# The Effects of Driving Forces and the Influence of Organizational Variables on Learning Organizations and their Performance: A Case Study of the Software Development Industry in Thailand

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## Abstract

*Organizational development professionals have continuously stressed the need for organizational changes to remain competitive for any business (private, public, or nonprofit), stating that the need for change is driven by external and internal environmental forces and that organizational changes must be planned, whereby the changes and desired outcomes are clearly established. The concept of the learning organization is one of the total change strategies available to organizations of all industries to be utilized in steering through the challenges thrown into the path of survival and success.*

*The purpose of this study was to examine: (1) the effects of external and internal driving forces of change on planned organizational changes with respect to learning perspectives; (2) the relationships between interacting organizational variables (under the influence of driving forces of change); and (3) the effects of interaction of organizational variables and learning outcomes on perceived levels of organizational performance.*

*A theoretical model and a survey instrument were developed to assess and validate all of the aforementioned points in a real world situation*

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*(Thai Software Industry) as a case study, where learning and knowledge are essential components. The results indicated that the driving forces of change do have an indirect effect on learning outcome and organizational performance of an organization mediated by organizational variables, as theorized in the conceptual framework.*

***Keywords:*** *Driving Forces of Change, Organizational Variables, Learning Organizations*

# ผลกระทบจากแรงขับเคลื่อนและอิทธิพลของปัจจัยองค์กรที่มีต่อองค์กรแห่งการเรียนรู้และผลการปฏิบัติงานขององค์กร: กรณีศึกษาอุตสาหกรรมซอฟต์แวร์ไทย

*โพ ซะนะกะ**

**บทคัดย่อ**

*ในยุคปัจจุบันนี้นักวิชาการและผู้เชี่ยวชาญด้านการพัฒนาองค์กรได้ให้ความสนใจเป็นอย่างมากในการเปลี่ยนแปลงและพัฒนาองค์กรเพื่อที่จะอยู่รอดและคงความได้เปรียบในด้านต่าง ๆ ของธุรกิจ (ทั้งในภาครัฐ ภาคเอกชน และองค์กรไม่แสวงหากำไร) ซึ่งได้ให้ความเห็นว่าความจำเป็นในการเปลี่ยนแปลงองค์กรนั้นสามารถถูกผลักดันโดยแรงขับเคลื่อนจากทั้งภายในและภายนอก และการเปลี่ยนแปลงนั้นจำเป็นต้องถูกวางแผนและกำหนดเป้าหมายอย่างชัดเจน ด้วยเหตุผลนี้แนวความคิดเกี่ยวกับองค์กรแห่งการเรียนรู้จึงกลายเป็นหนึ่งในกลยุทธ์สำคัญที่องค์กรจากหลากหลายอุตสาหกรรมสามารถนำไปใช้ประโยชน์และขับเคลื่อนองค์กรให้บรรลุเป้าหมาย*

*งานวิจัยนี้มีวัตถุประสงค์เพื่อ (1) ศึกษาผลกระทบที่เกิดจากแรงขับเคลื่อนทั้งภายในและภายนอกที่ส่งผลให้องค์กรเกิดการเปลี่ยนแปลงไปสู่องค์กรแห่งการเรียนรู้ (2) วิเคราะห์ความสัมพันธ์ระหว่างตัวแปรต่าง ๆ ที่มีอิทธิพลกับการเรียนรู้ขององค์กร (ภายใต้อิทธิพลของการผลักดันจากแรงขับเคลื่อนที่ทำให้เกิดการเปลี่ยนแปลง) กับผลการเรียนรู้ (3) วิเคราะห์ผลกระทบของปฏิกิริยาที่เกิดขึ้นระหว่างตัวแปรต่าง ๆ ที่มีอิทธิพลต่อการเรียนรู้ขององค์กรและผลการเรียนรู้ซึ่งส่งผลต่อผลการปฏิบัติงานภายในองค์กร*

*กรอบแนวคิดเชิงทฤษฎีและเครื่องมือที่ใช้ในการหาข้อมูลเพื่อวิเคราะห์ได้ถูกพัฒนาขึ้นในงานวิจัยชิ้นนี้เพื่อที่จะประเมินและทดสอบวัตถุประสงค์ที่กล่าวมาแล้วข้างต้นในสถานการณ์*

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*ความเป็นจริง โดยใช้อุตสาหกรรมซอฟต์แวร์ไทยเป็นกรณีศึกษาซึ่งความรู้และการเรียนรู้เป็นปัจจัยที่สำคัญและขาดไม่ได้สำหรับองค์กรประเภทนี้ ผลลัพธ์จากการวิจัยยืนยันและชี้ว่าปัจจัยที่มีอิทธิพลต่อการเปลี่ยนแปลง (1) สิ่งแวดล้อม 2) อุตสาหกรรม และ 3) องค์กร) มีบทบาททางอ้อมกับการเรียนรู้ และ ประสิทธิภาพขององค์กร ซึ่งสอดคล้องตามทฤษฎีในเฟรมเวอค์ที่ว่าปัจจัยเหล่านั้นจะมีอิทธิพลผ่านตัวแปรตัวกลาง (8 ปัจจัยบริหาร)*

***คำสำคัญ:*** *แรงขับเคลื่อนที่ก่อให้เกิดการเปลี่ยนแปลง ตัวแปรที่มีอิทธิพลกับการเรียนรู้ องค์กรแห่งการเรียนรู้*

## Introduction

It is generally accepted nowadays that organizations are being increasingly challenged by a competitive market geared towards globalization, which calls for setting new and innovative business strategies in order to meet the near and long-term goals and overcome the challenges. Leadership capabilities must be built up to a better and stronger level, and the workplace must be transformed into a healthier environment by creating a work climate open to creative thoughts. However, it has traditionally been the practice, in organizations, to leave all of the thinking and planning to senior management, while everyone else follows what is decided as the best practices for the organization by the senior management. This method of planning and conducting business does not fully utilize the available resources, i.e. the entire workforce in the organization who may have a lot to offer towards effective and efficient work processes, improved products and services for customers, and a productive work climate.

