A MODEL FOR MINIMIZING SATISFACTION GAP IN PARTNERSHIP DEVELOPMENT

SENG-FAT WONG

Ph.D

The Hong Kong Polytechnic University

2009

The Hong Kong Polytechnic University
Department of Industrial and Systems Engineering

A Model for Minimizing Satisfaction Gap in Partnership Development

SENG-FAT WONG

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

December 2007

CERTIFICATE OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

_______________________________(Signed)

WONG Seng-Fat
_______________________________(Name of student)

Abstract of dissertation entitled:

A Model for Minimizing Satisfaction Gap in Partnership Development

Submitted by Seng Fat WONG

For the degree of PhD in Industrial and Systems Engineering

At The Hong Kong Polytechnic University in December 2007

ABSTRACT

Good communication and satisfaction are often the major considerations in the partnership development between service providers and their subcontractors. An important measurement of satisfaction, rarely discussed, is the satisfaction gap. In this research, the satisfaction gap in partnership development is analyzed. The satisfaction gap is classified into nine cases and is described in the form of a matrix. A numerical relationship model on a knowledge-based ERP methodology is hence developed as a new objective method of narrowing gaps between different perspectives of good partnership development through harmonizing satisfaction.

Traditionally, satisfaction levels are measured by fixed period or dynamic communication, interview and questionnaire survey. In this research, communication and interview that capture the tacit knowledge only are implemented by a questionnaire survey of five main service industries in Macau and their sub-contractors. This special and unexplored situation of Macau was explored through find out the dominating satisfaction gaps and how they can be clearly underpinned using information systems.

The result has demonstrated that the satisfaction gap is widened by four confusing satisfaction factors (CSF), such as effectiveness, consideration, selling and marketing, and policy. A factor analysis of the CSF has shown that the core-companies have clear-cut roles of Pure Social Inferences Type and Pure Economic Inferences Type while their partners are having different expectations.

Further full scale analysis extends the findings to develop the above mentioned objective relationship model that recommends corrective actions to narrow the satisfaction gap, which forms the main contribution of this research. Effective knowledge-based indexes derived from the effective grouping of the factor analysis can be used to further enrich the partnership development. The model has been introduced to the relevant industries for validation and is generally accepted by the industries.

PUBLICATION LIST (JOURNAL)

Wong, S. F., Yung, K. L., 'Minimizing Satisfaction Gaps in Partnership Development of Macau Industries' submitted to the *Industrial Marketing Management*.

Wong, S. F., Yung, K. L., 'A Numerical Relationship Model for Partnership Development' to be submitted to *The Journal of Strategic Information Systems*.

Conference Papers and Others

Wong, S. F., Yung, K. L. (2005). A New Model for ERP assisted Partnership Development in Outsourcing, *Proceedings of International Conference on Service Systems and Service Management 2005 (ICSSSM'05)*, June 2005, Chongqing, China ,Vol. 1, pp. 602 – 607.

Wong, S. F., Chung, W.W.C. (2003). Web-Enabled Quick Response Technology Application in Advanced Product Design, *The 9th International Conference on Enhancement and Promotion of Computational Methods in Engineering and Science (EPMESC IX)*, November 2003, Macau, pp. 599-606.

Wong, S. F., Chung, W. W. C. (2003). Knowledge Recycling for e-Solution in Enhancing Operation Process, *First International Conference on Performance Measures, Benchmarking and Best Practices in New Economy (Business Excellence 2003)*, June 2003, Portugal, pp. 630-635.

Wong, S. F., Chung, W. W. C. (2001). A Review of Knowledge Management Tools for Enterprise Engineering, *International Conference on Supply Chain Management and Information Systems in the Internet Age*, December 2001, Hong Kong, pp. 435-443.

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my deep gratitude and sincere appreciation to Prof. K.L. Yung, my research supervisor, for giving me such opportunity to learn and practice. His constructive comments and advice have rendered my inspiration for continual improvement. I am also grateful to Chair Prof. W.B. Lee, Prof. T.M. Yue, Assoc. Prof. W.C.C. Chung, and Mr. M. J. Pomfret for their continuous support and encouragement.

Besides, I have to express my sincere gratitude to my family especially my wife – Pui Cheng Cheong. Her love and concern powered me when I was confused on my research study. Moreover, I would like to thank my daughters – Sam In Wong and Sam Ut Wong. They are my special power supply. I would also like to extend my thanks to my parents, sister, mother-in-law, and grandfather for their support.

I am also grateful to Mr. Heng Kong Lo for improving my view of life and philosophy. I would also like to extend my thanks to my colleagues Prof. L.M. Tam and Prof. C. T. Kwok for their support and valuable discussions.

Definitely, the financial support from The Hong Kong Polytechnic University enables this project (No. G-W109) and University of Macau offers support both of the finance and workload arrangement. I like to acknowledge all parties once again from the heart including those mentioned above together with those who helped me indeed but I miss thanking before.

Table of Contents

LIST OF FIGURES

List Of Tables

LIST OF ABBREVIATIONS

AI, Artificial Intelligence

AP, Adjustable Priority

ASI, Adjustable Satisfaction Index

COG, Centre of Gravity

CSF, Confusing Satisfaction Factors

CSI, Core-company Satisfaction Index

ERP, Enterprise Resource Planning

IDEF, Integration Definition Function Modeling

KM, Knowledge Management

KBERP, Knowledge-based Enterprise Resource Planning

PFI, Pivotal Fusion Index

PSI, Partner's Satisfaction Index

SIS, Satisfaction Improvement Strategies

CHAPTER 1 INTRODUCTION

1.1 Background

Most large scale service industries and many middle size groups are now engaged in an in-depth analysis and evaluation of the opportunities for cost reduction and productivity improvement through outsourcing and downsizing, and many technical service sub-contractors are moving into this market (Blumberg, 1998; Sampson, 2000).

When enterprises face globalization, their competitive advantages can be strengthened through better communication with their business partners to enhance their partnership network. Outsourcing becomes one of the main strategies to reduce running cost in the globalization era (Martin, 1997). Partnership development is the trend of growing enterprises, especially for the service industries.

Most of the service industries try to contract out their technical services to static / available sub-contractors and new sub-contractors to enhance their competitive advantages, so, effective partnership development is very important for service industries.

Unfortunately, the contemporary research and partnership development practices are focused on the exchanging of ideas, information and benefits, joint problem solving, and research and technology development based on long-term trust and faith (Lehtinen, 1999; Hall, Andriani, 1999; Virolainen, 1998; Bryans, 1999; Bonaccorsi, Lipparini, 1994; Willcocks, Choi, 1995; Brown, Boyett, Robinson, 1994; Simpson, Wren, 1997) by subjective assessments.

The traditional partnership development mainly emphasizes on heuristics. This lacks objective elements to build up partnership development. Therefore, traditional partnership development can only be considered as sub-optimal approach. New partnership development is necessary to apply scientific and objective methods to develop partnership for outsourcing technical services in the service industries. The aim is to exploit the complicated sub-contractors' relationship and network for optimal service efficiency and quality.

Huang, Mak, Humphreys (2000 and 2003) tried to use Partnership indexes (Satisfaction index, Flexibility index, Risk index and Confidence index) to create WeBid for the Partnership Explorer. The WeBid can contribute to extending new partners by the scientific method, but this model only concerned the relationship of customer requirements and supplier capabilities. It does not offer a closed-loop method to help the sub-contractors to enhance their competences. Therefore, it cannot develop a long-term sub-contractors relationship, because the relationship is lacking in a viable feedback mechanism.

Likewise, although applying artificial intelligence (AI) techniques (Ip et al., 2003; Ip et al., 2004; Hajidimitriou et al., 2002), knowledge-based tools (Narazaki et al., 1993; Chen et al., 1994, Choy et al., 2002) and performance score (Lau et al. 2001) were proposed to assist partner selection, these scientific methods were only concerned in selecting potential partners for contracting out activities. The development of long-term partnership relationship by scientific and objective methods has not been investigated.

Marriage has been proposed as a metaphor for long-term partnership development (Snider, 2003)! Most people continuously search for methodologies to maintain a perfect marriage. Meanwhile, most enterprises want to find out methods for keeping perfect partnerships with their service provider. However, the pivotal element of a perfect marriage depends on love which is very difficult to define objectively. On the other hand, the pivoting element of a partnership is the heuristic relationship of traditional partnership development. The challenge is to use scientific means to produce a logical approach for partnership development.

The problems of relationships between partners normally occur in their non-consideration. The critical point in the solution is how to show their understanding for each other. When this scenario is applied to the relationship of partnership development, they need to understand why they satisfy or do not satisfy cooperation. The satisfaction gap is often neglected in traditional partnership development. However, services have been defined as activities or tasks that satisfy customer needs (Brax, 2005). A service provider partnership is presented as a continuous relationship development of service industries and sub-contractors. Since the core outcomes of this partnership are the high quality of multilayer services to keep their healthy relationship, the satisfaction gap can deeply affect the partnership between the two service providers. Moreover, the interactive satisfaction measurement of the service provider partnership is lacking in a logical approach for its institutionalization. Hence, a new method is proposed to overcome this block.

