are offered at a spread over a comparable reference Treasury note (Spears, 2005).

Most economists agree two major factors influence the shape (slope) of the yield curve: future interest-rate expectations, related to expectations of future inflation, and the "risk premium" investors expect for investing in longer-term bonds. The yield curve's normal or natural slope is upward. This makes sense because investors should expect to receive higher returns on money invested for longer periods of time due to increasing interest rate risk (Fisher, 2001).

The relative steepness of the yield curve has increased significantly in recent years. Since July 20, 2005, 20-year Treasury rates have dropped some 120 basis points (b.p.), while the 1-year Treasury has plummeted some 324 b.p (figure 1). The combination of a downward shifting, steeper yield curve has implications in terms of relative risk/return tradeoffs along the curve – treasuries of various maturities.

Figure 1: Comparative yield curves, July 20, 2005 and March 30, 2012



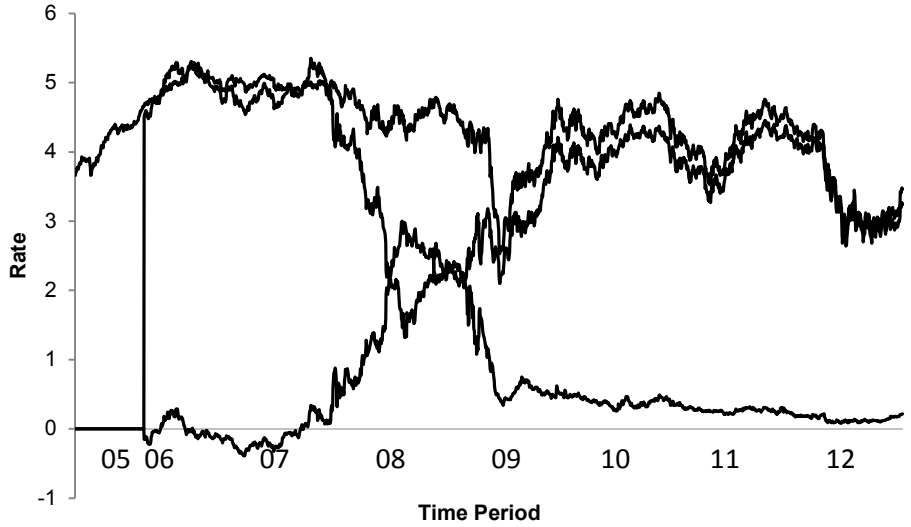
Note: Yield curves for 07/20/2005 and 03/20/2012. Data based on range of Treasury maturities at the time. Thirty-year Treasuries were not traded on 07/20/2005. While rates have dropped for all maturities, the reduction on short rates has been particularly dramatic (www.treasury.gov).

The dramatic decline in Treasury yields took place during 2007 and 2008. The spread between short and long rates widened dramatically (see figure 2.) The literature on yield curve trading dates back to the late 1960s; a sample of the earlier literature includes De Leonardis (1966); Freund (1979); Darst (1975); Weberman (1976); Dyland, Joehnk (1981), and Stigum and Fabozzi (1997). More recent analyses of the subject are found in Jones (1991), Grieves and Marchus (1992), Willner (1996), Mann and Ramanlal (1997), and Palaez (1997).

A well known yield curve investing strategy is termed “riding the yield curve.” It involves the purchase of a longer-dated security and selling it before maturity. The purpose of riding the yield curve is to benefit from certain interest rate environments. In particular, if a fixed income manager has the choice between investing in a 1-month deposit or a 12-month money market instrument and selling after 1 month, there are certain rules of thumb as to which strategy might yield a higher return. For instance, when the yield curve is relatively steep and interest rates are relatively stable, the manager will benefit from riding the curve rather than buying and holding the short-maturity instrument. However, there are risks to riding the yield curve, most obviously the greater *interest* rate risk associated with the riding strategy (as reflected by its higher duration). Thus, if one is riding and yields rise substantially, the investor will incur a capital

loss on the riding position (Bieri and Chincarini, 2005). This literature acknowledges the primacy of interest rate risk.

Figure 2: Yield Spread Change: July 20, 2005 and March 30, 2012.



Note: This graph depicts rates before and after the 2007 – 2008 rate decline. Graph compares 1-year Treasury rates with 30-year Treasuries, July 20, 2005 through March 30, 2012. In the early years, yields on long-term and short-terrm Tresuries were similar. Thirty-year Treasuries were not traded until 02/09/06. More recently, long rates have periodically exceeded short rates by over 400 basis points (www.treasury.gov).

Another area of focus has been the mean-reverting propensity of the yield curve. This view asserts that the yield curve mean-reverts to a historical norm. This market view is consistent with historical experience. For instance, U.S. Treasury bill rates, spreads, and curvature all trade within tight, finite bounds. This suggests that some form of mean-reversion mechanism is at work that prevents the yield curve from drifting to extreme levels or shapes over time. The market view of yield curve mean reversion is also represented in theoretical models of the interest rate term structure—as discussed in Vasicek (1977); Cox et al. (1981,1985), and Campbell and Shiller (1991), for example—that incorporate some form of mean-reversion mechanisms and are based on some form of the expectations hypothesis. In essence, the pure expectations hypothesis of the term structure is the theory that the long-term interest rate is the average of the current and expected short-term rates, so that the yield spread is mean reverting." Interest rates along the yield curve adjust to equalize the expected returns on short- and long-term investment strategies.' Furthermore, by incorporating rational expectations, the pure expectations hypothesis implies that excess returns on long bonds over short bonds cannot be forecasted; hence, they have a zero mean in the case of the pure expectations. This implies that deviations from this pure expectations assumption can be exploited for abnormal profits. Given today's modest inflation forecasts, exceptionally high longer term rates may constitute such an exploitable deviation.

Duration as an interest rate risk measure does have limitations. Macaulay (1938) derived modified duration as a measure of the average length of time until the promised cash flows of a bond are paid. He did not derive it as a measure of risk. However, Samuelson (1945) used Macaulay's concept to show how to make an institution's solvency "immune" to (perfectly hedged against) interest-rate changes by setting the duration of its assets equal to the duration of its liabilities. Redington (1952) independently rediscovered portfolio immunization, which was of great importance to insurance companies. Fisher and Weil (1971) tested the idea empirically and found that immunized portfolios were much less risky than portfolios in which only average terms to maturity were matched.

The relationships of returns to alternative measures of duration have also been studied (Gultekin and Rogalski, 1984; Ilmanen,1992). In all of these cases the comparisons of duration were made separately at single points in time. However, as interest rates change, duration as a risk measure may perform perversely. Consider a coupon bond or a portfolio of bonds. Duration is the present value weighted average of the times to payment. Therefore, as interest rates rise, nearby payment dates become increasingly more important than far away dates. Hence, duration falls. But empirically, as interest rates rise, interest rate risk also rises. There are also some contradictions connected with using duration for contemporaneous comparisons of interest-rate risk. For example, corporate bonds are normally considered riskier than Treasury bonds. However, for a corporate bond and a Treasury bond with the same term to maturity and price, the corporate bond has the lower duration because it will have a higher coupon. Another scenario depicting the limitations of duration as an interest rate measure is comparing a tax-exempt and taxable investors (Hessel and Huffman, 1981). Since the taxable investor receives a lower net interest rate, they will believe the bond has a higher duration than the tax-exempt bonds. Yet the taxable investor receives the same or less interest rate risk. It is assumed that interest rate risk is the relevant risk measure for the active bond trader. Acknowledging the limitations of duration, it remains the primary interest risk measure on fixed income investments.