Constant changes are a way of survival for organizations in dynamic business environments. Competitive markets and ever-changing customer demands usually are the major driving forces for organizations to continuously think about initiating changes for survival and better performance. Visions, missions, goals and objectives were usually set based on the environmental factors at the time when the organization was brought into existence and organizational strategies and plans were laid down accordingly. However, as the term "dynamic" suggests, the environment is always changing, and organizations need to follow suit by changing organizational strategies and plans accordingly to survive and to be successful. For organizations to compete in the current information age, it is necessary to remain dynamic, competitive, and to continuously look for ways to improve.

Continuous change and improvement in turn demand a commitment to learning and the transfer of that learned knowledge into action (Garvin, 1993). The ability to learn better and faster than competition may be the only sustainable competitive advantage and the key to survival (Senge, 1990). A continuous learning process is proven to be beneficial in terms of change and performance and is imperative for organizations to cope with the modern day business world (Senge;

1990; Garvin, 1993; Marquardt, 1996; Watkins & Marsick, 1996). The appeal of developing an organization's ability to learn is driven by the need to remain dynamic and fluid in a constantly-changing environment shaped by environmental-level, industry-level and organizational-level driving forces. It has been widely theorized that by focusing on learning for organizational strategies and plans, the organization should obtain the ability to develop new ways of thinking on higher levels, more refined and mature levels of generating innovative thinking, creativity, and organizational advancement (Senge, 1990; Watkins & Marsick, 1993; Kaiser & Holton, 1998), and such organizations have been termed as learning organizations.

## Organizational Changes and Driving Forces of Change

Organizational changes are neither spontaneous nor instantaneous events. Driving forces (both internal and external) initiate the change process and keep the change going, whereas resisting forces (internal) go against (attempt to oppose) driving forces. The organization must first be aware of and accept the need for change and be prepared to move away from the current practices. Next, the dimensions of change such as scale, focus, type, and source of changes must be agreed upon and a plan must be formulated to implement the changes desired. The plan must clearly state the desired outcome from the changes with the methods and tools necessary to measure the outcome of change defined.

External driving forces collectively include environmental-level and industry-level change drivers, as they originate outside the organizations in the macro-economic environment and the industry. Environmental change drivers are part of the PESTEL framework. They are political, economic, social, technological, environmental, and legal factors and they may be inter-related. Organizations may decide to initiate changes accordingly with industry practices and prospects such as competitors' objectives, assumptions, strategies, capabilities and customer's preferences, spending strategies and pattern, to gain strategic advantage over the competition. The five competitive forces stated by Michael Porter (1985) can be used to explain the industry level change drivers, and these are the entry of new competitors, the threat of substitute products, the bargaining power of suppliers, the bargaining power of customers, and the existing rivalry between competitors.

The strength of these forces may vary among different industries.

Lunenberg (2010) has stated that processes and people problems are the two most significant pressures for change that are generated internally. Internal change drivers can be categorized into four organizational perspectives at its most fundamental level, as suggested by the Balanced Score Card framework (Kaplan & Norton, 1992). This framework proposed that the organization observe four perspectives, i.e. customer, financial, business process, and learning, when attempting to implement organizational vision and strategy into results, and monitor organizational performance against strategic goals or identify underperforming areas that internal organizational changes should be initiated upon.

**Table 1: Driving Forces for Organizational Change**

| External Drivers | | Internal Drivers |
|---|---|---|
| Environmental-level | Industry-level | Organizational-level |
| - Political | - New Entrants | - Customer |
| - Economic | - Substitute Products | - Financial |
| - Social | - Bargaining Power (Supplier) | - Process |
| - Technological | - Bargaining Power (Buyer) | - Learning |
| - Environmental | - Intensity of Rivalry | |
| - Legal | | |

## Organizational Change from the Learning Perspective

Learning is a trait of a self-adjusting organization in the organizational development discipline. However, the presence of external driving forces does not necessarily mean that a change is imminent or that all internal changes are always influenced by external change drivers. Organizational changes from the learning perspective can take place as a result of both external and internal change drivers, as environmental-level and industry-level changes may require organizations to create a learning culture or organizations may have decided that creating a learning culture is beneficial in the long term for achieving its vision, implementing its strategies, and attaining its goals. Hence, from the learning perspective, it would bring more positive results for the organization to let employees explore and develop (within limits) their own individual potentials

while performing their duties. Through training, skills and knowledge are gained, but only through learning, creativity and innovation are they realized.

However, no one can bring success to an organization single-handedly. As such, many organizations have tried to place emphasis on learning together as a team and bring about positive results in terms of knowledge, creativity and innovation. Organizations have come to gradually be more dependent on teams of individuals to implement vital strategies and to perform operational related tasks (Edmonson, Dillon, & Roloff, 2006). Peter Senge wrote "*teams, not individuals, are the fundamental learning unit in modern organizations*" (Senge, 1990: 10), and it is the communication and exchange of ideas among the members of the team that is responsible for escalating the power of the organization to expand and advance.

