Establishing a Change Management Model for Precision Machinery Industry in Taiwan

Feng-Tsung Cheng, Shu-Li Wang, Mei-Fang Wu, Hui-Yu Chuang

Abstract—The rapid development technology and widespread Internet make business environment changing a lot. In order to stand in the global market and to keep subsistence, "changing" is unspoken rule for the company's survival. The purpose of this paper is building up change model by using SWOT, strategy map, KPI and change management theory. The research findings indicate that the company needs to deal with employee's resistance emotion firstly before building up change model. The ways of providing performance appraisal reward, consulting and counseling mechanisms that will great help to achieve reducing staff negative emotions and motivate staff's efficiencies also. To revise strategy map, modify corporate culture, and improve internal operational processes which is based on change model. Through the change model, the increasing growth rate of net income helps company to achieve the goals and be a leading brand of precision machinery industry.

Keywords—Organizational change, SWOT analysis, strategy maps, performance indicators.

I. INTRODUCTION

NDUSTRY is crucial for nation's economic development. Core competency represents nation's competitive advantage. The economic growth and development stages are: agriculture, manufacturing, knowledge-based service, and high-tech industries. The traditional industries play important role for half century in Taiwan. Human resources are important assets for the organization. Therefore, change people value and behavior patterns will create company's value as well. Globalization market makes competition advantage more intense and brutal. In order to survive and gain an operation profit, organization is not only need to change and innovation continuously but need changing external environment also. Therefore, organization change is necessary. Three of management tools and process steps of change is explored by literature review. The change model contains four elements: SWOT, strategy maps, performance indicators and change management. The paper uses case studies to verify the feasibility and reproducibility of change model. The practical study explores the reasons why the case company not able to implement SWOT smoothly. First, companies need to confirm the success or failure of change programs, and propose change plan and steps for resistant situation. This study uses two common management tools: performance indicators (PI) and strategy maps as a supplementary tool. Second, we need to assess the completeness of two of management tools carefully. Finally, this study revises strategy map and performance indicators for case company and propose outcome. Performance indicators primarily used as an assessment mechanism after plans executed. Through PI score, company may catch the current status and strategy map may help case company to develop various management strategies precisely to achieve company goals.

II. LITERATURE REVIEW

The literature review includes SWOT, strategy maps, performance indicators, organizations, and organizational change.

A. SWOT Analysis

SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a strategy tool to assess core competencies and may evaluate company's strengths, weaknesses, opportunities, and threats of the enterprise in the market. The company needs to analyze deeply and completely what their market power are before making any strategy. SWOT analysis is a basic management tool to develop the most influential model. This paper chooses steps and model cited as the reference. Steps and basic model [1], [2] are shown in Figs. 1 and 2.

B. Strategy Map

Strategy maps contain four dimensions with financial, customer relationship, internal processes, and learning and growth. The maps may present policy objectives for the four facets and provide a causal relationship between organizational values with graphic. It aims to show organization's strategy clearly and effectively for all of the supervisors and employees of sectors. Simply description is the strategy connotation materialized from abstract into definiteness. Scholars sorted out the strategy map of the construction of the basic model to provide a reference to establish strategic map of the steps. [3] The basic construction of the strategy map is shown in Fig. 3.

C. Performance Indicators

Performance indicator (PI) is a quantitative management indicator. It can effectively and precisely evaluate and measure company's performance of the strategy. The company needs to implement performance management that will cause success or failure to the company. The SMART principle (Specific, Measurable, Attainable, Relevant, Time bound) is framework of PI implementation [4].

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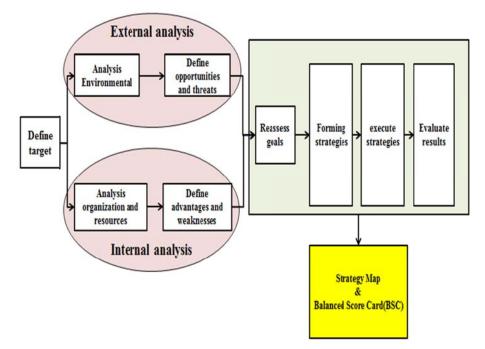


Fig. 1 SWOT analysis steps

| Internal External | Strengths | Weaknesses | |
|----------------------|---|--|--|
| Opportunities | SO (Type of Development Strategy) | WO (Type of contention strategy) | |
| Threats | ST (Type of expansion strategy) | WT (Type of Conservation strategy) | |

Fig. 2 SWOT analysis model

D. Organizational Change

Organizational change uses behavioral science and managerial methods to carry out the system tuning and innovation. The purposes of organization's change is adapting to external environment, technical features, and other aspects of the organization's mission so as to improve organizational effectiveness. Organizational change contains the organizational member's concept, attitudes, behaviors, and the spirit of cooperation between members, etc. [5].