METHODOLOGY

Risk-adjusted returns are measured on 1, 2, 5, 7, 10, 20, and 30-year Treasury bonds over an 80-month period, forty months before, and forty months after, fourth-quarter of 2008. Altogether, 566 risk-adjusted returns were calculated (www.treasury.gov.,2012). The "low rate period" consists of forty months from January 20, 2009 through March 20, 2012. The "high rate period" consists of forty months from July 20, 2005 through September 20, 2008. Forty months is the look-back period from data collection to the time interest rates reached a sustained low. The prior forty months was chosen to ensure term symmetry for the "before and after" comparison. Nominal returns are adjusted for interest rate risk using Macaulay's duration. Macaulay's duration measures the interest rate sensitivity of a bond's value and is derived as follows.

Let *r* be a bond's yield to maturity, so that *r* solves

$$P = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \cdots + \frac{C}{(1+r)^{T-1}} + \frac{C+F}{(1+r)^T} \tag{1}$$

where *C* is coupon payment, *F* is face value, *T* is maturity and *P* is the current price of the bond. Macaulay's duration is defined by the weighted average time to maturity, where the weights are *w:*

$$D = \sum_{t-1}^{T} tw_t = \sum_{t=1}^{T} t \frac{C_t}{P(1+r)^t} = -\frac{\frac{\partial P}{P}}{\frac{\partial r}{(1+r)}} \tag{2}$$

A one-way analysis of variance procedure is used to perform an analysis of variance to test whether or not the mean risk-adjusted return (RAR) among the Treasury maturities are equal. It assumes all sample means are drawn from normally distributed populations with equal variance. In this case, the data sets comprise 40 months. One-way ANOVA is an extension of the two-sample t-test, which yields the same result when the factor variable has two levels. ANOVA was chosen over multiple t-tests to overcome type I errors. This analysis consists of seven levels, corresponding to the different maturities: 1, 2, 5, 7, 10, 20, and 30-year maturities.

The ANOVA is conducted on mean RAR for each maturity term for both the "low rate period," and for the "high rate period." Additionally RAR is compared for like maturities between the two rate periods. The null hypothesis is that there are no significant differences among different maturities within a rate period, and that there is no significant difference between the two rate periods for the same maturity term. Risk-adjusted returns are defined as a Treasury bond's nominal rate of return (r) divided by the bond's duration (D): RAR = r / D. The calculation of duration is based on the assumption of equal coupon and market rates. This model is conceptual similar to measurement models used to find risk-adjusted returns of mutual funds. With the Sharpe approach (Sharpe, 1966), excess returns on a portfolio are compared with the portfolio standard deviation. The Treynor approach (Treynor, 1965) compares excess returns with portfolio beta. In both cases, excess return is defined as the difference between total portfolio return and the risk-free rate of return.

The focus on duration as a risk measure is particularly applicable to bond traders. (Buy-and-hold investors are generally more interested in inflation risk, the erosion in purchasing power over time). For the trader, price change risk is measured as the product of duration and the expected change in interest rates:

$$\%\Delta P \approx - DUR \times \Delta i/1+I, \quad (3)$$

Where
$\%\Delta P = (P_{t+1} - P_t)/P_t$ = *percent change from t to t + 1*
DUR = duration
i = interest rate

FINDINGS

For all maturities, risk-adjusted returns were significantly reduced from before to after fourth quarter of 2008. In the earlier period, from July 20, 2005 through September 20, 2008, risk-adjusted returns were significantly different among all terms to maturity (see Table 1). The greatest return, relative to risk, is on the one-year treasury, with a risk-adjusted return averaging 3.988 for the period. The poorest risk/return tradeoff is on the 30-year treasury, with a risk-adjusted return of 0.2894. Note that even while the yield curve is rather flat (figure 1 above), when adjusted for duration the risk-adjusted returns become quite different, dropping significantly with increasing maturities.

Table 1: Risk-adjusted Treasury Bond Returns, July 20, 2005 - September 20, 2008

Maturity (N)	Mean risk-adjusted return**
1	3.986
2	2.025
5	0.9000
7	0.6905
10	0.5705
20	0.3985
30	0.2894

***Returns are significantly different among all terms at .05 level. These values reflect average risk-adjusted returns for forty months, from July 20, 2005, through September 20, 2008.*

In the more recent period, from January 20, 2009, through March 20, 2012, the greatest return relative to risk is on the seven-year treasury at 0.3715, although the five-year treasury is not significantly less at 0.3695. The least attractive risk/ return tradeoff is again on the 30-year treasury, with a risk-adjusted return of 0.2265

Table 2: Risk-adjusted Treasury Bond Returns, January 20, 2009 - March 20, 2012

Maturity (N)	Mean Risk-Adjusted Return
1	0.2950
2	0.3275
5	0.3695**
7	0.3715**
10	0.3415
20	0.2705
30	0.2265

***Differences are not significant (.05 level) between 5 and 7-year maturities. These values reflect average risk-adjusted returns for forty months, from January 20, 2009, through March 20, 2012.*

The only maturities for which the differences between means is not significant are the 5 and 7 year maturities for the January 20, 2009 to March 20, 2012 period. The P-value of .932 is far greater than the alpha level of significance (.05), so the null hypothesis is not rejected; that is, the mean RAR for the 5 and 7-year RARs are the same. See table 3.

Table 3: ANOVA Summary

	Sum of Squares	df	Mean Square	F	P-value
Between Groups	0.000	1	0.000	.007	.932
Within Groups	0.859	78	0.011		
Total	0.859	79			

Note: The critical F(1,78) value from the F-table with alpha = 0.05 is 1.38. The computed F value of .007 is well below the critical F. The p-value is greater than 0.05. Therefore, we do not reject the null hypothesis and conclude that there is no difference between the 5 and 7-year mean RAR.

CONCLUSION

Interest rates on treasury bonds of all maturities have dropped significantly in the past seven years. With the new, lower interest rate environment, the relative risk versus return tradeoff, as measured by risk-adjusted return, has likewise changed. The objective of this paper is to identify the maturity date for which the optimal return to risk is found. An ANOVA test was used to distinguish among average risk-adjusted returns for seven different Treasury maturity terms. For the forty month period before and during the 2007/2008 rate decline, the one-year treasury offered the best RAR. More recently, however, lower market interest rates for all maturities, and much lower rates on bonds with the shortest maturities, has stripped the one-year treasury of its RAR superiority. The five and seven year terms now offer a better risk/return tradeoff. The steeper yield curve provides incremental returns exceeding the increased duration risk with these maturities. The 30-year bond, while offering the greatest nominal yield for all months when traded, is also subject relatively high interest rate risk, rendering the 30-year a poor value on a risk-adjusted basis.

Limitations of duration as an interest rate risk measure have been noted. This paper's objective is limited to identifying the return/risk profile for a variety of published terms to maturity for Treasury securities. Subsequent research into how trading or hedging strategies could benefit from this information would be useful. For example, "riding the yield curve" may seem imprudent in terms of interest rate risk incurred in this buy and sell strategy.

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BIOGRAPHY

Charles Corcoran is a Professor of Finance at the University of Wisconsin – River Falls. Last year he collaborated with Ningyang Huang and Meng Gong on an article, "An Analysis of the Long-Term Effects of Rural Labor Migration in China Based on the Markov Chain Method," *Journal of International Business and Economics*, November, 2011. He has a Ph.D. and MBA from the University of Minnesota, and a BSBA in Finance from Georgetown University. He is also a CFA.