In the first place, the satisfaction gap looks forward to narrowing the distance by a systematic approach. Information flow and active knowledge exchange can offer a good channel to enhance their understanding levels. It is an effective way to apply a knowledge-based ERP system that helps to capture and organize information and data for transparency enhancement in partnership development.

The new concept of partnership development for service providers intends to use the information accumulated in a knowledge-based ERP system to retain and convert the heuristic relationship to objective assessments and mutual understandings. An initial attempt is to map the interactions by Integration Definition Function Modeling (IDEF0) and Integration Definition Information Modeling (IDEF1X). The structures and functions of this new partnership development model are defined by the relevant information flow.

This new model of partnership development concentrates on keeping the partnership healthy, which specifically deals with the technologies in the monitoring satisfaction model and its relationship with other functions and models. However, satisfaction is a vague term. Some people may be quite rich, but they are still not satisfied. Other people may be quite poor but they are satisfied.

Thus, a complete meeting of minds is an ideal form of human communication, and it is expected to have a perfect response in partners' communication in project cooperation. Synchronizing the different perspectives toward satisfaction levels between the core-company and its partners are necessary to minimize their gaps continuously. The analysis arising out of satisfaction surveys can help to reduce the gap in knowledge (Kujala and Ahola 2005). The significance of satisfaction survey and their implications on economic and social satisfaction have been reported (Geyskens and Steenkamp 2000, Lai 2007, Mckee and Wang 2006, Ramaseshan et al. 2006).

However, contemporary satisfaction improvement strategies often lack support from objective data. Members of the partnership may easily be deceived by their subjective approach to satisfaction improvement strategies, resulting instead in enlarging the satisfaction gap. Normally, the core-companies and their partners concentrate in building up their relationship in terms of cost and profit (Dye 2004). However, some relationships, such as marriage, cannot be properly developed by money alone. Investigation of the pivotal elements, as given in this research, suggests that satisfaction gap measurement is the key factor that can be used to develop an objective system for partnership development. The development of such an objective system for relationship development is a challenge in engineering management.

Satisfaction is a vague term, while its measurement poses even more uncertainty. Normally, it is measured by fixed period or dynamic communication, interview and questionnaire survey. However, communication and interview capture the tacit knowledge only and are not good enough to support the objective system design. Hence, a questionnaire survey was carried out in relevant service industries and their sub-contractors.

This satisfaction gap survey provides an effective method of analyzing the satisfaction gaps among members of the partnership. It is different from other contemporary satisfaction surveys that only consider satisfaction measurement (core-company or its partners).

Monitoring satisfaction gap is one of the key elements in this research concept. Since different people will have their own definition of satisfaction, fuzzy sets can be used to define the satisfaction index. The satisfaction level of business partners can optimally match the satisfaction level of the core companies. The result of this research can contribute by using objective means to clarify the fuzzy relationships between the business partners, under a dynamic cooperative relationship, and its further development. This research addresses the question as to why fuzzy sets are suitable for developing satisfaction and harmony in the new generation of partnership development, and how fuzzy sets describe the behavior of satisfaction harmony.

In Macau, the major service providers have operated in an environment of low competition. All these were changed after the 1999 handover. The service industries encounter three new challenges: the granting of two new provisional licenses for public mobile telecommunications services in 2001, the opening up of the gaming industry from exclusivity to three licenses in 2002, and the electricity market will be reformed and opened in 2010. These lead to globalization and fierce competition for both the core-companies and the sub-contractors. Therefore, it is the opportune moment on innovative approach to develop partnership for the service industries in order to get well-prepared for the global competition. Provided by this special background of Macau, there are a lot of good changes where we can make studies by using the satisfaction gap for the measure of innovative partnership development.

Therefore, the empirical research addresses the relevant service industries sector in Macau. Five core-companies were requested to answer the questions related to different satisfaction aspects of partnership development for Macau Power Station, Macau Water Supply Company, three Macau Telecommunication Companies. Moreover, their sub-contractors ,Cheong Kong Architecture, Soi Kun Engineering Limited, Mak Hong Kei Engineering Limited, Tong Tat Engineering Limited, Tong Lei Architecture and Lei Kei Communication were requested to answer the questions and provide their satisfaction aspects in term of sub-contractors' role. Five sub-contractors including the Cheong Kong Architecture, Soi Kun Engineering Limited, Mak Hong Kei Engineering Limited, Tong Tat Engineering Limited, Tong Lei Architecture are the main and local engineering service companies for the five core-companies. They will offer the maintenance service, building service and technical support service for the core-companies. Lei Kei Communication is one of the key sub-contractors in the field of selling and marketing service for the Macau telecommunication company.

The open market of the public mobile telecommunications services and the reformation of the electricity market cause a big impact on Macau service industries. Therefore, by investigating their changes of partnership development a benchmark of the knowledge-based ERP model of partnership development is thus generated. Although their data may not represent all of the Macau service industries, this empirical research can generate the reference model of objective partnership development for other service industries facing fierce competition.

1.2 Motivation

Conventional partnership development hinges on long-term trust, as a subjective aspect (Lehtinen, 1999; Hall, Andriani, 1999; Virolainen, 1998; Bryans, 1999; Simpson, Wren, 1997; Bonaccorsi, Lipparini, 1994). However, in the real situation, there is unwillingness to trust partners fully (Brown, Boyett, Robinson, 1994). If partnership development was focused on subjective long-term relationship development by trust and faith, this is dangerous and very often the solution is not optimal. Two valuable contributions are addressed in this research:

1. Investigating the impact of the satisfaction gap in partnership development for the service industry.
2. Designing scientific subcontracting analysis systems and investigating the cause of objective analysis versus heuristics in partnership development, as well as its contribution in maintaining healthy partnership development.

1.2.1 Impact of Satisfaction Gap in Partnership Development

Satisfaction level is one of the key factors which impact partnership development. However, satisfaction is a vague term. The contemporary satisfaction measurement for a partnership (Geyskens & Steenkamp, 2000; Lai, 2007) is concentrated in economic satisfaction and social satisfaction.

In conventional partnership development, satisfaction measurement is often done in isolation from one single side of the partnership, often from the side of the core company. Although this approach may be adequate to achieve social and economic results in the case of a small circle with close relationship, it is unable to be competitive in a dynamic world where new partnerships have to be developed from time to time. The satisfaction gap is thus valuable in investigating its contribution in partnership development.

1.2.2 Scientific subcontracting analysis system

A scientific subcontracting analysis system is proposed to link daily information generated in the ERP system to optimal strategies, using artificial intelligence technology and knowledge management techniques, to support a scientific and objective approach to partnership development that forms a regenerative feedback loop that maximizes benefits to both parties.

1.3 Problem Formulation

The trend of service industries will continue to down size and build up more wholly-owned subsidiaries for surviving globalizing challenges and cutting down on their running cost (Blumberg, 1998; Sampson, 2000). If they keep following the traditional relationship development by long-term and faith (Lehtinen, 1999; Hall, Andriani, 1999; Virolainen, 1998; Bryans, 1999; Bonaccorsi, Lipparini, 1994; Willcocks, Choi, 1995; Simpson, Wren, 1997), the solution may be dangerous as the defects will be embedded, such as an unwillingness to trust partners fully (Brown, Boyett, Robinson, 1994), in the real situation.

It is necessary for the service industries to scientifically and objectively exploit their partnership network to keep their competitive advantages and harmonize their growth. Otherwise, it is hard to handle the complicated partnership network. Moreover, they may lose touch with the market if their competitors can more effectively handle partnership development.

Contemporary studies in partnership indexes (Huang, Mak, Humphreys, 2000 and 2003) and AI partner selection (Ip et al., 2003a; Ip et al., 2003b; Hajidimitriou et al., 2002; Narazaki et al., 1993; Chen et al., 1994; Choy et al., 2002; Lau et al. 2001) contributed in extending new partners by scientific methods, and these models and methods are only concerned with advancing partner selection. The development of long-term partnership relationship by scientific and objective methods has not been. If both parties expect to keep a healthy relationship to enhance competition, the closed-loop partnership development method is a real panacea to solve the problems.

Building up a regenerative feedback loop model for a partnership development is required to be supported by a highly efficient and good quality database system. The workload and investment are heavy for both parties, whether or not they need to make a custom-built database system to support this concept. Applying data and information from the ERP system can simplify the approach and save resources for the core-company and sub-contractors. Unfortunately, developing a long-term strategic partnership was only simply discussed in the ERP and KM combined influence on organizational efficiency and flexibility (Newell et al., 2003). However, there was a lack of detail and scientific analysis.