III. RESEARCH METHOD

This research interviews senior manager and staffs to identify the most crucial problems in the company. The company needs to analyze operation condition, conjecture the causes of the problem as an amendable point. According to amendable point, this research collects literature, finds out most commonly methods, and presents basic model as a reference. The research process is shown in Fig. 4.

A. Construction of SWOT Analysis

The main purpose of SWOT analysis is to define the

differences and competitive of internal and external clearly, strengthen own strengths, improve own weaknesses, reduce the damage of external threats that will help to develop strategic plans to achieve vision target. SWOT analysis is the first step for individuals or groups. [6] Construction of SWOT analysis is divided into three steps and shows in Fig. 5.

SWOT analysis is common tool for the enterprise. This model is from McKinsey & Company. The company sorts out a SWOT analysis of thinking model by many years of experience. McKinsey & Company is an influential management consulting firm in the world. In Harvard Business Review and published books indicates that McKinsey & Company is the largest consulting company in the field of the world and be recognized as a leader of knowledge management strategy. [7] The contents of model show in Fig. 6.

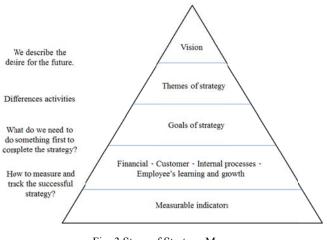


Fig. 3 Steps of Strategy Map

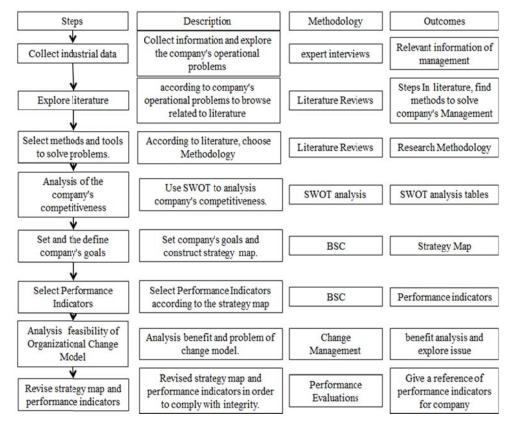
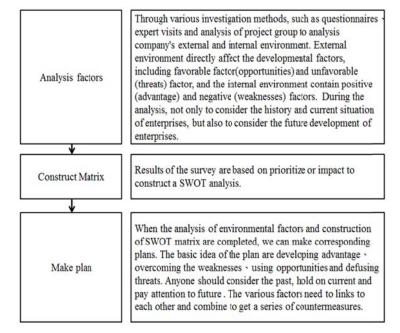
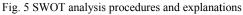


Fig. 4 Research framework flowcharts





| | Strengths | | Weaknesses | |
|---------------|--|-------------------------------------|---|--|
| 1 | Technical Skills Advantages | 1 | 1 Lack of technical skills of competitive | |
| 2 | Tangible Assets Advantages | | significance | |
| 3 | Intangible Asset Advantages | 2 | 2 The lack of a competitive tangible assets, | |
| 4 | Human Resources Advantages | intangible assets, human resources, | | |
| 5 | Organization System Advantages | | organizational assets | |
| 6 | Competitive advantage | 3 | The key areas are losing competitiveness | |
| Opportunities | | | Threats | |
| 1 | Appear a opportunity to expand market share | 1 | Appears strong new competitors who will enter | |
| | and other geographic. | | the market. | |
| 2 | Technical skills transfer to new products and | 2 | Demographic characteristics, social | |
| | services to serve more customers. | | consumption patterns of adverse changes | |
| 3 | Integrate forward or backward | 3 | The main product market decline in growth | |
| 4 | The market entry barrier is lowered | 4 | Adverse movements in the exchange rate and | |
| 5 | obtain ability from Competitor of acquisitions | | foreign trade policy | |
| 6 | Strong growth in market demand, it can expand. | 5 | Alternatives to seize the company's sales | |
| 7 | Widening the customer group or product | 6 | Reduction of market demand | |
| | gments | 7 | Vulnerable to the impact of the recession and | |
| | | | the business cycle | |
| | | 8 | Customer or supplier improve negotiation skills | |