SUSTAINABILITY FOR HISPANICS IN CALIFORNIA: DO THEY REALLY CARE?

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Ramon Corona, National University
Richard Weaver, National University

ABSTRACT

This paper is a study about the perceptions of well-educated Hispanics living in California regarding environmental sustainability. Hispanics in the US are growing three times faster than non-Hispanics and now comprise 16% of the population, or more than 50 million. Just in the last 10 years, Hispanics grew 43%, equivalent to more than half of the growth of the entire US population. Given its importance and the undeniable needs of creating a conscious for sustainability in California, we developed this study to learn about the attitudes and perceptions of Hispanics regarding environmental practices, vs. non-Hispanics, in an effort to find out any differences between the two groups, and how this could be beneficial for many companies trying to market their products and services to this vibrant target market. The results of our survey showed a number of differences regarding environmentally friendly activities, such as use of solar energy and carpooling, and use of media to gain information about sustainability.

JEL: M30, M31

KEYWORDS: Hispanics, Sustainability, Environmental, Marketing Strategies, Eco-friendly Behavior

INTRODUCTION

Given the importance of the rapid growth of Hispanics in the US and particularly in California, associated with the impact of new and evolving environmental laws for all residents of California, as well as the promotion of a recycling culture and sustainability practices, the authors believe a new research is required to investigate the perception of attitudes of Hispanics living in California towards these practices, given its growing numbers in population. Hispanics in the US are growing three times faster than non-Hispanics and now comprise 16% of the population, or more than 50 million. Just in the last 10 years, Hispanics grew 43%, equivalent to more than half of the growth of the entire US population. California has the largest Hispanic population in the US with over 14 million, or more than 37% of the total Hispanics. The literature has yet to focus on the narrow issue of distinguishing between the green attitudes and behaviors of Hispanics from the larger population. There has been sparse information here to help guide marketers in better meeting the environmental needs of the Hispanic community. This includes needs in areas such as recycling, water conservation, personal solar energy, and hybrid cars. Given the reality of the growing Hispanic population, both in real numbers and as a percentage of the total population, marketers need this information to be more effective. This research seeks to identify productive information on this subject to both assist marketers and researchers will join in this exploration. The methodology and findings provide this contribution to the literature. The balance of this paper is organized with a review of the literature, methodology, findings, and conclusions.

LITERATURE REVIEW

According to the 2010 U.S. Census there were 308.7 million people living in the United States, of which 50.5 million (or 16%) were Hispanics or of Latino origin (2010 census). Hispanics grew at an amazing rate of 43% between 2000 and 2010, four times faster than the general population at 10%. More than half of the growth of the entire US population was due to the increase in Hispanic population.

The preceding data enhances the relevancy of the Hispanic population in the United States and their influence in the long term future of our country, both politically and economically as well as the many cultural aspects that will be merged with the already diversified American melting pot. For marketers and business owners, this information is very relevant regarding the current and future marketing strategies to reach this lucrative market segment. In 2009, the U.S. Hispanic Buying Power reached $ 978.4 billion, and is projected to reach $1.3 trillion in 2014 (San Diego Ad Club, 2011), making it a very important part of the total US economy, estimated at $15 trillion for 2011 according to the International Monetary Fund (IMF). Of the over 50 million Hispanics cited above, 63% are Mexicans, 9.2% Puerto Ricans, 3.5% are Cubans, and the rest are coming from Central America, South America and Spain. California has the largest Hispanic population in the US with over 14 million, or more than 37% of the total Hispanics, followed by Texas with 18.7%, Florida with 8.4%, and New York with 6.8%.

Hispanic or Latino? Numerous studies have been published about the possible differences between the term "Latino" and "Hispanic" in the U.S. to identify people coming from Mexico, Puerto Rico, Cuba or other Latin American countries. Most of them agree that there are really no differences and the terms are the same. Some of the commonalities of this group are that they all come from Spanish-speaking countries and have specific customs and values. Most Hispanics or Latinos identify themselves in relationship to their country of origin, e.g. Mexicans, Cubans, or Colombians. Other articles show that some people in this group associate the term Hispanic with the Spaniards who conquered many of this countries, with a negative connotation, and hence prefer to be recognized as Latinos. However, for the purpose of this article both terms will be used to identify this segment, interchangeably.

Current research in Hispanic Marketing is insufficient and do not reflect the rapid population growth which translates directly into economic clout. Furthermore, the complexity of the Hispanic Market is growing almost as fast as its size as a result of second generations of Latinos as well as the constant influx of immigrants to the United States, both legally and illegally. Therefore, new research is needed to understand the dynamics and changes of this vibrant generation of Latinos that is influencing our society. The challenge to reach this segment is so significant that several prominent universities, namely Southern Methodist University, Florida State University, UCLA, and De Paul already have Ethnic Marketing programs and in particular Hispanic Marketing programs, courses and seminars (Sebor, 2007).

Recent studies show that culture significantly impacts customer responses, levels of satisfaction, propensity to buy products and services, and most significantly the relationship between a company or brand and the consumer. Moreover, cultural differences do impact assessment of quality and satisfaction of products and services (Ueltschy & Krampf, 2003). As stated by the Office of Minority Health, "Hispanics/Latinos are disproportionately underrepresented in research activities. Without adequate and targeted research, Hispanics/Latinos are disadvantaged in policy making, resource allocation, program planning and program implementation activities" (Diaz, 2005).

There is extensive literature addressing sustainability/green issues for organizations, in general, and marketers, in particular. This literature focuses on the strategies (e.g., Chen & Lin, 2011; Hedman & Henningsson, 2011; Parguel, Benoit-Moreau, & Larceneau, 2011; Muster, 2011; Laughland & Bansal 2011; Rüdiger 2011; Burgin, 2010, Raghavan, 2010). These strategies range from the economic value to companies of internal green activities to incorporating green into the company's business model. Literature more directed to marketers focused on green brand management and promotional messages (e.g., Yakup & Sevil, 2011; Chen, Y., 2010; Schubert, 2010; Dos Santos, 2009). Additional research examined consumer responses to sustainable/green products and services (Singh, 2011). These studies were completed in a great variety of locations around the world (e.g., Chen & Chai, 2011; Choi & Ng, 2011; Cohen, 2010; Huang, 2011; Savita, 2010; and van Rijswijk, Fewer 2008).

The greatest surprise in reviewing the literature was the lack of academic research addressing questions about the attitudes and behaviors regarding environmentally sustainable activities. Searching a variety of databases of academic journals resulted in only one article directly on this subject (McCabe & Corona, 2011). The surprise was that this market, the second largest in the United States, was not the subject of intense research exploring its approaches to the growing effort to promote sustainable activities and purchases. Ignoring the unique dynamics within the Hispanic community would appear to be a poor business decision for organizations wishing to grow their market share.

METHODOLGY

This research was designed as an exploratory study of the similarities and differences between Hispanic and non-Hispanic attitudes towards sustainability and their engagement in associated activities. A convenience sample was utilized, drawn from contacts maintained by the three researchers and databases of members of a variety of Hispanic professional organizations. While convenience sampling has known limitations, such as potentially not being representative of the larger population, this approach has been used productively in other studies, especially exploratory research. Particular attention was made to include a sizable proportion of known Hispanics in those invited to participate.

The survey instrument was developed to collect green activities and interests plus standard demographic information. The instrument was tested and appropriate modifications were made to increase both clarity and ease of completion. Potential responders were invited via email to participate. The instrument was made available utilizing SurveyMonkey.com over a two week period in November, 2011. A total of approximately 310 invitations were sent to potential responders. 144 completed the survey. This constituted a 46% response rate. Of these, 29 were discarded due to respondents not being residents of California. The remaining responses were sorted, tabulated, and correlated using standard statistical processes.