Actually, applying case-based knowledge management in ERP that aimed at two types of knowledge, unstructured and structured, was discussed in how to transfer the business knowledge and product knowledge with business partners (O'Leary, 2002). Moreover, applying knowledge-based resource planning tools and neural network techniques was proposed to advance manpower control by scientific methods (Huin, 2002). However, they did not investigate how to link daily information generated in the ERP system to optimal strategies, using artificial intelligence technology and knowledge management techniques, to support a scientific and objective approach to partnership development that forms a regenerative feedback loop for a partnership development that maximizes benefits to both parties.

This is necessary to build up a new knowledge-based ERP for partnership development in the service industry that can provide a possible means through partnership, close monitoring, scientific and transparent assessment, plus most important of all, feedback from reliable knowledge-based ERP generated data to push the collaboration forward. "Brand New" partners introduced into the system will be thoroughly assessed as to their past experiences and feedbacks.

1.4 Objectives

This study focuses on applying scientific and objective methods to develop a partnership for outsourcing services in the service industries to exploit the complicated sub-contractors' relationship and network to target the optimal approach. The aim of this research is to improve relationship development through inter-satisfaction gap modification. The objectives of this study include:

- Investigate the feasibility of using an objective system for relationship modeling to demonstrate heuristic relationships;
- Build up a new architectural model for knowledge-based ERP (KBERP) in partnership development;
- Develop a fuzzy feedback algorithm for satisfaction gap analysis in both parties (core-company and sub-contractors);
- Find out the uncertainty factors of the algorithm through the advanced partnership development questionnaire survey;
- Implement the satisfaction gap assessment into software to validate the conceptual model.

1.5 Outline of the Thesis

This thesis consists of seven chapters:

Chapter 1 introduces the background of the knowledge-based ERP for partnership development in the service industry and the motivations of the study.

Problem formulation and the research objectives are given in terms of the research characteristics of the partnership development.

Chapter 2 is a literature review of related studies including the comparison of traditional and modern partnership development in the service industry, state of the art in the application of ERP and knowledge management in the service industry, and satisfaction impact in partnership development.

Chapter 3 addresses the development of the concept model for knowledge-based ERP for partnership development. The architecture and IDEF models of the concept are described in this chapter. It emphasizes the satisfaction gap and how to impact and affect the pivotal information flows in knowledge-based ERP systems.

Chapter 4 describes the support of the pivotal information flows from the satisfaction gap perspective to develop an inter-satisfaction gap algorithm. This algorithm integrates with the fuzzy sets in satisfaction harmony through bi-indexes analysis, and the fuzzy satisfaction gap programming method. The concept of a knowledge-based ERP for partnership development is scientifically presented in this chapter.

Chapter 5 presents a scientific questionnaire survey to find out the uncertain factors in the satisfaction gap algorithm development. The questionnaire is distributed by a stratified random method to the main service industries in Macau and their sub-contractors. The result consolidates the satisfaction gap algorithm for partnership development and satisfaction improvement strategies.

Chapter 6 validates the theoretical framework of the knowledge-based ERP for partnership development through putting the satisfaction gap algorithm into programs and trying it in real situations. Computerizing the fuzzy satisfaction gap can output the feedback indexes to narrow the distance of both parties. The case study shows the partner relationship can healthily develop according to strategic guidance by the output of the fuzzy satisfaction gap indexes.

Chapter 7 concludes the contributions of this new approach in partnership development. The core-companies and their partners can clarify their gaps in terms of different points of view in partnership development and satisfaction, that are based on their different roles, cultures, and behavior. This scientific approach can guide both parties to re-use their knowledge in the field of partnership development from the ERP system to achieve healthy relationship extensions. The result can be enhanced through long term investigation of project collaboration in the future.

CHAPTER 2 LITERATURE REVIEW

2.1 Current Trends in Modern Service Industries

Most large sized service industries and many middle size groups are now engaged in an in-depth analysis and evaluation of the opportunities for cost reduction and productivity improvement through outsourcing and downsizing, and many technical service sub-contractors are moving into this market (Blumberg, 1998; Sampson, 2000). A strategic approach for evaluating the decision to outsource involves seven key factors:

- Customer view of the function.
- Capabilities and physical assets required to perform the function.
- Technological requirements.
- World class abilities.
- Performance and delivery capabilities versus competitive alternatives.
- Time and cost required to close performance gaps.
- Long-term commitment.

Most of the technical services such as maintenance activities were proposed to be contracted out to keep the competitive advantages in the service industries. Outsourcing of some maintenance activities may be necessary for strategic and/or economic reasons (Zhu et al., 2002). The choice between in-house capability and outsourced service was a strategic dimension of maintenance management (Tsang, 2002; Murthy, 2002). Strategic contracting out of maintenance activities can enhance operational flexibility and financial flexibility for the service industries (Martin, 1997).

2.2 Enterprise Resource Planning in Service Industries

An overview of ERP systems shows functions as sales and marketing (customers), operations and logistics (suppliers), financial, human resources (Chen, 2001; Kock, 2001; Umble et al., 2003). The contemporary status with the major themes of ERP research is concentrated in deployment strategies, change management, standardization and flexibility, business process management, methodological aspects of ERP research, ERP in IS curriculum, training and teaching ERP, technical aspects of implementation, successful and failed implementation, managing various scales of changes, risk management, role of IS function in implementation, supply chain reengineering, ERP & E-commence applications, strategic alliances & outsourcing, CSF/CFF, project management infrastructure, process-based IS analysis and design, benchmarking best implementation, knowledge management, ERP for various businesses, investment evaluation, investment evaluation, ERP and competitiveness, and performance measurement (AI-Mashari, 2003).

The objective of ERP is expected to improve the efficiency of service organizations by streamlining the business processes, introducing better workflow between departments and by supporting these processes and workflow using suitable vehicles. The targets are to improve efficiency and performance of IT services, while reducing costs, and increase productivity via streamlined business processes and optimized organizational structure. This ensures a reliable enterprise-wide integration system through the alignment of business processes and data (www.cem-macau.com).

Enterprise Resource Planning enables businesses to plan and manage financial-related and human resources-related issues. The ERP Financial solutions can support a global business, improve effectiveness and efficiencies, establish appropriate controls and manage key financial drivers. The ERP Human Resources solution can use Internet-based automation to transform business-to-employee relationships, providing unprecedented internal efficiencies and proactive knowledge delivery (www.pccw.com).

2.3 State of the Art in Enterprise Resource Planning with Knowledge Management

Most enterprises and research, only focuses on ERP implementation. However, when an ERP system lacks organizational memory, it will affect the performance of different business processes. Hence, considering organizational memory with an ERP system is a future research direction in the ERP domain. Knowledge management is a good tool to handle organizational memory (Stijn et al., 2001).

ERP and KM combined influence organizational efficiency and flexibility (Newell et al., 2003). The mutually reinforcing nature of the ERP and KM systems are:

- *The creation of internal boundaries*: both the ERP and KM initiatives aimed to break down formal departmental and divisional boundaries.

- *The reduction in social capital*: smaller number of suppliers and service providers will enhance the efficiency and develop a long-term strategic partnership, but lose some valuable "social capital".
- *The creation of inter-group conflict and resistance*: no two-way translation between ERP and Product Data Management.

The above research confirmed that: (1) the two systems can be implemented in tandem to good effect; (2) complementarity between the two systems is possible, although this is not an automatic outcome; it has to be fostered.

Impact of ERP and KM initiatives in terms of four mechanisms (Adler et al., 1999):

	ERP initiative	KM initiative
Metaroutines	▪ New set of routines introduced, once created routines stabilized	▪ Learning communities created a new routine to continuously stimulate innovation
Enrichment	▪ Inhibited by standardizing processes and routines	▪ Learning communities allowed employees opportunity to reflect and learn from their experiences
Switching	▪ Minimized to enhance predictability	▪ Learning communities provided opportunity to periodically switch from ERP-defined routines
Partitioning	▪ Pre-existed in company with production divisions focused on efficiency	▪ Pre-existed in company with consultancy division focused on innovation

Table 2.1 Impact of ERP and KM initiatives

Applying case-based knowledge management in ERP (O'Leary, 2002) aimed at two types of knowledge: unstructured and structured.

- The Knowledge Warehouse is aimed at managing unstructured knowledge, such as business knowledge (data, processes, and models), product knowledge (R/3 functionality), training materials, and documentation.

- SAP's Business Information Warehouse is used to manage structured data.

The National Industrial Information Infrastructure Protocols (NIIIP) consortium's Solution for MES-Adaptable Replicable Technology (SMART) applied KM to implement manufacturing and business procedures and policy using ERP in an Open Application Group Interface Specification for developing a Virtual Enterprise (Barry et al., 1998).

Knowledge-based resource planning tools and neural network techniques can advance the manpower control by scientific methods (Huin, 2002).