Fig. 6 SWOT analysis of thinking model

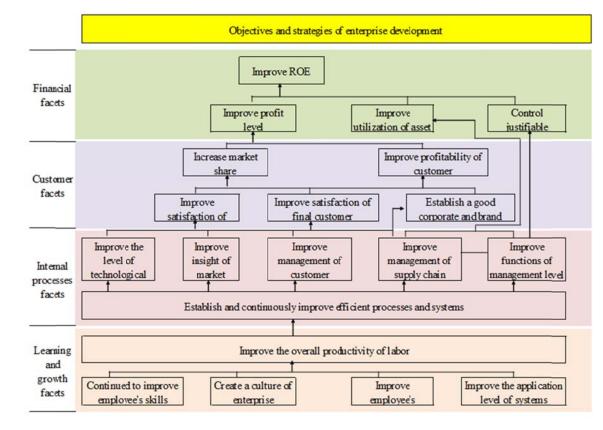


Fig. 7 Strategy map based model

B. Construct Strategy Map and Performance Indicators

1. Strategy Map

The importance and definition of strategy map may quote concept of Balance Score Card (BSC). BSC contains financial facets, customer relationship facet, internal processes facets, and learning and growing facet. According to the goals of each facet, company may describe causal relationship between facet and goals that construct a graph, strategy map, in next step [8]. Kaplan constructs strategy map model focus on operational objectives and important management factors. [1] The model is shown in Fig. 7.

2. Performance Indicators

Performance indicators is known as the performance of the company which implement operation system and plans that may follow and control development situation, propose improvement projects to promote operation effectiveness.

C. Organizational Change

The purpose of the organization is to execute the company's strategy to achieve their goals. Organizations change needs to follow the company's strategies that should follow the external operation environment. The strategies and organizations change if the external environment changed. Organization executes change continuously since overall benefit of company remains still or decreasing.

IV. PRACTICAL VERIFICATION

A. Case Company

Case company founded in 1975, it was engaged in the processing punch and manufacturing lathe parts. After years of efforts, they successfully product first domestically produced machine tools of dedicated chip conveyor. Thus, company becomes the most important manufacturer specializing in the chip conveyor design Industry. Company insists on quality first, efficiently work, extensive use of computerized and making robotic welding more precise to have a perfect product quality. They also invest in machinery and equipment and training professional R & D personnel to expand the scale of company and make company getting better.

B. Organizational Structure of Case Company

The company employees about 100 people, organization can be broadly divided into two managing blocks, Facility Department and Administration Department. Facility Department primarily aimed at management of field work, and in addition to management of field work, other processes almost belong Administration Department. Beside these two departments, other positions are associate and general manager. Associate main work is helping general manager to manage company and dealing with operational matters. The organizational structure shows in Fig. 8.

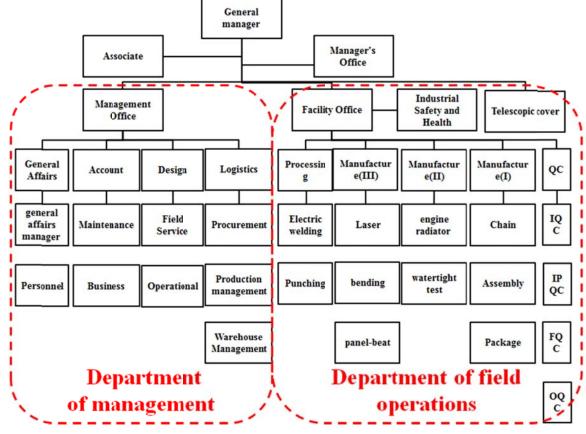


Fig. 8 Case company organization chart

C. SWOT Analysis of Case Company

Case Company's competitiveness table of SWOT analysis is based on the current status of the company listed internal strengths and weaknesses, external opportunities and threats is referring the most influential DMG MORI SEIKI AG Annual Report 2013 of machine tool industry. [9]

According to SWOT analysis which is shown in Fig. 9, this study explores the focus topics of the company need to improve. The first one is employees' tough resistance with old thinking and behavior. The resistance coupled with performance indicators or human resources training deficiency. This paper uses high-feasibility and universal management tool, such as human training program with core courses and professional courses to assist enterprises to educate staffs with expert skill and thinking to achieve organizational goals and enhance the outcomes of strategy map and performance indicators. Finally, exams and excesses the benefit after the change.