FINDINGS

After collecting all data from the surveys the answers to the direct questions were analyzed and tabulated, as well a series of cross tabulations based on the relevancy of the findings to take advantage of the data as much as possible. The finding were categorized as follows: Sustainable behavior and intentions, Energy, Media Preferences, Sustainable activities, and Demographics

The results on sustainable behavior are presented in Table 1. For all respondents to the question of "always" recycle, non-Hispanics recycle substantially more than Hispanics; 42% vs. 19% in print cartridges, 36% vs. 14% cell phones, 59% vs. 27% newspapers, and 61% vs. 25% plastic bottles, aluminum cans and glass. The highest recycling level for Hispanics was 27% for newspapers.

Between both groups who make $100K or more, there is a large difference in the amount of water they plan to use over the next year. As we see in Table 1 (above), Hispanics are 19.4% more likely to use less water than non-Hispanics in the year ahead. They are also 13.5% more likely (70.6% vs. 57.1%) to recycle waste than non-Hispanics. The opposite was the result in lighting. Only 41% of the Hispanics plan to change their lighting or appliances to energy efficient, while 51.4% of non-Hispanics plan to make this change. If we take higher education as a basis for comparing both groups, Hispanics are far ahead in planning to use less water and change lighting to a more efficient one and about the same in their willingness to recycle waste.

Auto behavior intentions are presented in Table 2. The finding that was most revealing was that of energy-related products and services. Hybrids were a topic of interest as 44% of all our respondents plan to purchase a hybrid car next. That is an increase in purchasing intentions from 14% who drive one now,

and is a strong indication of behavior change. Looking at only Hispanics surveyed, 46% plan to buy a hybrid and 13% already drive one. That finding was higher than expected for both categories of Hispanics, purchase intention as well as already drive one.

Table 1: Respondent Green Behaviors

	Hispanic	Non-Hispanic
Always Recycles - percentage		
Plastic, bottles, aluminum, glass	25	61
Newspapers	27	59
Cell phones	14	36
Print cartridges	42	19
High Income Green at Home		
Use less water	76.5	57.1
Recycle waste	70.6	57.1
Lighting	41	51.4
Higher Education at Home		
Use less water	75	52
Recycle waste	65	66.7
Lighting	85	43.8

This table reports the percentage of respondents in each of the two categories who reported that they always take the identified green actions.

When we looked further at those Hispanics who earn more than $100,000, we saw even more revealing information. Of those Hispanics, 17.6% drive a hybrid and only 14.3 of non-Hispanics with that income do the same. Hispanics drive more hybrids at higher income levels. High income Hispanics are more inclined to purchase a hybrid car, (53% vs. 45.5%) than their counterpart high income non-Hispanics.

For the higher educated Hispanics, 10% drive a hybrid now and 30% plan to purchase one next time. For non-Hispanics, 14.6% drive a hybrid now and 39.1% plan to purchase a hybrid next. What this tells us is that the more educated Hispanics are different from those with money. These Hispanics are not greener than their non-Hispanic counterparts. With higher education, the preference to buy a new hybrid is 30% less for Hispanics than non-Hispanics. This finding surprised the researchers.

Table 2 Respondents Auto Behaviors/Intentions

	Hispanic	Non-Hispanic
High income respondents		
Drive hybrid	17.6	14.3
Next car hybrid	53	45.5
30+ mpg	29.4	22.9
21-30 mpg	36	60
Higher education respondents		
Drive hybrid	10.0	14.6
Next car hybrid	30	39.1

This table reports the percentage of respondents in each of the two categories who reported that they strongly agree with statements regarding their current and future auto purchases.

California is known for being a state in love with the automobile. We wanted to learn more about vehicle mileage comparing Hispanics to non-Hispanics. In the more than $100K income segments, the major finding was that some Hispanics are not driving cars with good mileage. Hispanics that drive 21-30 MPG were 36%. Non-Hispanics in the same category are at 60%. For the more than 30 mpg, Hispanics have the edge at 29.4% vs. non-Hispanics at 22.9%. For the middle, 21-25 mpg, non-Hispanics are at 34.3% vs. Hispanics at 29.4%.

The 21-25 mpg segment was very similar among both Hispanics and non-Hispanics, averaging at about 33-34% for all income levels surveyed. There was a larger difference in Hispanic vs. non-Hispanic as the mpg numbers increased or declined, especially in the high mileage categories, i.e., more than 30 mpg. For

non-Hispanics in over 30 mpg vehicle mileage was 24% of respondents and for Hispanic responders the more than 30 mpg mileage was 15% (all respondents). One in four non-Hispanics has a primary vehicle with mpg greater than 30 mpg. The opposite was true for the low mileage vehicles, with 10% of Hispanics primary vehicle getting less than 15 mpg. They may be driving older trucks. Hispanics are paying attention, as 43% of them are now driving cars with more than 26 mpg. That number is similar for non-Hispanics, at 45%. For the higher educated, 45% drive a vehicle with 21-25 mpg. This 30% drive vehicles with more than 26 mpg. For highly educated non-Hispanics, 50% drive vehicles with more than 26 mpg, clearly a large difference.

Current Green activities of survey respondents are presented in Table 3. Solar Water Heaters: Among high income Hispanics ($100k+) 23.5% have solar water heater vs. only 5.7% of non-Hispanics with $100k incomes have solar water heaters.

Table 3 Current Green Activities of Survey Respondents

	Hispanic	Non-Hispanic
Solar PV (Photovoltaic) owner	0	11.4
Solar water heater owner	23.5	5.7
Eco activities	70.6	68.6

This table reports the percentage of respondents who answered "yes" when asked if they owners of these green investments in their homes and engaged in additional eco activities.

Regarding solar energy, we found that none of our Hispanic respondents had solar PV (Photovoltaic) installed; however, 13% had a solar water heater, nearly double of the non-Hispanic response. The average cost of installing solar PV is still considerable, and the cost of solar water heaters is roughly one quarter to one third of the price. Our non-Hispanics at 10.5% had installed solar PV, and only 7% had solar water heaters, which was another unexpected response. Looking at the higher incomes, still zero Hispanics have solar PV, and a higher 11.4 non-Hispanics have solar PV homes. Among high income Hispanics 23.5% have solar water heater compared to only 5.7% of non-Hispanics with this feature. This finding indicates that for the same incomes, four times as many Hispanics chose to use a solar water heater than non-Hispanics. Looking at the more educated graduate Hispanics, 10% have a solar water heater at home vs. 6.5% for non-Hispanics, consistently lower ownership rates for this segment.

Green Event Participation: Among these $100k incomes, 70.6% of Hispanics have participated in green events, vs. 68.6% of non-Hispanics who have participated. Slightly more Hispanics have participated in green events at the high income levels. That finding changes if you look at our summaries, where only 56% of Hispanics participate in green events vs. 72.4% of non-Hispanics participate. It would seem that the more Hispanics earn, the more likely they become active in green activities. Of higher educated Hispanics, 60% have been involved with green events vs. 68% for non-Hispanics with graduate degrees.

Hispanics clearly responded to the question about what media they prefer to get information about green products and services, and with higher response rates to electronic news versus print or magazines as seen in Table 4. Hispanics slightly prefer TV over the web and then radio. Non-Hispanics prefer the web, then Newspapers/Magazines, then TV then radio. (See Table 4 below) Nearly 70% of those Hispanics responding overall indicated a preference for TV to get their information. The findings about Facebook's popularity with both Hispanics and non-Hispanics are very similar, at nearly one third of respondents. However, what was not expected was the difference in Twitter response. Three and a half times more non-Hispanics prefer Twitter to get their information than Hispanics.