2.4 Traditional Features of Partnership Development

Traditional features of partnership development were focused on long-term relationship development through exchanging sensitive information and long-term trust, subjectively (Lehtinen, 1999). Hall and Andriani (1999) proposed to develop and manage strategic partnerships through intangible resource development and handling the dynamics of trust.

The relationships evolve through five general phases, according to Dwyeer, Schurr, and Oh (1987):

1. Awareness
2. Exploration
3. Expansion
4. Commitment
5. Dissolution

Virolainen (1998) suggested partnership sourcing must be based on a long-term relationship, so, five key factors for establishing successful partnerships are:

- Two-way information sharing
- Top management support
- Shared goals
- Early communication to suppliers
- Supplier adds distinctive value.

Effective partnership relations require a clear understanding of expectations, open communication and information exchange, mutual trust and a common direction for the future (Mclvor et al. 1997). A partnership can be defined as a strategic relationship between independent parties who share “compatible goals, strive for mutual benefit, and acknowledge a high level of mutual interdependence (Brownell et al., 2002).

Individuals must feel a benefit to themselves as well as to the organization for partnership development (Bryans, 1999). Successful partnerships (development of partnerships) tend to exhibit high levels of joint planning, formalized marketing programs, cooperation, communication, trust and long-term commitment (Simpson, Wren, 1997), and the continuity and the stability of the relationship (Bonaccorsi, Lipparini, 1994). However, the real situation showed an unwillingness to trust partners fully (Brown, Boyett, Robinson, 1994). Therefore, if partnership development was focused on subjective long-term relationship development by trust and faith, this is dangerous and very often the solution is not optimal.

2.5 State of the Art in Scientific Method for New Partners' Development

Partnership indexes were proposed to create WeBid for the Partnership Explorer for contributing to extending to new partners (Huang et al., 2000 and 2003). Four types of distinctive index were:

- *Satisfaction index* is the measure of the extent to which a customer requirement is satisfied by a supplier capability.
- *Flexibility index* is the measure of the extent to which a supplier capability exceeds a customer requirement.
- *Risk index* is the measure of the extent to which a supplier capability fails to meet a customer requirement.
- *Confidence index* is the measure of trustworthiness of the supplier meeting the customer requirements over a period of specified time. Longer term partnership may be considered, instead of using short-term competitive tendering.

In calculating partnership indexes are used four value types are used: Range (R_s: the set of supplier capability for a certain inquiry; R_c: the set of customer requirement for a certain inquiry); Option; Boolean; Overall. The inquiry will be: Financial difficulties, ISO9001 Quality Certified, Communication channels, Product volume changes, Product style series, Short delivery lead time, Color options for each style, Product life expectance, Formal application of MRPII, Machinable dimension range, Dimension tolerance, and After sales customer service.

Artificial intelligence (AI) techniques in solving partner selection problems by scientific method were proposed while considering the factors of cost, due date, precedence of sub-project, the probability of success and time (Ip et al., 2003; Ip et al., 2004; Hajidimitriou et al., 2002).

Knowledge-based tools in decision making (Narazaki et al., 1993; Chen et al., 1994, Choy et al., 2002) and performance score (Lau et al. 2001) were proposed to assist partner selection, but these scientific methods were only concerned with selecting potential partners for contracting out activities.

2.6 Satisfaction Impact in Partnership Development

Satisfaction level is one of the key factors which impact partnership development. However, satisfaction is a vague term. The contemporary satisfaction measurement for partnerships (Geyskens & Steenkamp, 2000) is concentrated in economic satisfaction and social satisfaction (E&S satisfactions) and their study objectives are:

- Partner's use of power has been identified as one of the most important determinants of channel member satisfaction (Geyskens, Steenkamp, and Kumar, 1999);
- Use of power (also referred to as influence strategies) can be conceptualized as an exercise of a coercive versus noncoercive power base (Gaski and Nevin, 1985) in a contingent or noncontingent way (Scheer and Stern, 1992);
- Discussion of Exit, Voice, Loyalty, and Neglect typology of responses to relationship problems.

Five sub-directions are recommended to support the fine tuning of E&S satisfactions.

- Economic Satisfaction:
  - Profitability
  - Discounts
  - Quality Enhancement
  - Effectiveness
  - Selling and Marketing
- Social Satisfaction:
  - Feelings of hostility
  - Tactful Criticism
  - Mutual interactions
  - Apocalypse
  - Policies

The findings that contribute in partnership development by E&S satisfactions are:

1. Partners use of **noncoercive power** *increases* a channel member's economic satisfaction;
2. Social satisfaction is enhanced by the partner's noncontingent exercise of noncoercive power, but is eroded by the partner's contingent exercise of noncoercive power;
   - Partner's contingent use of noncoercive power undermines the focal channel member's social satisfaction, thereby decreasing voice and increasing exit, and as such may be detrimental to organizational and relationship success in the *long run*.

3. Loyalty is built by economic satisfaction but actually is reduced by social satisfaction;
4. Voice was found to be affected by social satisfaction but not by economic satisfaction (occasional relationship);
   - Non-contingent noncoercive power use might have a much larger positive effect on the reseller's social satisfaction than may be anticipated.
5. When economic satisfaction is high, social satisfaction has only a weak effect on discouraging destructive responses;
   - When economic satisfaction is low, social satisfaction becomes increasingly important for the survival of channel relationships.
   - The findings indicated that increasing social outcomes for the partner becomes a very effective strategy for reducing *exit and neglect*.
6. Enhancing a reseller's economic satisfaction is to provide high quality products, attractive discounts, as well as high quality marketing and *selling support*;
7. Increasing reseller's social satisfaction can encourage the constructive response of voice;
8. Reseller's economic satisfaction is low and cannot be easily enhanced in the short run.

Satisfaction difference also was discussed by E&S satisfactions (Lai, 2007). The discussion was the effect of suppliers' application of various influence strategies on dealers' economic / social satisfaction, and whether different satisfactions generate different performances for improving channel relationships.

Four influence strategies were discussed for E&S satisfactions:

- Hard coercive strategies (including threats and legalistic pleas) – coercive power
- Promise strategies – coercive power
- Request strategies – noncoercive power
- Perception altered strategies (including recommendations and information exchange) – noncoercive power

The use of hard coercive strategies against channel partners increases conflict. Finally, the more frequently that suppliers use hard coercive strategies, the lower is the dealers' economic and social satisfaction. However, the promise strategies and use perception altered strategies are good for them.

This result can further approve the meta-analysis of satisfaction by Geyskens, Steenkamp, and Kumar 1999.

Partner's use of Strategy	**Economic Satisfaction**	**Social Satisfaction**	**Conflict**
Threats	↓	↓	↑
Promises	↑	↓	↑
Noncoercive Influences	↑	↑	↓

↑: increasing level; ↓: decreasing level

Table 2.2 Meta-analysis of satisfaction (Geyskens, Steenkamp, and Kumar 1999)

Moreover, the E&S satisfactions were discussed with communication, trust, and commitment (Rodríguez et al., 2006). The findings of economic and social satisfaction in manufacturer-distributor relationships are:

- Interchange of information made by the manufacturer allows distributors to develop their tasks more efficiently in the relationship;

- Communication does not have a direct effect on non-economic satisfaction, something which can be justified by its indirect effect through three variables: credibility, benevolence and economic satisfaction;
- Both trust and relationship commitment also increases distributor's satisfaction with manufacturer;
- The positive effect of communication on credibility and benevolence dimensions of trust has also been shown;
- The positive association between trust and relationship commitment has been confirmed.

Bantham (1998) suggested the critical success factors for partnership as:

1. Increasingly electronic communication environment (ie. Characterized by heavy reliance on e-mail, fax, and shared databases)
2. Face-to-face communication

Moreover, Bantham (2003) built up a further framework to advance the partnerships:

1. Makes explicit ideas
2. Clarifies existing business relationship
3. Integrates relevant new and existing relationship

The discussion of this framework can conclude in three directions:

1. Mindset and skillset positively affect interdependent problem solving
   - Mindset: awareness of and willingness to address dialectical tension
   - Skillset: Communication behaviors
2. Interdependent problem solving positively affects satisfaction and investments.

3. Commitment can be enhanced, and satisfaction and investments often increase.

The relationship of performance satisfaction and partnership quality was discussed (Wiertz et al., 2004) for multichannel service systems, with findings:

1. Service quality and image quality are positively related to performance satisfaction;
2. Significant positive relationships lead to performance satisfaction and trust;
3. Trust will be affected by partnership quality;
4. In a trusting relationship, the channel partner is willing to increase its vulnerability by cooperating, as well as by behavioral intentions.

2.7 Summary

Contemporary satisfaction measurements for partnerships are focused on economic satisfaction. However, the social satisfaction cannot be ignored because of global market competition. When the number of suppliers or partners is increasing and the long-term relationship is diminishing, partnership development needs to consider both the E&S satisfactions simultaneously.