D.Strategy Map and Performance Indicators of Case Company's

The biggest goal of case company is to be a professional Chip conveyor leader in the market. The company may upgrade inventory and accounts receivable turnover through research and development capabilities and customized-make to achieve overall profitability for financial facet. Customer facet expects to improve service quality, customer satisfaction, shorten new product development, and promote market shares. Internal process facet expects to increase professional knowledge, improve quality, reduce costs of development, and research development capability of employees to meet the expectations of enterprise for operations of employees. Finally, the company expects employees to strengthen the professional and practical skills and knowledge through training program with core courses or instructors, implementing new technology to improve the quality of staff to achieve company's goals. Four facets of strategy map after aggregating targets which is drawn as Fig. 10.

The case company proposes performance indicators bases on strategy map. Main targets of case company are high-quality products and fine customer satisfaction. Therefore, the performance indicators are all about time completion and high yield rate of materials and final products which are coupled with basic performance with offering the turnover rate, the actual shipping rate, efficiency, equipment utilization rate etc. The list of the company's existing assessment indicators are shown in Fig. 11.

E. Importing Organizational Change

The senior managers expect all of the staffs locate the business goals clearly to sustain the undefeated status in the global market. This paper establishes steps of change model compliance with 5W1H idea, why should change (WHY), who is the object of change for (WHAT), where do need to change (WHERE), what is the best time for change (WHEN), who do it (WHO), how to perform (HOW). After understanding direction of implementation clearly, the company begins to promote and execute organizational change program. The case company resolved employees' resistance problems firstly. All of puts forward reasons those may occur and how to solve ways of the resistance factors is shown in Fig. 12.

| Strengths | Weaknesses |
|--|--|
| 1. The domestic market share over 80%. | 1. Each country join the ranks of competition. |
| 2. Develop customized machines and improve customer satisfaction. | 2. Talent hard to find. |
| 3. The company adopted automated production system. | 3. Government tax system is unfair: Government deucedly publicize high-tech. industries. |
| 4. Low labor costs. | |
| 5. Flexible organizational structure: one person can | |
| do more than one job. | |
| 6. Delivery of orders is accurate. | |
| 7. Quality by certain: through ISO certification. | |
| 8. Have CE certification. | |
| Opportunities | Threats |
| 1. Foreign manufacturers in Taiwan entrust processing and get high willingness to cooperate. | 1. Many processing equipment from abroad, it's difficulties in obtaining service or parts. |
| 2. Company joining the WTO in favor of international competition. | 2. Experience and knowledge are limited transmission range. |
| 3. Strategic Alliance: the same industry can cooperate with each other to achieve data sharing and profit sharing. | 3. Traditional industries are almost a family industry, it taken over by family members. So, company's core beliefs and values are difficult to change. |
| Company use government resources: Government set up a "traditional industries counseling center." | Family enterprises can refer more opinion, but it will can't quickly decide and accurately select policy. |
| 5. The company signed the ECFA with mainland China. We have a new opportunities of Taiwan market transformation and development. | |