## Learning Organizations

A learning organization has the superior ability to continuously learn, adapt, and change. It comes into existence upon the necessity to survive and prosper, driven by external and internal forces. They must have certain values such as appreciation of learning and thirst for knowledge, firm policies and management practices supporting learning, programs, support systems, and organizational structure to support and accelerate the organizational learning.

Pedler, Burgogyne and Boydell (1991) described a learning organization as "*an organization that facilitates the learning of all its members and continuously transforms itself.*" Peter Senge (1990) has further expanded the definition by adding the involvement of the people stating that the learning organization is a place where members develop the aptitude necessary to create desired results, where innovative, unrestrained and out-of-the-box thinking is fostered, where their ambitions to succeed are collectively and totally unleashed, and where members are encouraged to learn continuously together to see the complete picture of their efforts. Johnson (1993) concurred with Senge's definition of the concept by stating that the work environment in learning organizations is conducive to innovative thinking. Members of learning organizations experience a paradigm shift from the traditional, strict hierarchical workplace attitude to one where the input and

viewpoint of every member is valued and nurtured, and learning to participate in idea creation, innovation, and challenging oneself to contribute to the betterment of the workplace are encouraged (Rheem 1995). Watkins and Marsick (1992) have provided some basic characteristics of learning organizations as an organization where the change processes are geared towards shared values and principles, and changes are jointly carried out, with members being accountable as a whole rather than individually for the results through total involvement. Mason (2012) stated that true learning organizations cherish changes and are constantly establishing positions to cause a structure that is continuously developing with integrated visions of the future.

In addition to suggestions by various theorists (Senge, 1990; Pedler et al., 1991; Kline & Saunders, 1993; Watkins & Marsick, 1993; Marquardt, 1996) on the definition of the learning organization and the obvious importance of learning and collective action, there are other characteristics that are recognized as part of the learning organization such as vision and mission, which includes learning as part of its goals, an organizational culture that promotes learning and a supporting environment or climate, and a leadership that strongly advocates learning. Lesser characteristics may include systems thinking and open communications among members, flexible organizational structures with effective organizational supportive systems, and management supportive of learning and teams motivated to learn.

## Purpose of the Study

O'Keeffe (2002) wrote that "*learning organizations develop as a result of the pressures facing modern organizations which enable them to remain competitive in the business environment*". It is, therefore, critical and imperative to understand how much of an influence external and internal driving forces; i.e. environmental, industry and organizational-level forces (Lunenburg, 2010; Sarkar, 2010), exert upon the management of an organization to take action in terms of formulating and implementing organizational strategies, styles of management and leadership, and organizational culture in transforming it into a learning organization; how each individual and/or work unit itself strives towards creating a learning organization; the level of significance that some of the organizational variables (Burke & Litwin,

1992) have on the organizational change; and how these changes collectively affect the performance of the organization financially and in terms of knowledge.

This study empirically measured the principle perceptions of organizational members regarding influence of external and internal forces, evaluated the influence of organizational variables and their roles in organizational performance via changes and learning outcome, and assessed the level of effectiveness of the changes in relation to the performance of the organization, both financially and regarding knowledge.

## Theoretical Framework

The theoretical framework of the research was based on a collection of existing theories. The theorization was that driving forces require organizations to change and organizational changes from the learning perspective involve attempting to learn better and faster than the competition and transforming the organization into a learning organization (Senge, 1990; Garvin, 1993; Ang & Joseph, 1996). This action affects certain organizational variables in such a way that they will play a vital supporting role in achieving the goal of becoming a learning organization. The organizational model of Burke and Litwin's (1992) "A Causal Model of Organizational Performance and Change" hypothesized relationships between the external environment and organizational variables (the constructs of transformational and transactional variables), and organizational performance which is the very goal that the learning organizations are trying to achieve. The original model was extended by measuring the level of influence that the external and internal forces exert on the organizational variables.

Furthermore, continuous learning must occur at all levels (the individual, team, and organization) in a learning organization and the result of the effort taken to create the capacity to learn better and faster at all levels (the learning outcome) will improve organizational effectiveness and performance (Senge, 1990; Pedler et al., 1991; Watkins & Marsick, 1993; Marquardt, 1996). It is hypothesized in the model that certain organizational variables are vital to transforming the organization into a learning organization and must be taken into consideration when the transformation strategy is developed.

Eventually, every performance outcome domain must be measured for feedback and improvement. The scale of measuring the performance in terms of perceived improvement financially and in terms of knowledge was adopted from Watkins and Marsick's "Dimensions of Learning Organization Questionnaire" (Yang, Watkins, & Marsick, 2004).