An applied fuzzy analytical approach in the partnership era was discussed in optimal partner selection (Mikhailov, 2002). It can advance the decision making in a partnership. However, decision making is only one of the key factors in partnership development, so the concept can be extended to touch other factors in partnership development to modify the satisfaction indexes in both parties.

Although t-test analysis method can be used to evaluate the satisfaction levels of the core-company and partner, because of their sample size difference it cannot present the real problems embedded in the partnership development. Fuzzy logic is more suitable to describe the expectation of satisfaction, according to their cultural difference and individual factors.

CHAPTER 3 CONCEPTUAL MODEL OF KBERP

3.1 Background

Scientific and objective partnership development are necessary to focus on long-term relationship development through fair and objective analysis for contracting out technical services and scientifically lifted the qualifying level of potential sub-contractors by daily and continuous knowledge-based ERP data support. A new methodology is integrated knowledge-based ERP resource and soft computing technique to optimize the subcontracting analysis.

Optimal partner selection is one of the elements in the concept model that concerns both of the exploiting new-partner-in and contracting-out technical services by scientific and objective methods. Contemporary studies are only concerned with applying scientific methods to contract out technical services (Ip et al., 2003; Ip et al., 2004; Hajidimitriou et al., 2002; Narazaki et al., 1993; Chen et al., 1994; Choy et al., 2002; Lau et al., 2001). However, if the partners were invited to join this outsourcing services' group by heuristics methods, the output of scientific contracting-out technical services would still be affected by human factors.

The advanced methodology in this domain is necessary to simultaneously control the quality of partner-in and contracting-out, with daily and continuous data support from knowledge-based ERP by objective and scientific methods. Extending to new partners applied Internet technology and knowledge-based ERP can be applied to innovate the searching and inviting methods. The traditional "searching and inviting new partner method" is through exhibitions, brand loyalty, and generic web-search engines.

Huang, Mak, and Humphreys (2000 and 2003) contributed using Partnership indexes. It can be extended and communicated to new partners through WeBid, the Partnership Explorer. It can be aggressive as to whether the qualifying sub-contractors can get the pre-announcement information for the criteria of outsourcing technical services, through a new web-platform with knowledge-based ERP.

The knowledge-based ERP can be based on the characteristics of the potential sub-contractors to offer significant suggestions for upgrading their equipment, technical skills and human resources to match the needs of outsourcing technical services, because partnership development was suggested for bi-directional supply chains in service industries (Sampson, 1999). These bi-directional supply chains can benefit between the service industries and the sub-contractors. The characteristics of this knowledge-based ERP system have intelligence beyond the contemporary knowledge-based resources planning tool that only functions in manpower control by a viable feedback mechanism (Huin, 2002).

It can closely monitor the performance of contracting out technical services. This kind of explicit data can integrate with the ERP database and knowledge management technique to organize viable and valuable feedback to potential sub-contractors. Moreover, the quality and significance of this kind of explicit data can be enhanced to meaningful knowledge by knowledge management techniques. The potential sub-contractors can adjust and improve their competence and performance based on viable and valuable feedback from reliable knowledge-based ERP data.

The potential sub-contractors' competitive advantages can be thus enhanced through collaborating with core-companies. The core-companies can strengthen the competence of their partnership network because their potential sub-contractors can proceed to self-improvement through a new partnership development approach. This is thus a key for the research that links daily information generated in the ERP system to optimal strategies, using artificial intelligence technology and knowledge management techniques. This can support a scientific and objective approach to partnership development that forms a regenerative feedback loop that maximizes benefits to both parties.

A new knowledge-based ERP for partnership development is designed. It provides a possible means through partnership, close monitoring, scientific and transparent assessment, plus most important of all, feedback from reliable knowledge-based ERP generated data, to push the collaboration forward.

The model of Knowledge-based ERP in Partnership Development is integrated with the advantages of traditional partnership development and the features of current scientific methods. The advantages of a traditional partnership can keep long-term relationship development through exchanging sensitive information (shown as figure 3.1). However, its disadvantage is that it is only focused on long-term trust by subjective means. When the enterprise tries to use objective methods to develop the partnership, long-term trust and faith is vaporized because of the dynamic environment.

Although contemporary scientific methods of partnership development can objectively select potential partners through soft computing technology, using the project requirement, partners' information and performance information, it lacks long term relationship development. Actually, it omits to include an effective method to communicate with their partners. Moreover, it cannot equally share benefits with partners. The contemporary proposed scientific methods lack needed real-time information to support communication.

Enterprise Resource Planning (ERP) is effectively the operating system of a business that includes administrative applications (finance, accounting), human resources applications (payroll, benefits), and manufacturing resource planning applications (procurement, production, planning). This is an untouched research area in the application of ERP information for supporting scientific outsourcing analysis. This outsourcing analysis can give higher quality decisions because of using the most up-to-date partnership and performance information through the ERP data.

Moreover, if the knowledge-base can be analyzed with soft computing techniques, together with the ERP and CRM systems, knowledge and real-time information can be more effectively shared with all the parties.

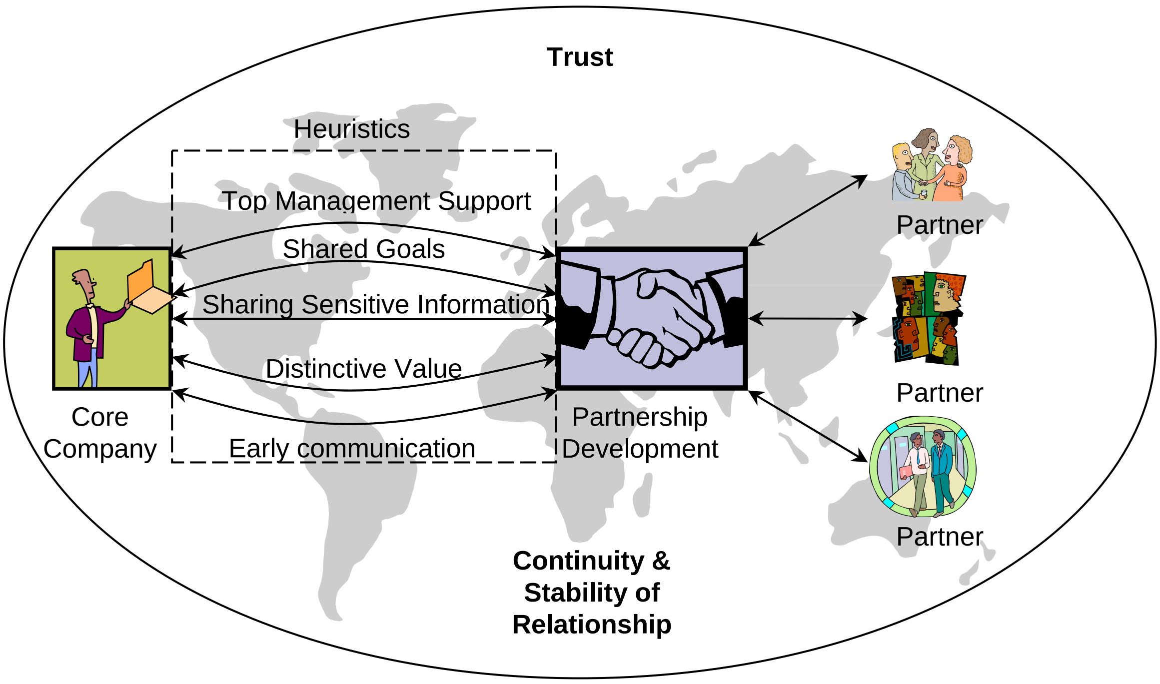


Figure 3.1 Traditional Partnership Development

3.2 Architecture of Knowledge-based ERP for Partnership Development

The architecture of the applied knowledge-based (K-based) ERP system in partnership development for outsourcing (shown as Figure 3.2) will focus on communication, cognitive resources, decision making, selecting partners and keeping the partnership healthy.

Communication: Communication is very important for developing a partnership. However, the traditional communication method lacks intelligence and only concentrates on delivering dialogue (information). However, if the dialogue (information) can be converted and captured to become valuable data and explicit knowledge, a knowledge-based ERP system can be efficiently analyzed to give intelligent messages for sharing with business partners. The valuable data and explicit knowledge in communication will focus on knowing what goal is wanted, what are the needed skills and information to convey the desired message, and past experiences.

Cognitive Resources: the cognitive resources will be obtained from systematic communication by intelligent methods. The cognitive resources include creativity, communication and cultural skills, past experiences, and talent. Creativity is most valuable for cognitive resources, because new ideas or knowledge can be fostered from this kind of resource. Hence, how to build up “Creativity” by Knowledge Management (KM) and Artificial Intelligence (AI) is a very interesting topic. McElroy (2002) suggested using the demand-side KM angle to enhance the knowledge to the creative level.

Keeping the Partnership Healthy: the concept of this model functions in the e-Consultant system through Monitoring Satisfaction. This e-Consultant system can work with the model of Regular Partnership Review and the Stages of Partnership Development model to add value in the new partnership development environment.