As shown in Table 4, the top choice for Hispanics earning $100K and over is TV and second is the web. Both choices were for 60% or greater of the respondents. For non-Hispanics, it's very different: the top choice was newspapers, with nearly 60 % and the second was the web, with nearly 55%. As incomes rose

for non-Hispanics, newspapers became more important as a resource for information. Non-Hispanics in the higher income categories did not rate other media as their preference for information about environmental issues. For non-Hispanics, they selected TV at 42.4% vs. 66.7%. Facebook was similar, with Hispanics ranking that higher. Hispanics preferred Twitter only 6.7% compared to non-Hispanics, who preferred it 18.2%, nearly 3 times more frequently.

Table 4: Media Preferences on Green Information Sources

	Hispanic			Non-Hispanic		
	All Respondents	High Incomes	Higher Education	All Respondents	High Incomes	Higher Education
TV	69.2	66.7	52.6	44.7	42.4	43.2
Web	66.7	60	73.7	55.3	54.5	59.1
Radio	53.8	53.3	36.8	40.8	30.3	34.1
Newspapers	43.6	46.7	26.3	48.7	57.6	50
Facebook	39.8	33.3	26.3	31.6	27.3	29.5
Flyers	12.8	13	0	3.9	9	2
Twitter	5.1	6.7	10.5	18.4	18.2	18.2

This table reports the percentage of respondents who indicated particular media as their preferred source of information regarding green products and services.

Table 4 also describes the high earning Hispanics vs. non-Hispanics choices for media to inform them about environmental issues. TV is most frequently selected, followed by the internet for Hispanics when it comes to learning more about environmental issues. Respondents were asked to select all that apply. For non-Hispanics, magazines and newspapers were the top choice, followed by the internet and then TV.

The top choice for Hispanics with graduate degrees is web ads and websites, with second being TV, and then radio. Only 10.5% use Twitter. The top choice for non-Hispanics with graduate degrees is web ads, then magazines/newspapers, and then TV. 18% are using Twitter, 80% more than Hispanics in the same education category. These findings had us consider selective perception and if people are paying attention to messages, they may be likely to act.

Table 5: High Income Who Always Pay Attention to Information

	Hispanic	Non-Hispanic
Solar energy	41	20
Hybrid cars	31.3	14.3
Water	47	37.1
Recycling	17.9	26.5

This table reports the percentage of those with family incomes of over $100,000 who pay attention to information presented in the media.

In responding to the "always" pay attention question for the high income category in both groups, Hispanics want to know more about Solar Energy and non-Hispanics were more interested in water than solar energy. The answer "always" for Hispanics was water with 47%, vs. non-Hispanics was only 37%. For Solar always were 41% vs. 20% for non-Hispanics. Hybrid was 31.3 for always for Hispanics and 14.3 for non-Hispanics.

In the never category, for Hispanics: Hybrid was 18.8, solar 17.6 and water use and recycling 5.9, were the same. For non-Hispanics, never Hybrid was 14.3, Solar 11.4, Water was 8.6 and recycling was 8.8. So, in summary for the never, Hispanics were more on never with hybrid and solar (more expensive propositions) and they were less likely to say never on the water use and recycling, which are less expensive.

For the question about willing to pay for organics in Table 6 below, Hispanics responded 35.3% sometimes vs. 48.6 % for non-Hispanics. Clearly, Hispanics are not willing to pay as much, which could be attributed to insufficient information.

Table 6: Actions Respondents Are Willing or Not Willing to Take

	Hispanics	**Non-Hispanics**
Sometimes willing to pay for organics	35	49
Never use shared transportation		
Car pool	41	37
Public transportation	70.6	67.6
Always or most of the time save water		
Water at work	67	69
Water at home	77	82.9
Always reduce printing	47	38
Always save energy by saving lights	61.5	49.3

This table reports the current behaviors regarding a variety of green activities. These are indicative of the respondents' commitment to eco friendly actions.

Of all Hispanics surveyed, 41.2% never use a car pool vs. 37% for non-Hispanics. 70.6% of Hispanics never use public transportation, and of non-Hispanics, 67.6 % never use public transportation. Although the difference is not significant, Hispanics are slightly less likely to use shared transportation than non-Hispanics.

Compare Hispanics to non-Hispanics on saving water at work vs. at home. As depicted on Table 6 above, Hispanics and non-Hispanics tend to save 10% more at home than at work. What this may mean is they have more control over their home environment. Hispanics are slightly less inclined to do both of these activities always or most of the time.

Finally, Table 6 above shows that Hispanics tend to reduce their printing and are more concerned about energy saving lights, than non-Hispanics.

CONCLUSIONS

This paper was intended to explore the differences between the attitudes and behaviors, regarding eco-friendly issues, of well-educated and higher income Hispanics from similar Non-Hispanics. This research tested the validity of the prevailing pattern of marketers in approaching Hispanics as an extension of the Non-Hispanic population. This study looked at those with higher education and higher incomes to see if there were differences. Using a web-based survey instrument, participants responded to emailed invitations to complete the surveys electronically.

After reviewing the results, we conclude that there are substantial differences in Hispanics with higher income and education than the perception of the general public has for this Hispanic market in general. These variables are relevant in comparing both Hispanics and non-Hispanics regarding the perceptions and attitudes about the environment, and more specifically recycling newspapers, plastic bottles, cell phones and cartridges. For the affluent Hispanic with income of over $100k, the study showed a greater propensity to use less water and recycle waste than non-Hispanics, which was surprising. The results were different using Higher Education for both groups and therefore can infer that these two independent variables are very significant for both groups, and with a low correlation factor.

High income Hispanics are more inclined to buy a hybrid car than non-Hispanics that was also an interesting discovery from this study. 10% of educated Hispanics have a solar water heater at home vs. only 6.7% of non-Hispanics. Similarly, 23.5% of high income Hispanics has a water heater at home vs. only 5.7% of their counterpart. Regarding involvement in green activities, it would seem that the more

money Hispanics make, the more likely they become active in green activities: 60% of them with graduate degree are involved vs. 68% of non-Hispanics with same education.

Regarding attention to media, Hispanics prefer TV and the web, and non-Hispanics prefer newspapers as number one, followed by the web. This may be of some interest for marketers trying to reach the Hispanic segment. Interestingly, Hispanics responded very low to their attention and involvement with Twitter (only 5.1%) vs. 18.4% for non-Hispanics. Facebook was very similar for both groups. The study also revealed that Hispanics are less likely to pay for organic products than non-Hispanics. In regards to transportation, 41.2% of Hispanics never use car pool vs. 37% for non-Hispanics, and the ones who never use public transportation was consistently high for both, 70.6% for Hispanics vs. 67.6 % for non-Hispanics.

These findings bring some significant light to the behaviors and attitudes of Hispanics vs. non-Hispanics in California regarding environmental issues, which can be used for marketers in conveying their messages to this important growing segment of the population. Nonetheless, more in-depth research is needed to find out other variables and factors that may affect the results.

This has been an exploratory study that investigated an emerging area of concern for marketers. The limitations of this research are primarily in the nature of the convenience sample, rather than a random sampling of the targeted population. The study focused on Hispanics and Non-Hispanics with higher education and higher income who live in California. Further research is desirable to test the results using a random sample of the targeted population. Additionally, it will be useful to test the generalizability of these findings to those with less education, less income, as well as those Hispanics and Non-Hispanics who live beyond the borders of California.