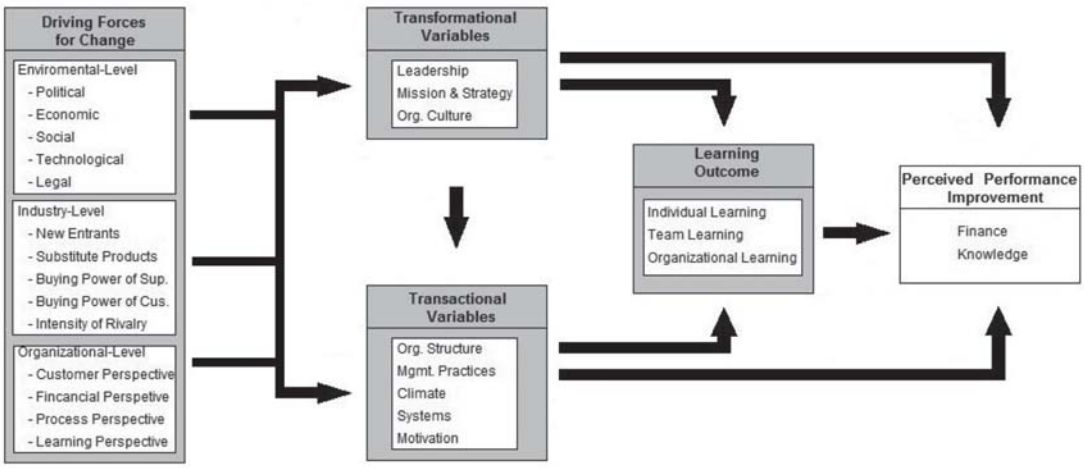


**Figure 1: Nomological Network of the Theoretical Framework**

## Conceptual Framework

Driving forces of change, transformational and transactional variables, learning outcome, and organizational performance were the latent constructs in the model. They were indirectly measured through a set of indicators (see Figure 2). The following indicators were used to indirectly measure the construct of the driving forces of change which were political, economic, social, technological, and legal (environment); new entrants, substitute products, bargaining power of suppliers and buyers, and intensity of rivalry (industry); and customer, financial, process and learning perspectives (internal). The indicators used to indirectly measure the transformational construct were leadership, mission and strategy, and culture whereas the indicators used to indirectly measure the transactional construct were organizational structure, management practice, work climate, systems, and motivation. The learning organization construct was measured indirectly through following indicators: individual learning, team learning, and

organizational learning. The performance construct was evaluated indirectly through following indicators; perceived level of performance financially and in terms of knowledge.

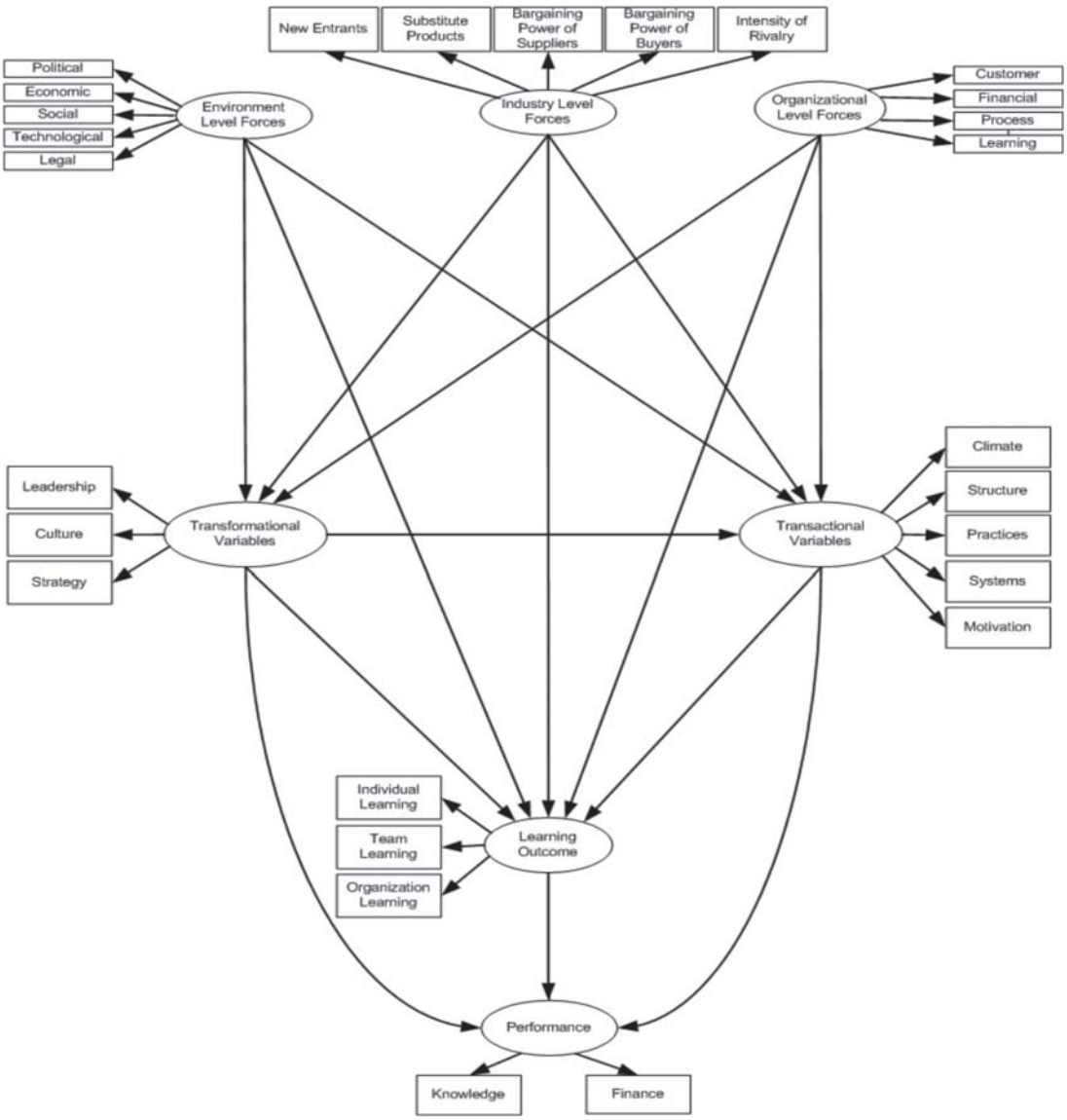


**Figure 2: Conceptual Framework**

## Research Questions

The research was designed to answer the following research questions.