- Monitoring satisfaction: ERP is a good tool to work with in the monitoring satisfaction system, because the core-company and its partners necessarily share their critical cooperation information. Hence, the monitoring level of the core-company can continue to appreciate, if they can define the right and critical performance information that is requested, to share with the ERP system.
- Regular Reviews of Partnership: it will focus on the responses and reviews.
    - Response time – apply AI & KM to shorten the response time and enhance the performance
    - Conducting reviews:
        1. evaluation of each partner's personal qualities
        2. evaluation of the partner relationship
        3. evaluation of the business performance
- E-Consultant with partnership: it will focus on providing skills, overseeing a special project, and evaluating the operation.
- Stages of Partnership Development
    - Make a full description of each partner's responsibilities
    - Prepare a detailed process for resolving disputes
    - Define a procedure for a regular review of partnership functioning
    - Developing a Business

Selecting Partner: the characteristics of this model are focused on

- Prior work history
- Communication Skills
- Social Context
- Balance between strategic and tactical functioning
- Evaluating the compatibility of partner attributes

Decision Making: the characteristics of this model are focused on

- Definition of operational goals and priorities
- Attempt by each party to prevail
- The search for a joint solution
- Implementation of the negotiated decision
- Evaluation of outcome of decisions and resolution of disagreements
- Coping with disappointing decisions

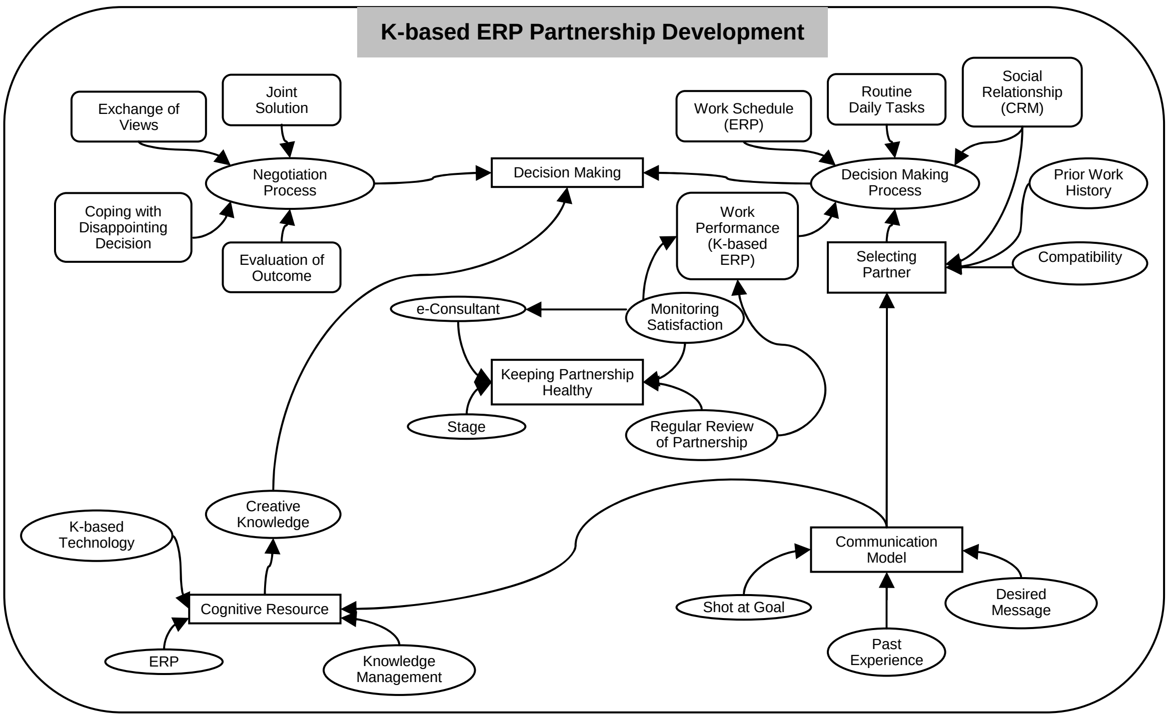


Figure 3.2 Architecture of K-based ERP Partnership Development

3.3 The IDEF Model of Knowledge Management Approach to Partnership Development

The first step in developing an objective method to analyze partnership development is to clearly define the background of behavior and culture of both parties. Integration Definition Function Modeling (IDEF0) and Integration Definition Information Modeling (IDEF1X) is a systematic method to be used in the modeling and system design with the systematic definitions. The certain and uncertain factors can clearly be defined for this new concept of partnership development.

To start the modeling, the structures and functions of this new partnership development model are defined by the relevant information flow. The uncertain variables can be determined through questionnaire surveys. This new concept of partnership development intends to use information accumulated in a knowledge-based ERP system to retain and convert the heuristic relationship to objective assessments and mutual understanding.

The contemporary studies in partner selection fuzzy logic only concern the decision making for outsourcing selection. It is rarely concerned with updating the level of partnership development. This updating information can be developed when the data can be efficiently applied from the ERP system of the core-company. Actually, the partnership level will lose its representative edge if the measurement is only considered by the core-company. The innovative measurement is necessary to discuss the partners' consideration as well as the core-company. The partners' knowledge becomes more valuable in the system support.

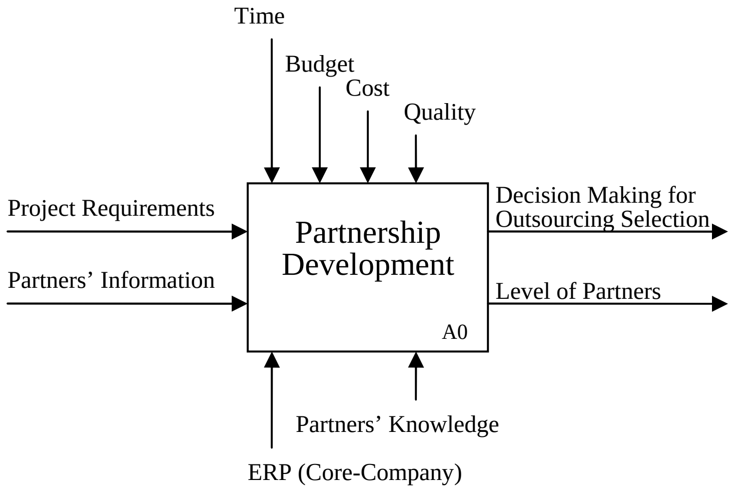


Figure 3.3 IDEF0 of Partnership Development

The partners' knowledge in the collaboration and partnership for various projects can be captured through a proper communication process. As the decision making processes are publicly discussed in the contemporary studies, the black boxes of working performance and keeping partnerships healthy are deeply considered in this study.

3.4 Pivotal Information Flows for Satisfaction

Four main functions of IDEF0 of Partnership Development are Communication (A1), Working Performance (A2), Keeping Partnership Healthy (A3), and Decision Making (A4). Investigated in this model design is how the core-company and its partners can determinate the development strategies of their relationship.

The developing characteristics of IDEF model of partnership development can be identified from the key information of partner and project. The major controls of this IDEF0 model are time, cost, and quality to properly handle project development in their cooperation. The satisfaction level and partner level are the major outputs. The core-company and its partners can find out the satisfaction gap with regard to the analysis of this model. They can search the improvement strategies after this scientific evaluation.

3.4.1 IDEF Model of Communication

The major entities, together with their attributes and relationship of communication (A1) are described with figure 3.5. The major functions of communication are desired message (A11), goal (A12), and critical knowledge (A13). The needs of both parties can be found through the systematic communication of desired message. Their requests for the critical goal can be determined according to their development level and investment. The supporting data and knowledge can be identified after the goal is being determined.

Entity relationships among project, partner, problem and satisfaction gap are described in the reference model (refer to figure 3.6). The problem of both parties is the identification of the type, technical level and impact factor. These useful data are required to help in the classification of their strategic goal with their role's data which includes project information and partner's information. Nevertheless, their satisfaction gap in the field of economic factors and social factors will affect their needs of knowledge resource regarding their strategic goal. The economic satisfaction index and social satisfaction index of both parties are necessary to assist the analysis of communication. The needs of knowledge resource can systematically identify its type, strategy, method and resource.

3.4.2 IDEF Model of Working Performance

The working performance (A2) is one of the key factors affecting the health of partnership development. Its main output in the IDEF0 model is concentrated in the satisfaction index. The major functions of working performance (A2) are monitoring satisfaction (A21), regular review of partnership (A22) and knowledge-based ERP (A23). Their attributes and relationships are shown as figure 3.7. The updating capacity and performance are monitored and analyzed by regular review of partnership. These are the important information to support the knowledge-based ERP model of partnership development, because the partner's level can be updated in accordance with the result of updating capacity and performance. The major output of knowledge-based ERP function is key performance indicators. This is the critical supporting data to support function entities of communication (A1), keeping partnership healthy (A3) and decision making (A4).