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TURNOVER AND JOB EMBEDDEDNESS IN TIJUANA MEXICO

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ABSTRACT

In this paper we analyze the relationship between family and community links and future intentions to quit from employees at the export processing zone (EPZ) in Tijuana, Mexico. With survey data gathered in an organization belonging to a Tijuana EPZ, we applied the theory of embededdness to identify the causes behind turnover. A questionnaire with 125 items using a 4-points Likert scale was developed to assess job embeddedness, family embeddedness, satisfaction with benefits, and affective commitment and correlated the potential causes with employee's future intentions to stay or leave the organization. One hundred employees completed surveys. Statistical analyses of their survey data revealed strong relationships between certain predictor variables and intentions to stay.

JEL: M12

KEYWORDS: job turnover, embeddedness, EPZ, job satisfaction, affective commitment

INTRODUCTION

While an extensive literature research has been developed about turnover in the last fifty years since export processing began in northern Mexico, very little research has addressed how job embeddedness -or forces inducing employees to stay- affect the quit propensity of manufacturing employees in export processing zones 9EPZ) . Traditional turnover research in Mexican EPZs and elsewhere (e.g. America) has focused on job attitudes and unemployment rates, finding that job dissatisfaction and/or job opportunities in other companies often induce employees to quit. Yet this preoccupation with the psychology of leaving fails to explain the psychology of staying because why employees quit can be quite different from why they stay in a job (Mitchell & Lee, 2001). To address this oversight, Mitchell and Lee (2001) recently proposed "job embededdness", which represent forces inducing employees to stay –namely, (a) fit to the job and community; b) links (ties to people inside and outside the organization); and (c) sacrifice (what job or community benefits employees would lose if they leave)- Mitchel and Lee (2001) demonstrated that job embeddedness can improve turnover predictions beyond that of traditional determinants of turnover (i.e., job attitudes, employment opportunities). Our study tests whether job embeddedness theory can explain why Mexicans staying in EPZ factories as most investigations of this model have been carried out in the United States, raising doubts about its generalizability. For greater validity, we also extend this model to include more culturally specific determinants that can affect staying and consider how they can improve this model. With survey data gathered in a factory from Tijuana EPZ, we thus seek to determine whether an extended theory of job embeddedness can explain employee quit propensity.

The paper begins with a documentary research related to turnover studies and findings. Next, we analyzed the data collected using the questionnaire developed to be applied in Mexico with the purpose of finding the relationship of the variables of the model. Tijuana is a dynamic EPZ area along the Mexican Border

that has contributed to employment growth, economic resources and knowledge spillovers since 1960. EPZs in Mexico originated as part of the Mexican government's 1965 Border Industrialization Program. Most EPZs in Tijuana are foreign-owned, controlled or subcontracted manufacturing plants that process or assemble imported components for export. EPZs inputs are generally duty-free imported and countries like the U.S. only tax the value-added portion. EPZs account for more than 60% of Mexico's exports. The area of Tijuana, Mexico employs roughly 120,000 workers in over 3,000 off shore manufacturing companies. Approximately 58% of the jobs in Tijuana are from the EPZs. Tijuana is also geographically desirable to foreign investors as it is conveniently located directly on the U.S. Mexican Border allowing for inexpensive shipment of assembled products directly into U.S. twin plants.

Tijuana is the "TV manufacturing capital of the world." EPZ companies produce more than 12 million television sets each year. Tijuana's largest employers, for example, are Sony and Sanyo. Also, other manufacturing plants not related to the electronics have chosen Tijuana as their center of production due to the geographical advantages described above. Because of such plentiful employment, Tijuana has drawn many migrants from other parts of Mexico. Thus, Carrillo and Santibañez (2001) found that less than twenty-three percent of the EPZ workers there were natives of Tijuana.

The main research objectives of this paper are: a) to describe the relationship between job embeddedness and future turnover intentions; b) to describe the relationship between family embeddedness and future turnover intentions; c) to describe the relationship between satisfaction with benefits and future turnover intentions and d) to describe the relationship between affective organizational commitment and future turnover intentions. We first review the literature on turnover (focusing on the Mexican EPZ industry) and job embeddedness. Second, it will describe data and methodology used in this research. Third, it will describe the results and findings using descriptive statistics and Pearson correlations. Lastly, we will make some concluding comments about the main findings.

LITERATURE REVIEW

Research on motivational theories of worker turnover in the EPZs is scarce. Management scholars have rarely sought to understand why EPZ workers quit factory jobs. Rather, most theories about why and how employees quit have been developed and validated in the U.S. Because of cultural and economic differences between the U.S. and EPZ areas in developing countries, U.S. based models may not generalize to EPZ workers. Consequently, understanding why EPZ workers quit factory employment is limited, if not biased given the application of turnover models derived from other cultural contexts.

Arrioja (1993), partially proved that these western-based models could be applied in EPZ countries although his research was very limited and almost 20 years have passed since he validated his hypothesis. Other researchers such as Pena (2000) argued that conditions in the maquila industry were different, which allowed the emergence of new hypothesis that refuted the old ones. She also stated that up to the middle of the sixties, research examined the bivariate relationship between job satisfaction and turnover.

English, Williams & Ibarreche (1989) found that Mexican workers perceive personal and working conditions in a very different way than American workers. Also, they found a strong relationship between personality variables and job continuation. (Carrillo- Santibañez 2001). Rodriguez (1988) found that turnover didn't affect productivity of these companies due to the abundant labor available searching for jobs. Carrillo and Santibáñez (2001) emphasized the need of managing high turnover in the maquiladora sector, because such turnover can be costly and hamper production. For them, turnover was practically impossible to lower without affecting the location of the plants and the manufacturing process.

Ahr & Ahr (2000) mentioned that since March & Simon (1958) theory, researchers have focused in finding out how jobs availability and job dissatisfaction interact to result in turnover behavior. They stated that under certain circumstances, the availability of job opportunities may stimulate job dissatisfaction in workers by creating expectations that are not met in the present job. According to Kacmar and associates, employee perceptions of organizational practices are affected by favoritism, suppression of organizational competition and manipulation of internal policies. In the maquila industrythem, some employees stay in the organization due to loyalty to the company (normative commitment), while others stay due to the fact that leaving their job would incur considerable costs to them (e.g., lost job benefits). Those employees that show attitudes and habits desired by managers tend to stay because they want to (affective commitment).

In the maquila industry, centralization is high because top executives are foreigners who rarely delegate or share decision-making authority with local Mexicans (Kacmar et.al 1999). According to them, the perception of the organizational practices is affected by activities such as favoritism, suppression of organization competition and manipulation of internal policies. In the maquila industry workers do not perceive organizational policies as just because supervisors they do not behave respectfully toward workers and do not fairly allocate opportunities and remuneration to workers.

Lack of knowledge of the Mexican culture, its employment relationships, laws, and the prevailing atmosphere of business could lead to poor attrition management in the maquila industry. High maquila turnover, which can exceed 100% can offset the advantages of the low-cost maquila labor because turnover entails additional expenses in recruitment, selection and training, as well as productivity losses when inexperienced new hires replacing exiting workers (Cascio 1991).