- Do external and internal driving forces exert an influence on an organization's transformational and transactional variables and to what extent?
- Can transformational variables alone transform the organization into a learning organization and affect the learning outcome?
- Do transformational variables have a profound effect on transactional variables?
- Can transactional variables alone transform an organization into a learning organization and affect the learning outcome?
- Do all organizational variables collectively affect the learning outcome and organizational performance?
- Can the learning outcome at individual, team and organizational levels exert a positive effect on the perception of organizational performance financially and in terms of knowledge?

## Methodology

This research was designed to be descriptive and applied quantitative techniques. To conduct the research in a Thai environment, the Thai Software Industry (SME) was chosen as the target group of the study. The reason was that organizations that develop things based on intellectual factors need innovation and learning brings about innovation. It is also an important business sector that plays a prominent role in the country's attempt to become a creative economy and offer lucrative opportunities for investors.

### Survey Instrument

A custom-designed instrument was developed for collecting information from the respondents currently working in the Thai Software Industry. The development was based on the various literature and theories concerning the driving forces and organizational factors from the learning perspective and the

perception on organizational performance. The outcomes of the past research in the area of learning organization, measuring learning organizations and forces driving organizational changes were also taken into account during the development process. The initial theory and scale were refined through the qualitative process by asking for expert opinions and was revised several times.

The items for measuring the constructs of the external environmental-level and industry-level driving forces for change and internal organizational driving forces for change were created from the various organizational change literature from many sources. The items for the construct measurement and scales for the organizational variables, learning outcomes, and perceived organizational performance in the scale were adopted from "Assessing Strategic Leverage for the Learning Organization" (ASLLO) (Gephart, Holton, Redding, & Marsick, 1996), Learning Organization Survey (Garvin, Edmunson, & Gino, 2008), DLOQ (Yang et al., 2004) and Doctoral Dissertations (Poomontre, 2005).

**Development and Testing**

The items involved in each construct were listed and verified for relevance, where a list of the items extracted from the literature was provided and the opinion of the verifier (industry expert) was sought for relevance to actual industry practice. The initial version of the survey instrument was developed after this process. Expert opinion was sought for a second time for the instrument verification after it was developed. The items for each construct were verified and added or deleted according to the industry practice suggested by the industry expert.

As the scale was initially created in English, it was translated into Thai where three translators (including the researcher) independently did the translation while taking precautions not to change the context of the meaning, but not exactly adhering to a word-for-word translation into English. The translated results for each person were later compared and differences in opinion were sorted out and rectified. The resulting scale was submitted to 5 experts (experienced consultants in the HRD and OD discipline) for Item Objective Congruence testing to determine content validity, and together with the results from the pilot testing the instrument went through many revisions before it was actually deployed.

Two instances of pilot testing were carried out to test for comprehension and reliability of the items and to validate the survey instrument. The internal consistency and factor loadings of each construct were measured and evaluated from the data collected. The items with low internal consistency or low correlation (Cronbach's Alpha value of less than 0.5) with the latent constructs (factor loadings of less than 0.33) were evaluated in conjunction with the IOC values and revised.

The final revision of the scale consisted of 10 multiple choice items requesting general information and 94 Likert-scale items, with seven point scales ranging from Strongly Disagree to Strongly Agree requesting respondents' opinions of their respective organizations in terms of environmental, industry, and organizational-level forces, transformational and transactional organizational variables, the various levels of learning that occurred in the organization, and organizational performance indicators, both financially and in terms of knowledge.

**Sample**

The members of the Association of Thai Software Industry were selected as the sample population for the research. The focus group consisted of member organizations with at least 10 employees up to 100 employees; there were altogether 52 organizations that met the criteria with a total population of 1624 individuals. The average number of employees was 30. There were 35 organizations with between 10-30 employees and 9 organizations with between 31-50 employees, and 8 organizations with above 50 employees. During the collection process, the prospective respondents were assured of complete confidentiality to promote cooperation and to provide answers that reflected their real opinion.

**Respondents**

A total of 372 replies from 26 organizations out of 52 organizations contacted was received. Table 2 displays the respondent-related data, whereas Table 3 displays the related data on the respondents' organizations.

**Table 2: Respondent Data**

| Category | Count | Per Cent |
|---|---|---|
| *Gender* | | |
| Male | 137/372 | 36.8% |
| Female | 235/372 | 63.2% |
| *Education* | | |
| Diploma | 17/372 | 4.6% |
| Bachelor | 326/372 | 87.6% |
| Masters | 28/372 | 7.5% |
| Others | 1/372 | 0.3% |
| *Level* | | |
| Management | 39/372 | 10.5% |
| Supervisory | 57/372 | 15.3% |
| Operations | 276/372 | 74.2% |

**Table 3: Data of Responding Organizations**

| Category | Count | Per Cent |
|---|---|---|
| *Number of Years in Industry* | | |
| 1-4 years | 127/372 | 34.1% |
| 5-10 years | 122/372 | 32.8% |
| more than 10 years | 123/372 | 33.1% |
| *Type of Organizations* | | |
| Limited Company | 372/372 | 100.0% |
| *Countries/Regions of Operations* | | |
| Thailand | 281/372 | 75.5% |
| ASEAN | 51/372 | 13.7% |
| Asia-Pacific | 9/372 | 2.4% |
| World | 31/372 | 8.3% |

### Analysis

The collected data from the respondents was first analyzed for frequency, percentage, univariate descriptive statistics such as mean, standard deviation, etc. and bivariate descriptive analysis such as cross-tabulation information from the demographic data, quantitative measures for dependence, etc.