The IDEF1X of the working performance (A2) is developed for analyzing the information flow (refer to figure 3.8). The knowledge-record-ID can capture the information by four aspects, being communication, performance, partnership and decision, to support the final decision-making process. These information flows can be used to build up the relationship in terms of the social satisfaction index and the economic satisfaction index in the partnership development model.

3.4.3 IDEF Model of Keeping Partnership Healthy

Three major functions of keeping partnership healthy (A3) are described in their attributes and relationships as figure 3.9. The function of e-consultant (A31) works with the functions of joint solutions (A32) and capacity evaluation (A33). Three major outputs of this function entity (A3) are strategic suggestions, level of partners and capacity index.

The strategic suggestions are necessary for the data sources from Confusing Satisfaction Factors Index (CSF index) and Performance index. The entity relationships among the project, partner and ERP are described with figure 3.10. The feasible strategy can be identified after capturing the economic performance index, social performance index and CSF index. A detail analysis and classification of feasible strategies including economic strategy, social strategy and CSF strategy are shown in Chapter 5 “Inter-Satisfaction Gap Analysis” and chapter 6 “Development of an Objective Relationship Model”

3.4.4 IDEF Model of Decision Making

The function of this decision making model (A4) not only contributes to the general discussion on decision making in traditional action such as partner selection, but also provides development level and knowledge sharing level. Figure 3.11 shows that the major function entities (A4) are concerned with strategic decision (A43) as well as economic relationship evaluation (A41) and social relationship evaluation (A42). This is an important contribution in this research, because this model can provide sustainable information to both parties to maintain their relationship development and healthy growth. This is neglected to contemporary research of decision making analysis.

The evaluation of decision making is not only considered with economic factors. It is also considered with social factors and relationship development. Therefore, the information flow of the IDEF1X of the decision making (A4) is also linked with economic satisfaction level, social satisfaction level, and strategic improvement index (refer to figure 3.12). Profitability, discounts, quality, effectiveness, and selling and marketing are all required for the measurement of the economic satisfaction. As for the social satisfaction index, loyalty, concern, interactions, apocalypse and policies are measured. Provided by the evaluation results are the knowledge level, compatibility level, performance index and capacity index. From the final outputs of decision making, collaboration level, development level, investment level and knowledge sharing level are generated. Collaboration level and investment level can be used for the support on determining the partner selection. Development level and knowledge sharing level are applied for the contribution in relationship development and healthy growth.