Going beyond previous research on the maquila industry, our study considers job embeddedness to more fully explain why maquila workers stay or leave. A growing research stream concludes that job embeddedness explains additional variance in turnover beyond that of standard turnover antecedents (e.g., job attitudes, job opportunities) (Mitchel and Lee, 2001). Hom et al (2009) showed that job embeddedness can also explain why Chinese managers stay. Even so, Ramesh & Gelfand (2010) found this theory was insufficient for understanding attrition in collectivist cultures. They demonstrated that "family embeddedness"—comprising family opinions about an incumbent's employment in a firm, family benefits from incumbent's employment, and ties between family and incumbent's colleagues—can explain additional variance in turnover beyond that of job embeddedness. Customizing job embeddedness theory for collectivist cultures is increasingly essential as turnover is a crucial challenge for manufacturers in export processing zones EPZ (Sargent & Matthews, 2008) in developing typically collectivist countries. To illustrate, factory turnover can amount to 31% in China (Chiu, Luk, & Tang, 2002) and exceed 100% in Mexico (Maertz, Campion, & Stevens, 2003).

Understanding what embeds the Mexican EPZ workforce is important as they represent a vital source of low-cost factory labor (hired directly or indirectly) for U.S. transnationals (Gereffi, 2009). Even Chinese manufacturers may also become concerned about turnover in Mexico as they increasingly invest there to circumvent NAFTA tariffs, hire even less costlier Mexican labor, and access Latin American markets (Liu & Chenyin, 2011).

Apart from the forces for staying highlighted in embeddedness theories, we consider forces driving EPZ employees to quit, such as job dissatisfaction or shocks –critical events at work (or outside work) prompting incumbents to think about quitting (Lee & Mitchel, 1994) EPZ workers are especially prone to varied shocks noted by Lee and Mitchell's (1994) unfolding model. According to EPZ research, they quit due to a) personal (path 1) shocks (invoking pre-existing plans to quit), such as returning home to care for family members, b) negative workplace (path 2) shocks, such as hazardous working conditions or unpaid

wages, and job-offer (path 3) shocks, such as being recruited away by former co-workers or other plants (Johnson, 2004; Maertz et al., 2003; West, 2004). By simultaneously considering both forces to stay and to leave, we can estimate whether –and how strongly- embeddedness forces can help retain maquila workers who are exposed to much stronger forces to leave.

While exposed to greater forces that "push" (path 2 shocks) or pull" (path 1 shocks) them away from the factory job, EPZ workers however lack certain "pull" forces keeping them in jobs (Tharenou & Caulfield, 2010). Because many Mexican and Chinese EPZ workers emigrated from the interior countryside for work, they are rarely embedded in the EPZ community (Garcia & Tovar, 2007). To illustrate, Mexican migrants may live in substandard housing or lack ties to local border residents and thus would not find it costly (in terms of foregone community amenities) if they leave border communities. They also may have few--if any--family members residing nearby and even may have left children in their villages to be reared by grandparents. Because EPZ workers encounter more shocks and are weakly embedded in communities in which they work (lacking community links and sacrifice; Mitchell & Lee, 2001), it is not surprisingly that this workforce exhibits exorbitant turnover. In sum, evaluating "attenuation" capacity of our extended model to deflect or mute shocks' effects advances previous research by probing this capacity with EPZ workers, representing both a powerful as well as an international test.

The International Extended Job Embeddedness Model specify four antecedents of Factory turnover. For this model, job embeddedness includes job fit, job links, job sacrifice, community fit, community links and community sacrifice as important dimensions.

DATA AND METHODOLOGY

A questionnaire with 125 items using a 4 points Likert scale was developed to test the international extended job embeddedness model. Questions measuring variables such as attachment to the firm and community, satisfaction with benefits offered by the employer, Attitudes towards job and community, Family attitudes towards job, recent events causing the employee to think about leaving, benefits of returning home or emigrating to USA, cultural questions and personal data were used to correlate vs. employee future intentions to stay or leave the organization. The questionnaire items and corresponding variables are described in Table1.

As noticed in Table 1, the new adapted model contains 16 subscales. Each subscale groups a number of items in the questionnaire. Upon securing firm permission, we directly administered the survey to 100 workers when their work shifts ended. The purpose was to assure survey confidentiality as well as address respondent questions. After this first survey application, we tested the predictive validity of the model with logistic regression and cultural moderation with hierarchical moderated (logistic) regression.

The sample characteristics are described in Table 2. Most of the employees surveyed are young, 52% of them are less than 30 years old, 52% are male, 48% are married, 80% have a low level of education, where 40% only have elementary school and 40% secondary school. About seniority, 20% are new employees of 1 year or less, 28% have between 1 and 2 years of seniority, 12% have between 2 and 3 years and 40% have been working for the company for more than 3 years.

As shown in Table 2, Panel A, the level of education was divided between elementary school and secondary school. Only 20% of the sample had a high school diploma or more. We noticed that some employees don't know how to read and write, even though they mentioned their level of education as elementary school. As shown in Table 2, Panel B, the seniority level was mainly of more than 3 years, only 20% is a new employee of less than one year. And 40% has been working in the company for more than 3 years. That represents a high percentage of employees that decided to stay in the company for such

a period of time. As shown in Table 2, Panel C, the main age of the employees is between 20 to 30 years old, employees are really young and only 20% are older than 40 years. Young employees prefer to work in the outsourcing companies for their easiness to be hired and to learn the processes. As shown in Table 2, Panel D, the main gender are males due to the hard labor and harsh conditions of the factory where women only detail and do final jobs, even though in this sample both male and female are almost equal.

Table 1: Operational Description of International Extended Job Embeddedness Model

Subscales	Item
Workplace And External Shocks	ES1-2
Family Embdeddness	FE1-10
Job Embededdness	JE1-23
Satisfaction With Benefits	SB1-18
Pay Adequacy	PA1-4
Global Job Embeddedness	GJE5-12
Job Satisfaction	JS13-15
Affective Organizational Commitment	AOC16-19
Perceived Job Prospects	PJP19-21
Supervisory Commitment	SC22-25
Team Commitment	TC26-29
Defecting Coworkers Or Supervisors	DCS30-31
Normative Pressures From Family To Stay Or Leave	NP11-13
Relocation Desirability From Tharenou And Caulfield Model On Expatriate Turnover	RD1-8
Measures O Hofstede Cultural Dimensions 1-6 = Power Distance 7-12 = Collectivism 13-17 = Uncertainty Avoidance	HCD1-17
Factory Retention	FR1-5

This table provides a description of the International Extended Job Embeddedness Model. Source: Peter Hom, 2011

The questionnaire was designed using two survey formats: (1) Likert-type scales ranging from 1, "strongly disagree" to 10 "strongly agree" and (2) demographic questions. Employees self-reported data on all variables with the exception of characteristics of the organization, for which human resources personnel provided data. The control variables used in this research were Organizational characteristics and employee profile were controlled as both have been found to correlate with turnover (Griffeth et al., 2000). Gender was coded as "male" 1, and "female" 2.

The variables in the model were measured by individual perceptions and assessments as recorded on the questionnaire. The questionnaire included multiple items intended to measure the perception of the employee for the variables attachment to the firm and community, satisfaction with benefits offered by the employer, Attitudes towards job and community, Family attitudes towards job, recent events causing the employee to think about leaving, benefits of returning home or emigrating to USA, cultural questions and personal data were used to correlate vs. employee future intentions to stay or leave the organization. Most of these variables were based on previous measurement work by Hom and Garcia (2011). We designed 128 questions in a new questionnaire.