The collected data was then tested for internal consistency and construct validity. The internal consistency test for each item in the factor resulted in a very high correlation for each construct with Cronbach's Alpha values higher than 0.8, which indicated very good reliability. Furthermore, the construct validity test using principle component matrix using the varimax rotation method was employed. The results confirmed the validity of each construct by not extracting more than one component from the items submitted for each construct, and all of the factor loadings were greater than 0.6.

The un-standardized scores for each item in the constructs were later computed into standardized scores by reducing all of the items for a sub-scale (construct) into a single new dimension using factor analysis. As such, only a single value for each construct (latent variable) was loaded into the model for further analysis.

Furthermore, inferential statistical analysis was conducted using a structural equation model (SEM) built from the conceptual framework (Figure 2) using AMOS. If a certain structural model representing the conceptual model fits the data at an acceptable level, the research questions would be answered. Consequently, the hypothesized relationships between the constructs that were significant would have proven that an effect or influence did exist between the constructs as the theory had stated.

## Results

The results of the analysis are displayed in Tables 4 through 7.

### Descriptive Statistics

All of the constructs had standard deviation values in the range of 0.9-1.2 on a seven point Likert scale. This range of values demonstrated that the survey

instrument had managed to collect sufficient variability in the responses from different organizations. The mean values were in the 4.9-5.5 range which demonstrated that the responses tended to agree more with the survey instrument than disagree with it (see Table 4).

**Table 4: Sample Sizes, Means and Standard Deviations**

| Constructs | N | M | SD |
|---|---|---|---|
| 1. Environment | 372 | 4.9935 | 0.93 |
| 2. Industry | 372 | 5.1145 | 0.95 |
| 3. Organization | 372 | 5.3266 | 0.98 |
| 4. Leadership | 372 | 5.4145 | 1.07 |
| 5. Culture | 372 | 5.5841 | 0.91 |
| 6. Mission & Strategy | 372 | 5.1391 | 0.85 |
| 7. Practices | 372 | 5.3293 | 0.96 |
| 8. Structure | 372 | 5.2769 | 0.97 |
| 9. Systems | 372 | 5.0622 | 1.04 |
| 10. Climate | 372 | 5.3306 | 0.89 |
| 11. Motivation | 372 | 5.5280 | 1.00 |
| 12. Individual Learning | 372 | 5.4552 | 0.93 |
| 13. Team Learning | 372 | 5.4485 | 1.01 |
| 14. Organizational Learning | 372 | 5.0188 | 1.21 |
| 15. Financial Performance | 372 | 5.1335 | 1.16 |
| 16. Knowledge Performance | 372 | 5.0449 | 1.07 |

## Principal Component Analysis

Items that belonged to a single construct according to theory were validated through a PCA extraction to confirm that not more than a single factor with an Eigen value greater than 1 was extracted from the collection of items. All of the constructs demonstrated no cross loadings during these tests, and all factor loadings were at least 0.5, or the percent of variance explained was at least 50% (see Table 5).

### Internal Consistency

The data for items of the same sub-scale were tested for internal consistency to confirm that the items that measured the same general construct produced similar

scores. The resulting Cronbach's Alpha value for all of the constructs exceeded 0.8, which indicated good reliability (see Table 5).

**Table 5: Principal Component Analysis and Reliability Results from the Exploratory Factor Analysis and Reliability Tests**

| Factor | Eigen Value | Variance (%) | Cronbach's Alpha |
|---|---|---|---|
| Driving Forces | | | |
| Environmental-level forces | 2.834 | 56.686 | 0.807 |
| Industry-level forces | 3.178 | 63.560 | 0.854 |
| Organizational-level forces | 2.770 | 69.249 | 0.851 |
| Transformational Variables | | | |
| Leadership | 3.922 | 78.434 | 0.931 |
| Culture | 4.544 | 64.907 | 0.907 |
| Mission & Strategy | 4.313 | 53.916 | 0.876 |
| Transactional Variables | | | |
| Management Practices | 7.004 | 70.040 | 0.952 |
| Org. Structure | 4.256 | 70.773 | 0.917 |
| Systems | 4.997 | 71.382 | 0.933 |
| Climate | 6.716 | 67.160 | 0.945 |
| Motivation | 4.138 | 82.766 | 0.948 |
| Learning Organization | | | |
| Individual Learning | 2.435 | 81.152 | 0.883 |
| Team Learning | 4.636 | 77.262 | 0.939 |
| Organizational Learning | 2.355 | 78.503 | 0.863 |
| Organizational Performance | | | |
| Finance | 2.414 | 80.458 | 0.875 |
| Knowledge | 5.281 | 75.448 | 0.945 |

**Confirmatory Factor Analysis**

A CFA model was designed and tested using AMOS with the data collected to confirm that the structure fit the observed data and that the measurement items adequately represented the constructs for which they were written. The results indicated that all of the regression weight estimates except for the fixed ones

(at 1.000) were statistically highly significant at the .001 level with the standardized regression weights from the low of 0.38 for organizational learning to the high of 0.92 for team learning, indicating that all measured variables were reliable indicators for which they were written to represent. The amount of variances accounted for the measured variables by their latent constructs resulted in the range of .144-.853 (see Table 6).

Even though all of the items were statistically very highly significant at the .001 level, some of them may not have represented the construct well, especially for organizational learning at the estimated regression weight of.380 and squared multiple correlations of .144 with the residual error of 86%.