Fig. 9 SWOT analysis of case company

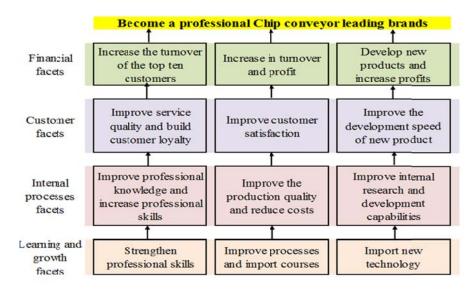


Fig. 10 Current strategy map of case company

| Ind ex | Definitions | The formula | Achievement rate |
|---|---|--|------------------------|
| Valuation and quotation achievement rate within 3 days. | Completed on schedule: After receiving the order, the next three days so far. | (numbersss of timely completion pieces / Total numbersss of completed pieces)*100% | More than 85% |
| Order shipping rates (Including conveyor and engine radiator) | Contract out:Order total numbersss of units. | (The actual numbersss of units delivery per month/ Contract out numbersss of units per month)*100% | More than 80% |
| The new custom-made products quotation turnover rate | Done deal: Finished tum over to customers or downstream firms to complete the delivery process. | (numberss of done deal / total numberss of completed pieces)*100% | More than 95% |
| During estimated delivery time, from receive orders to done deal completion rate. | Completion:8 to 40 days in 1/2 time to complete, more than 40 days to push forward 20 days to complete. | 1-{(numberss of late pieces / total numberss of completed pieces)*100%} | More than 90% |
| Hit rate of customer orders on schedule | Late Definition: Not in the purchase date (including that day) put in storage. | 1-{(Orders numberss of late orders / Total contract numbersss)*100%} | More than 98% |
| Purchase rate of purchasing goods on schedule | Late Definition: Not in the purchase date (including that day) put in storage. | 1-{(Orders numberss of late orders / Total purchase numbersss)*100%} | More than 98% |
| Schedule completion rate | Completion: purchase date of downstream manufacturers next day. | (numberss of done deal/total numberss of units)*100% | More than 95% |
| Quality yield | Defective products: Product is judged unacceptable. | 1-{(The numberss of defective products / total numberss of output)*100%} | More than 95% |
| The average individual output efficiency | Outputs: completion of a numberss of components or finished goods items. | {Total output / (hours of operation / a finished product completion time)}*100% | More than 80% |
| Laser machine utilization rate | Utilization rate: Actual production time / total operating time. | (Time of Laser beam Machine operation per month / Time of open machine per month)*100% | More than 60% |
| Customer complaint rate | Total Points: The total numberss of units shipped*10 * | (numbersss of customer complaint per month / Total points)*100% | Not more than 0.05% |

Fig. 11 Current performance indicators of case company

| | Reasons |
|---------------------------|---|
| | Do not want to lose the value of existing |
| | For the changes do not understand, causing fear |
| Personal | Think of change for the organization useless |
| factors | Lack of patience for change |
| Tactors | For own frustration on the job after the change, there is frustration |
| | Fear because change the original position in the organization |
| | The current work is very proficient, reluctant to change their job |
| | Working groups were dismantled |
| | Adapt to new social relations |
| Group Factors | Personal contact becomes less |
| Group Factors | To protect the status or privileges |
| | To maintain current lifestyle |
| | Avoid modify or reproduce the existing system costs spent |
| | Because of setting production ceiling, conflicting with other group |
| | Improper change, such as the nature of change, the meaning is not clear, ignore the existence of non-regular employees, etc. |
| o | Change purpose can not be achieved or conflict of interest with the current employees |
| Organizational factors | Because the original structure and strategy has great inertia, it's difficult to change. |
| | Enterprises culture affect their thinking, new thinking will let employees confused |
| | Change to change the relationship between the public and private sector interdependence, |
| | a new relationship of interdependence will becomes confused |
| | Proponents and opponents will conflict between other department or inter-department. |

Fig. 12 Resistances factors of organizational change

| Item | The key success factors |
|-------------------------------|---|
| | Setting clear vision for organizational change and performance targets |
| | Organizational changes have ambition |
| | Developing appropriate change management plan |
| Factors of goal setting and | Creating innovative spirit |
| change management | Founded influential change leadership team |
| | Guidance and assistance of consultants |
| | The success of the initial organizational change |
| | Establishment a new management evaluation criteria |
| | Creating a sense of crisis for organizational change |
| Easter of finishing shange | Combined with Enterprises growth strategies |
| Factor of finishing change | Organizational change focus on the enterprise Integrative changes |
| | Entire workflow as a responsibility of the employees |
| Factors of supervisor | Executives come forward to promote and personally |
| promotion and education of | Beginnings and ends of persistence and perseverance |
| employees | Education and training of employees |
| Factors of human resources | Allowing members proposed creative idea |
| and communication | Adequate communication with related staff of organizational change |
| and communication | Full integration of human resources and information systems plan |
| | Adequate budgetary and financial resources |
| | Using appropriate tools and methods of change management |
| Methods for change | Understanding of customer needs and focus on customer |
| Methods for change | Providing employee of satisfaction |
| | Referring other organizational change successful companies approach |
| | System of assessment of the performance indicators become part of the |
| Factors of Information | Effective using information technology to assist the operation of reengineering |
| Technology | and workflow |
| Factors of all of employee's | Commitment and support of executives |
| recognition and support | Getting across the company's recognition |
| Factors of inter-departmental | Through inter-departmental working group to implement processes |
| Working Team | Using the perspective of cross-functional departments to re-examine processes |
| Factors of improving ways | Escaping from the limitations of existing organizational structure and way of |
| of doing things | doing things |