Table 2: Summary Statistics

Panel A: Education Level	
Percentage	**Level of education**
40%	elementary school education
40%	secondary school education
20%	had high school or more
Panel B: Seniority	
Percentage	**Level of seniority**
20%	One year or less
28%	between 1 and 2 years
12%	Between 2 and 3 years
40%	More than 3 years
Panel C: Age	
Percentage	**Age**
52%	20-30 years old
28%	31-40 years old
20%	Older than 40
Panel D: Gender	
Percentage	**Gender**
52%	Male
48%	Female

This table provides summary statistics regarding education levels individuals in the sample. Source: self research.

RESULTS

We analyzed Pearson correlations. For the variable of future intentions to leave the job, we used the methods described by Hom, Shang and Garcia (2012) in their turnover research. Findings about demographics of the employees show that the group that presented high turnover represents 49.7% of the sample, and the low turnover group represents 41.7%, having 8.6% of non responders. Average seniority was 18 months in the job. Also, employees that stayed longer than 18 months in the job are older than 26 and younger than 35 years old. Married women represent most of the low turnover employees. On the other hand, 48% of the total employees sampled are foreigners who don't have family or community links in this city. And 47% of the total employees sampled are renting a small house temporarily. About the satisfaction with the benefits offered by the organization, we found that the average of the employees were satisfied. Still a great number was showing dissatisfaction, which could lead to turnover. Some of the results are shown on Table 3. As noticed in Table 3, most employees are satisfied with most of the benefits offered by the organization. Less than 16% are showing dissatisfaction with some of the benefits received. As noticed, The frequency of 16% mentions the yearly increases benefit as very dissatisfying for the employees surveyed.

Table 3: Satisfaction with the Benefits Offered by the Organization

Benefit Description	**Very Dissatisfied**	**Dissatisfied**	**None**	**Satisfied**	**Very Satisfied**
Christmas bonus	8%	20%	12%	52%	8%
Seniority bonus	12%	20%	32%	28%	8%
Punctuality bonus	4%	16%	8%	52%	20%
Yearly salary increases	16%	24%	28%	20%	12%

This table shows satisfaction levels with benefits. Source: self research

In Table 4 we show the Spearman Correlations to find the relationship of the variables included in this research. As shown in Table 4, correlations between family and community embededdness and withdrawal cognitions are significant and inverse (-0.236) employees with no family and community links are the ones that leave the organization first. We found a significant inverse relationship between withdrawal cognitions and employee's affective commitment (-0.337). Also, Job satisfaction shows an inverse significant correlation with withdrawal cognitions of -0.390. Objectives are achieved with these findings.

CONCLUDING COMMENTS

The goal of this paper was to analyze if having family and community links keeps the employees from leaving their jobs at the export processing zone (EPZ) in Tijuana. Descriptive statistics show most sampled employees were young and with a low education levels. Many have no community links and are identified as floating population. Those employees belonging to the floating population show no affective commitment and are temporarily working while waiting the opportunity to "jump" to the other side of the border. Correlations demonstrate that a future intention to quit and family and community embeddedness are highly related. Affective commitment and future intention to quit are highly significant too.

The main findings of these paper were to realize that Mexico is a collectivist society. People respond to the norms of others to fulfill their need for social affiliation. Community embeddedness of fit and sacrifice reflect an individual's preferences (i.e., self need of acceptance). Community links is related to future quit intentions. As noted, 48% of the employees sampled have no community links and have future intentions to migrate to USA. Job embeddedness theory does not fully capture the emotional intensity of links (which Holtom and colleagues, 2008 acknowledge).

Table 4 Pearson Correlations

Pearson CorrelationMatrix	Withdrawal Cognitions	Shocks	Family Embeddedness	Overall Job Embeddedness	Pay Adequacy	Job Satisfaction	Benefit Satisfaction	Organizational Commitment
Withdrawal	1	0.363**	-0.280**	-0.236*	-0.269**	-0.390**	-0.192	-0.337**
Cognitions		0.000	0.006	0.019	0.007	0.000	0.059	0.001
	99	98	96	99	99	99	98	99
Shocks	0.363**	1	-0.154	-0.178	-0.237*	-0.253*	-0.070	-0.281**
	0.000		0.135	0.078	0.018	0.011	0.492	0.005
	98	99	96	99	99	99	98	99
Family	-0.280**	-0.154	1	0.291**	.254*	0.436**	0.291**	.391**
Embeddedness	.006	0.135		0.004	0.012	0.000	0.004	0.000
	96	96	97	97	97	97	96	97
Overall Job	-0.236*	-0.178	0.291**	1	0.310**	0.304**	0.328**	.347**
Embeddedness	.019	0.078	0.004		0.002	0.002	0.001	0.000
	99	99	97	100	100	100	99	100
Pay Adequacy	-0.269**	-0.237*	0.254*	0.310**	1	0.345**	0.562**	.336**
	0.007	0.018	0.012	0.002		0.000	0.000	0.001
	99	99	97	100	100	100	99	100
Job Satisfaction	-0.390**	-0.253*	0.436**	0.304**	0.345**	1	0.509**	.724**
	0.000	0.011	0.000	0.002	0.000		0.000	0.000
	99	99	97	100	100	100	99	100
Benefit Satisfaction	-0.192	-0.070	0.291**	0.328**	0.562**	0.509**	1	.472**
	0.059	0.492	0.004	0.001	0.000	0.000		0.000
	98	98	96	99	99	99	99	99
Organizational	-0.337**	-0.281**	0.391**	0.347**	.336**	0.724**	0.472**	1
Commitment	0.001	0.005	0.000	0.000	0.001	0.000	0.000	
	99	99	97	100	100	100	99	100

This table shows the Pearson Correlation Analysis.

According to Hom, Shang and Garcia (2012) American-based models are so individualistic, assuming that people are motivated mostly by self-gain. We are finally recognizing social influences, though we continue to disparage them as "constraints" on self-fulfillment. Yet newer theories on collectivism suggest that collectivists embrace the opportunity to serve group goals (finding altruism "intrinsically rewarding; cf. Adam, 2007) or that their self-identity derives from group affiliations (Brewer & Chen, 2007). As we carry out more turnover studies in collectivist countries, we need to revamp our models to fit these cultural differences. As shown in the results, Family embeddedness and affective commitment are good predictors for turnover. For the sample of this research, it was very clear the importance of community and family links to feel attached to their roots. Having 35% of the population in Tijuana considered as floating population, due to their status, it is very understandable that employees consider

their jobs at the EPZ as temporary and a necessary step before crossing the border. Many of those employees that get hired by these companies (48%) according to this research will leave the company at the first opportunity.

With high instability in the border towns of the EPZ, administering and keeping the work force is a hard task for most human resources' managers. Organizations need to "read" the future employee intentions to stay or leave the company understanding the hidden reasons he has for his final destination. This research also, extends generalizability for Mitchell and Lee's (2001) original theory of job embeddedness, which heretofore has primarily been validated in Western developed economies (mostly America; Holtom et al., 2008; Gong et al., 2011).

The limitations of this paper were the large amount of missing data that surveyed employees left when answering the questionnaires. Even though we reorganized the questionnaire and readapt the questions after a pilot application, the low scholar level of many employees made the questions hard to answer for them. Also, fear to retaliation from the management made the employees leave many important questions blank.

Another limitation in our investigation was to use withdrawal cognitions rather than turnover. While understanding its etiology is important in its own right (e.g., psychological quits or withdrawal; Shaffer & Harrison, 1998) given its consequential impact on behaviors other than turnover. Future research should include a larger sample of companies in Tijuana were different activities apart from the EPZ show if the tendency of turnover is the same according to the economy situation. Also, including factory conditions and risks as variables should give important information.

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