**Table 6: Standardized Regression Weights (β) and Squared Multiple Correlations ($R^2$) from the Confirmatory Factor Analysis**

| Construct | Measured Variable | Standardized Regression Weights | Squared Multiple Correlations |
|---|---|---|---|
| Environmental-level Forces | Political | 0.740 | 0.547 |
| | Economical | 0.809 | 0.655 |
| | Social | 0.673 | 0.452 |
| | Technological | 0.591 | 0.349 |
| | Legal | 0.569 | 0.324 |
| Industry-level Forces | New Entrants | 0.735 | 0.541 |
| | Substitute Products | 0.678 | 0.459 |
| | Supplier's Bargaining Power | 0.661 | 0.437 |
| | Buyer's Bargaining Power | 0.781 | 0.610 |
| | Intensity of Rivalry | 0.821 | 0.674 |
| Organizational-level Forces | Customer | 0.804 | 0.646 |
| | Finance | 0.714 | 0.510 |
| | Process | 0.773 | 0.598 |
| | Learning | 0.782 | 0.612 |
| Transformational Variables | Leadership | 0.747 | 0.558 |
| | Culture | 0.680 | 0.463 |
| | Mission & Strategy | 0.789 | 0.623 |

**Table 6: Standardized Regression Weights (β) and Squared Multiple Correlations ($R^2$) from the Confirmatory Factor Analysis (continued)**

| Construct | Measured Variable | Standardized Regression Weights | Squared Multiple Correlations |
|---|---|---|---|
| Transactional Variables | Practices | 0.885 | 0.782 |
| | Structure | 0.853 | 0.728 |
| | Systems | 0.826 | 0.682 |
| | Climate | 0.867 | 0.752 |
| | Motivation | 0.790 | 0.624 |
| Learning Outcomes | Individual | 0.806 | 0.650 |
| | Team | 0.923 | 0.853 |
| | Organizational | **0.380** | **0.144** |
| Performance | Finance | 0.852 | 0.726 |
| | Knowledge | 0.871 | 0.759 |

**Correlation**

All of the correlation coefficients were statistically very highly significant at the level of .001 (see Table 7).

**Table 7: Standardized Correlation Estimates (r) from the Confirmatory Factor Analysis**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Environmental | - | | | | | | |
| 2. Industry | 0.696 | - | | | | | |
| 3. Organizational | 0.610 | 0.737 | - | | | | |
| 4. Transactional | 0.430 | 0.450 | 0.469 | - | | | |
| 5. Transformation | 0.672 | 0.723 | 0.800 | 0.914 | - | | |
| 6. Learning | 0.405 | 0.390 | 0.403 | 0.863 | 0.739 | - | |
| 7. Performance | 0.344 | 0.263 | 0.350 | 0.826 | 0.733 | 0.777 | - |

**Structural Equation Modeling**

The study had selected the following criterion indices to accept or reject the fit of the data to the model; namely the chi-square test, the goodness-of-fit index (GFI) and the root mean square error approximation (RMSEA). According to

baseline comparisons, the final refined structural equation model (see Figure 3) exhibited a minimum improvement of 84% (Relative Fit Index) and a maximum improvement of 90% (Comparative Fit Index) in fit over the null model (where it was assumed that no correlation existed among the variables and that they were all independent), with an average of an 87% improvement which was in the acceptable range. The GFI reached .831, indicating that more than 80% of variances and covariances could be explained by the theorized model. The RMSEA of the refined model was .079, which was in the acceptable range of 0.4-0.8.

## Findings and Conclusions

The inter-correlation among the driving forces of change and the transformational variables was strong, with a correlation in the 0.6-0.7 range, but the inter-correlation was weaker with other constructs; however, it was still statistically significant (see Table 7). This indicated a stronger effect on transformational changes. The standardized regression weights also confirmed this finding, where there were no significant effects between driving forces of change and transactional variables. The organizational variables, both transactional and transformational, were strongly inter-correlated as theorized, with a correlation at 0.9. There also was a statistically significant effect on transactional variables from the transformational variables as theory suggested. There were strong inter-correlations between both the transformational and transactional variables with the learning outcomes and organizational performance. However, the structural model revealed that only the regression weights from the transactional variables to learning outcomes and learning outcomes to performance were statistically highly significant. This finding also was according to the conceptual framework.