Fig. 13 Critical success factors of organizational change

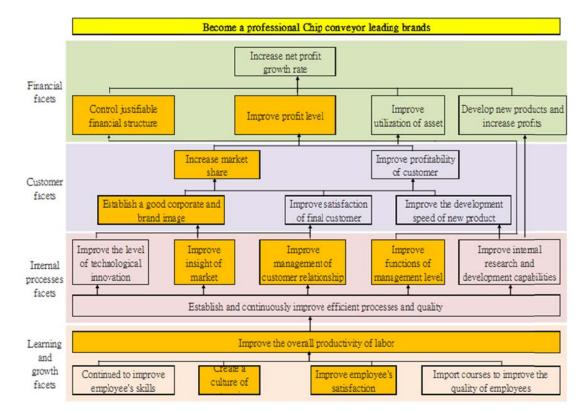


Fig. 14 Strategy map of case company after the revision

According to reasons of resources limited, the paper is looking for the best solutions to solve the problems. [10] There are nine key factors and a lot of the sub-factors of successful change which is shown in Fig. 13. The company can refer those key and sub-key factors to explore the ways to reduce impede of change, improve execution, and reduce the risk of failure of organizational change. The change steps and explanations are:

- Build up a sense of crisis: held conference with specific topic for company per month to promote point as a theme tune. Promote the senses of crisis to all of the staffs so as to motivate the willingness for participating organizational changes.
- (2) Establish teamwork: Choice one project leader from senior managers and organize team members from multiple departments by senior manager to recommend one to two faculties in the company.
- (3) Announce and post vision: Announce Company's vision by posting on stairs floor, corridors, elevators and other places, in addition, upload on web site to declare the vision of the company. All of employees need to know what the vision is and work for the targets.
- (4) Communication vision: Use all the channel in the company, such as intranet of the company, black board or declaration system, and job training system to spread the company's vision continuously.
- (5) Encourage participation of overall staffs: encourage all of the faculties to join projects programs to develop a sense of security and belonging.
- (6) Establish short-term rewards system: proposed rewards, system for performance indicators of improvement project

program.

- (7) Consolidate victories and redouble efforts: to maintain the short-term rewards system, modify or reject anything unfitted vision. Proposes adjusting program for management systems, organization structures, and operational policies.
- (8) Embedded corporate culture: the company's culture need to embed in staffs mind and to develop concept of change thinking to remote effectiveness for the long-term period.

F. Revision of Strategy Map and Performance Indicators

This paper assesses benefits of current strategies map and propose revised strategy map model to intend high-compliance strategy map again [2], the current and new strategy map is shown in Fig. 14.

The benefits after revising policy map are.

- (1) Control sound financial structure strategy: reduce unnecessary financial expenditure.
- (2) Improve asset utilization: reducing the waste of resources and asset management efficiency.
- (3) To increase market share: consolidation of the consumer market and increase profits.
- (4) Establish a good corporate image and brand strategy: to retain old customers and create new customers.
- (5) Improve market insight strategy: seize the opportunity to improve the competitiveness of the enterprise.
- (6) Improve customer relationship: improving customer relationship will bring profitability.
- (7) Improve the level of management performance: to improve work efficiency.

- (8) Improve overall labor productivity: increase outcomes and profit.
- (9) Embedded enterprise culture: to enhance the core competitiveness of enterprises.
- (10) Improve employee satisfaction: promote staffs to create customers' value.

The performance indicators need to change after strategy map changed. This paper explores common and specific indicators for enterprises as a reference. [11] The new indicators are shown in Figs. 15-18.

The potential benefits for four facets are:

(1) Financial facets: review overall company's financial structure to explore the ideal situation of operational

efficiency and profitability. Through this research to avoid capital waste and increase profitability.

- (2) Customer facets: establish good relationships with consumer, promote markets share through corporate goodwill and reputation.
- (3) The internal processes facets: improve overall productivity, quality and capacities, thereby enhancing output value, and improve the internal process performances.
- (4) Learning and Growth facets: training professional technology and skill, embed corporate culture in the facilities that will increase competitive advantages and competitiveness of enterprises.

| Item | Calculation | Description |
|---|--|---|
| | Financial facets indica | tors |
| Annual turnover | Total annual turnover to reach the company's goals | View Enterprises operating objectives are achieved or not. |
| The proportion of the tumover of new products | New product sales / total sales | View the level of development of new products. |
| Net profit growth rate | (Current total net profit - total net profit the previous period) / total net profit the previous period | View companies continue to grow the business model to improve management efficiency and let profit reach maximization. |
| ROI(Return On Investment) | Net income / paid-up capital | View Enterprises return on investment results. |
| ROE(Return On Equity) | Net income / Equity | View the company's main financial structure, operational efficiency and profitability. |
| Management expense ratio | Management costs / Total tumover | View management fee ratio of enterprises. |
| Sales growth rate | (Current sales - sales of the previous period)/sales of the previous period | View sales growth or reduction within a certain period. |
| Sales expense ratio | The total cost of sales / total sales | View performance of the marketing department within a certain period. |
| Accounts receivable turnover | Total sales of income /average value of accounts receivable | View accounts receivable frequency, a measure of Control Manager capabilities. |

Fig. 15 Financial facet indicators of case company after the revision

| Item | Calculation | Description | | |
|--|---|--|--|--|
| | Customer facet indicators | | | |
| Customer Satisfaction | Numbers of customers of Satisfaction Questionnaire average score more than 60% / total number of customers | View the company's customer satisfaction situation. | | |
| Customer complaint handling achievement ratio | customer complaints | View customer complaint handling capability and effectiveness. | | |

Fig. 16 Custom facet indicators of case company after the revision

| Item | Calculation | Description |
|--|---|---|
| | Internal processes in | dicators |
| Yield of target achievement rates | Yield of the actual completion /Yield of target | View the production sector production plan completion status. |
| employee's productivity of Manufacturing sector | GDP / Numbers of employees in manufacturing sector total | View the average values of employees productivity in manufacturing sector. |
| Production efficiency | Output costs / input costs | View the total production of labor within a certain period. |
| Delayed delivery times | Delayed delivery times within the period | View enterprises ability of delivery on schedule. |
| Quality control system evaluation | Occurring items of negligence in quality control system per year. | View the completeness and accuracy of quality control management system |

Fig. 17 Internal processes facet indicators of case company after the revision

| Item Calculation | | Description | |
|--|--|--|--|
| | Learning and growing facet | indicators | |
| Manpower training achievement ratio | Staff actually completed hours of training / The total hours of training plan | View HR capacity for implement the training program. | |
| Multi-ability-worker rate of manufacturing worker | Numbers of multi-ability-worker in the manufacturing sector / total employees in manufacturing sector | View the manufacturing sector employees have pluralism and flexible capacity. | |
| Multi-ability-worker rate of administrative staff | Numbers of multi-ability-worker in the Administrative sector / total employees in Administrative sector | View the Administrative sector employees have pluralism and flexible capacity. | |
| Merit employee rate | Numbers of employees of the PAS average score more than 60% / Total number of employees | View the company's overall employee's working of attitude and performance. | |

Fig. 18 Indicators of learning and growing dimension after the revision

V.CONCLUSION

This paper uses SWOT analysis, literature review and interviews senior managers to explore causes relationship of the change project for the case company. The most important reason for staffs to resist is thinking mind of employees. The employees do not want any change at all. The case company survives and faculties get salaries even though there are no SWOT analysis, no strategy map, and no performance indicators. Such thinking mind and current situation are the main problems that company is very hard to change the mode of operation and environment.

Company needs something to support for sustainability, to operate continuously. This paper provides the ways to build up change model for the case company. The change model is an operational tool to keep company surviving and reaching vision for the long-run period to build up goodwill and reputation in the global market.

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