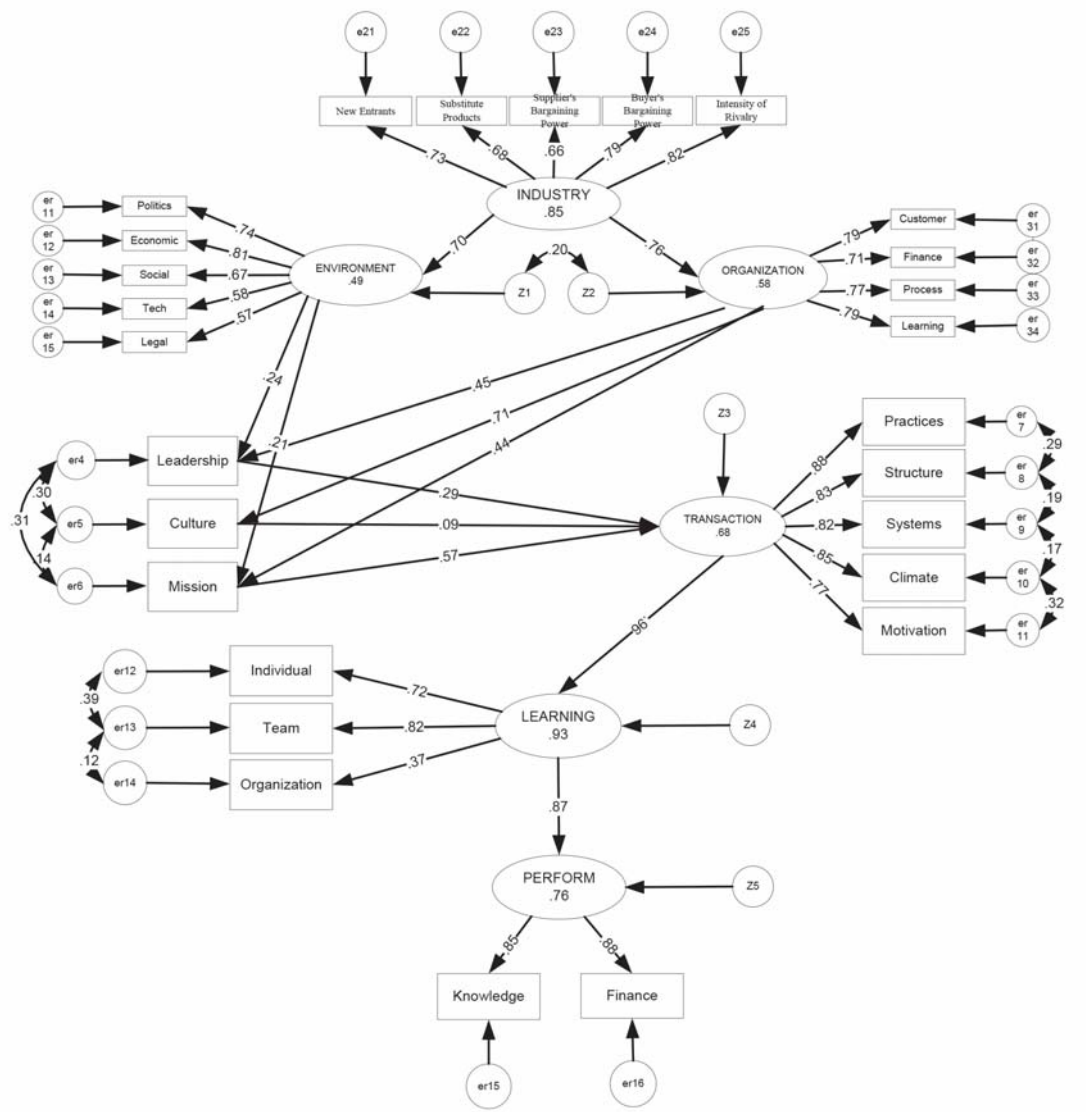


**Figure 3: Refined Structural Equation Model (Best Fit Model)**

In conclusion, the driving forces of change (environmental-level, industry-level, and organizational-level) did not have a significant effect on the learning outcome or organizational performance of an organization. However, their effect was indirect being mediated by organizational variables (transformational and transactional), such that the organizational-level forces had the highest level of effect followed by environmental-level forces on transformational variables, which

in turn exerted a positive effect on the transactional variables. Furthermore, the higher the efficiency and effectiveness of the day-to-day organizational transactions, the higher is the possibility of individual, team and organizational learning occurring in the organization. Finally, the higher the level of learning takes place, the higher the level of organizational performance there would be in terms of finance and knowledge. The explanatory (predicted) power of the model was reasonably good (the residual is 24%) in that 5 predicted variables accounted for 76% of the variance in determining the organizational performance.

The above findings empirically proved the hypothesis by the researcher—that all of the categories of driving forces for change in the research model actually drove the organizations to take action to change and remain competitive. The actions taken may be in the form of both transformational, where the changes transform the organization as a whole, and transactional, where the changes are more towards day-to-day interactions within the organization. The results had also empirically proved the hypothesis of Burke and Litwin's "A Causal Model of Organizational Performance and Change" (1992), where relationships do exist between external environment and organizational variables (the constructs of transformational and transactional variables) and organizational performance. The research model, however, had specified a further point to Burke and Litwin's model—that changes in the organizational variables driven by internal and external driving forces must be in relation to improving the learning outcome at the individual, team and organizational levels to have a positive effect on organizational performance, financially and in terms of knowledge.

## Benefits

The study has pointed out through empirical study the driving forces that are more influential than others and that would directly influence an organization's way of thinking with regards to the business and its strategies. With this knowledge, practices can be appropriately modified towards building a learning organization. At the same time, the driving forces that are insignificant and that can be disregarded were also pinpointed. The results also listed the perceptions of the respondents on the role and the level of influence that organizational variables exert on the learning

outcomes and the performance of organizations in terms of finance and knowledge. In this way, the organization will be equipped with the knowledge to lay down short-term and long-term plans for changes to the most influential organizational variables first and foremost and to the not-so-prominent ones in the later stages. The results should be of value to small and medium size information technology-related firms and will provide understanding of effects of environmental forces and effects of organizational variables on the perceived levels of organizational performance improvement.

## Future Research

Although this study provided credible evidence of reliability and validity for the conceptual framework and its corresponding survey instrument, several issues should be noted. First, the sampling technique used for instrument development and validation was based on convenience and cooperation. Further validation with a more diverse base of Thai software organizations would strengthen the validity of the instruments and their findings. Second, the number of respondents for each organization in some cases was few and may not have represented the overall position of the organization's collective opinion. Cooperation of a certain number of respondents would be necessary to further extend the reliability of the results. Eventually, it would be interesting to further extend the validation of this instrument to other industries in order to determine if the learning organizations indeed have an influence over organizational performance, financially and in terms of knowledge.

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