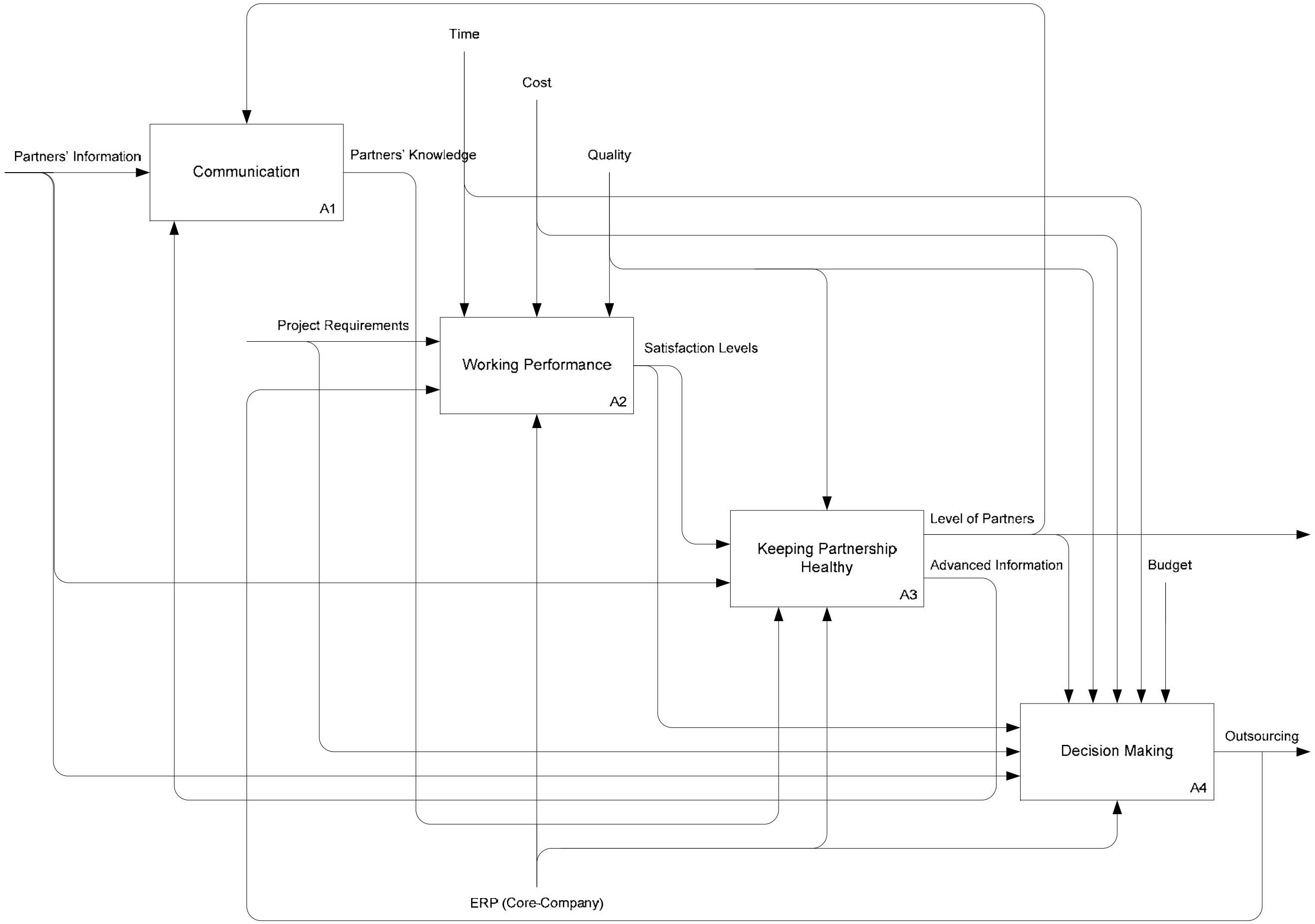


Figure 3.4 IDEF0 of A0

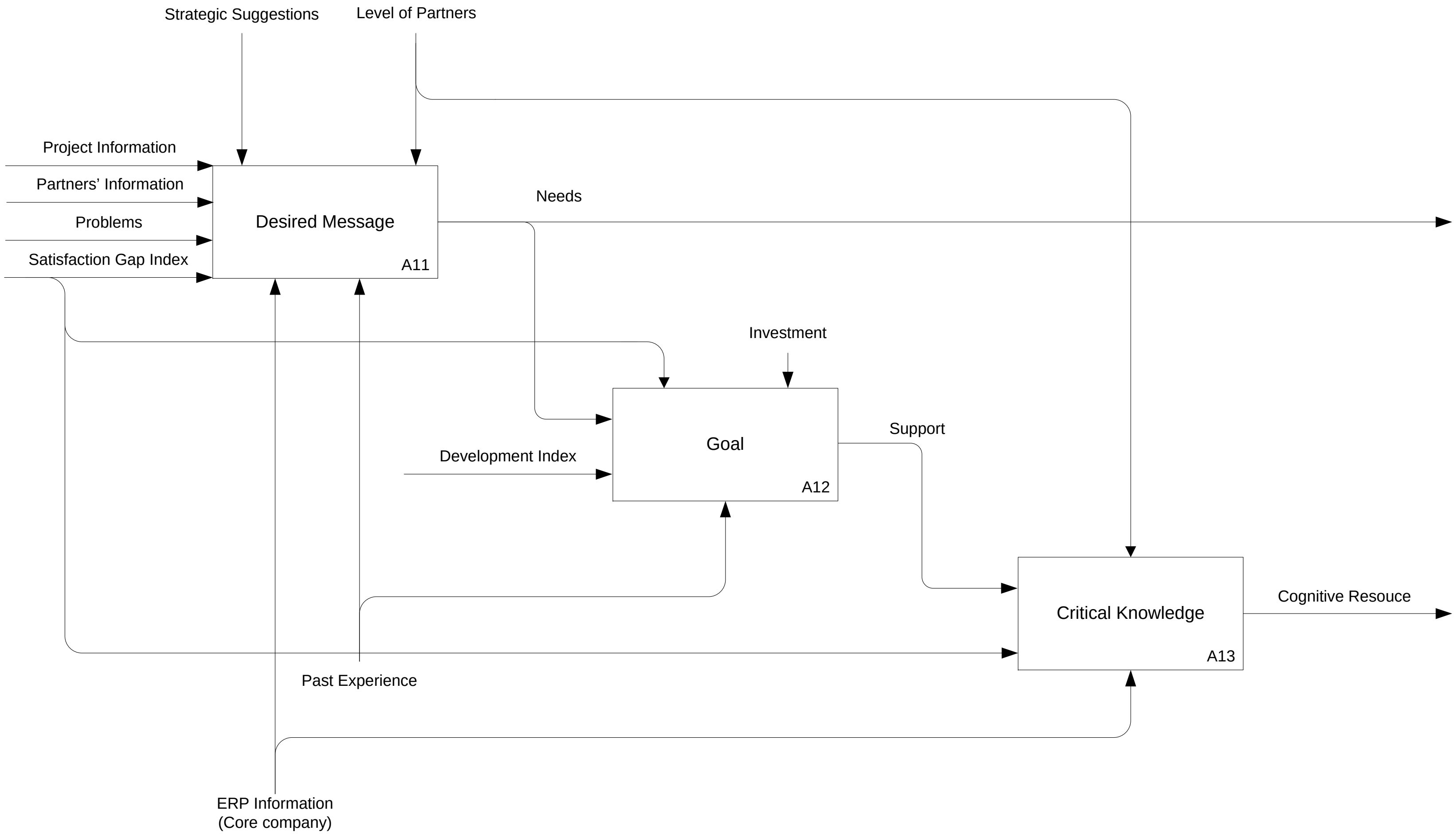


Figure 3.5 IDEF0 of Communication (A1) for Partnership Development

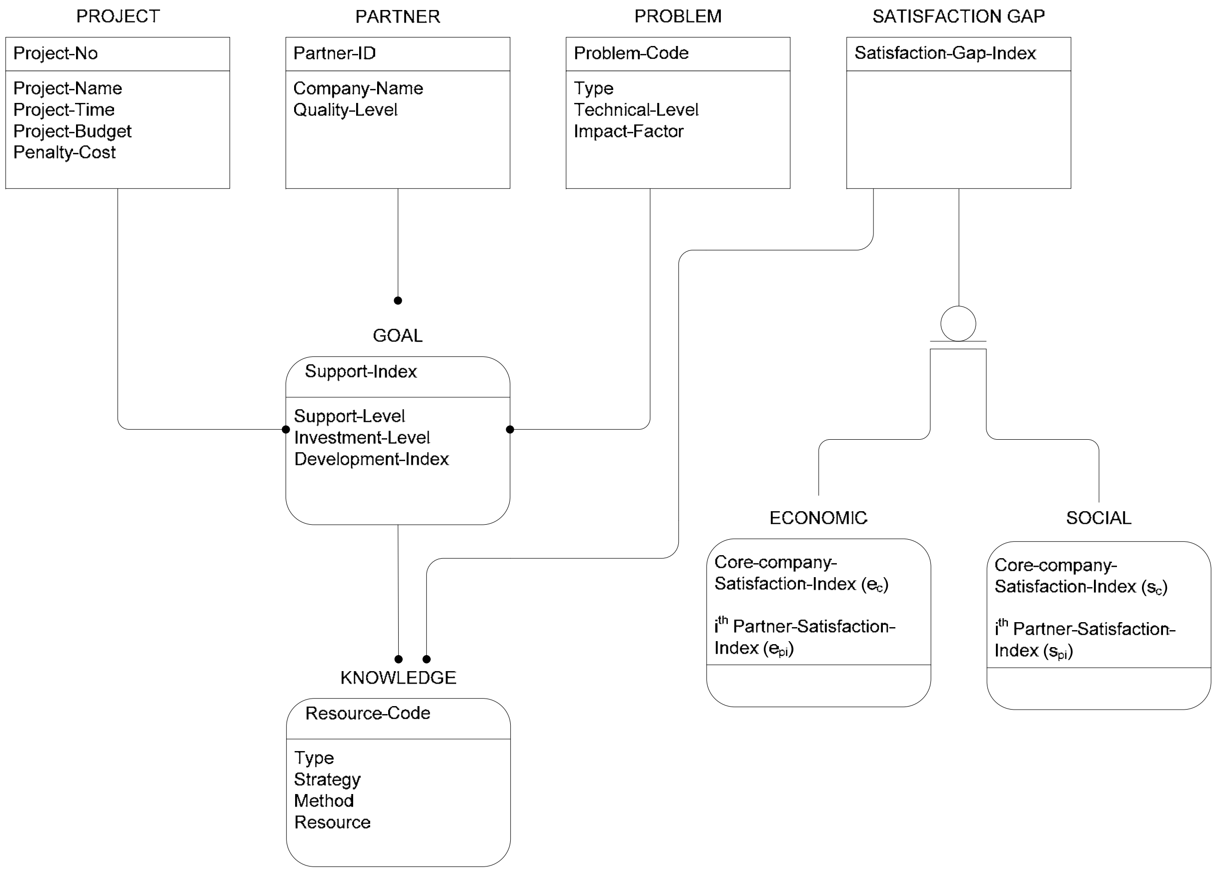


Figure 3.6 IDEF1X of Communication (A1) for Partnership Development

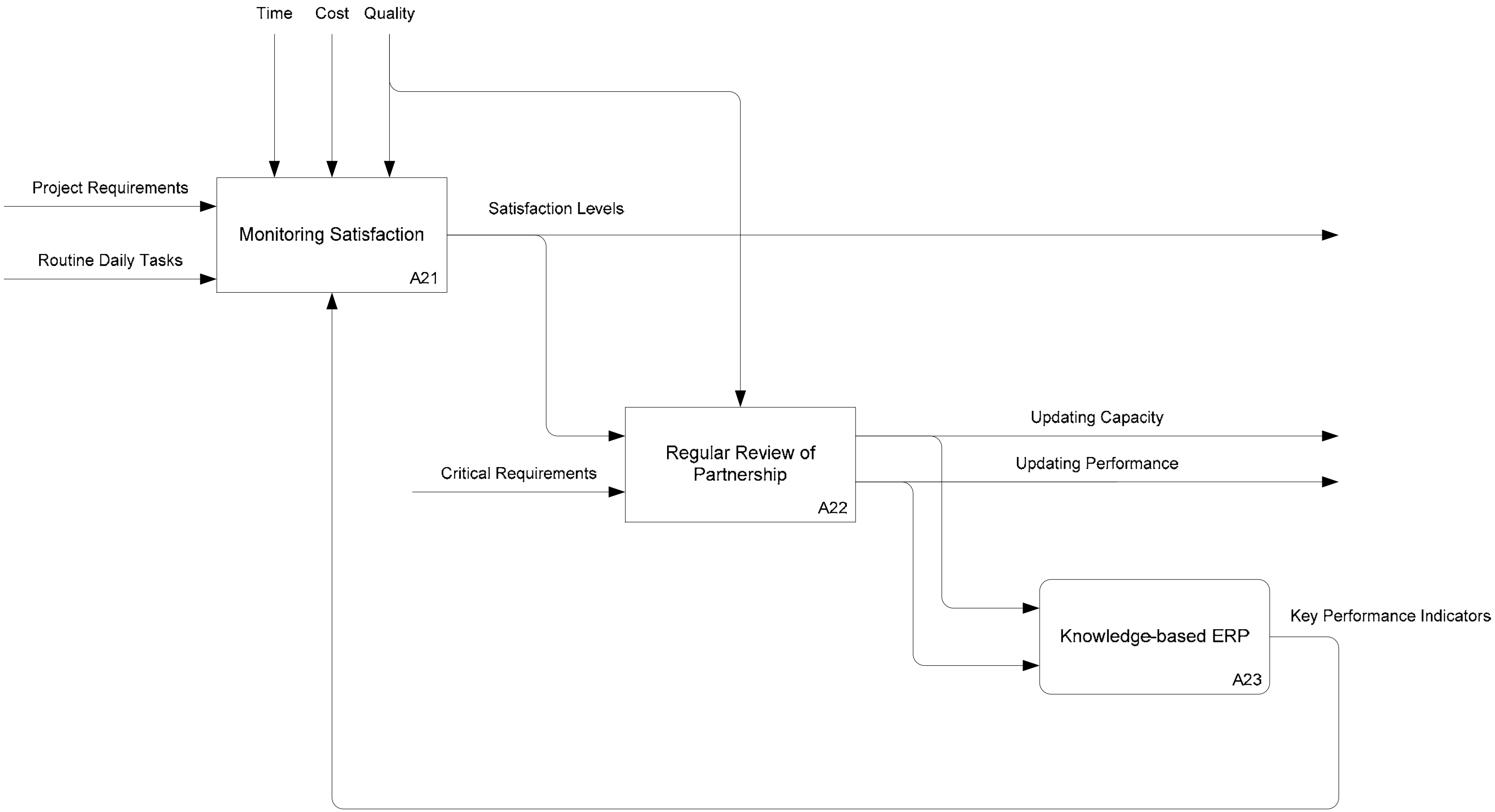


Figure 3.7 IDEF0 of Working Performance (A2) for Partnership Development

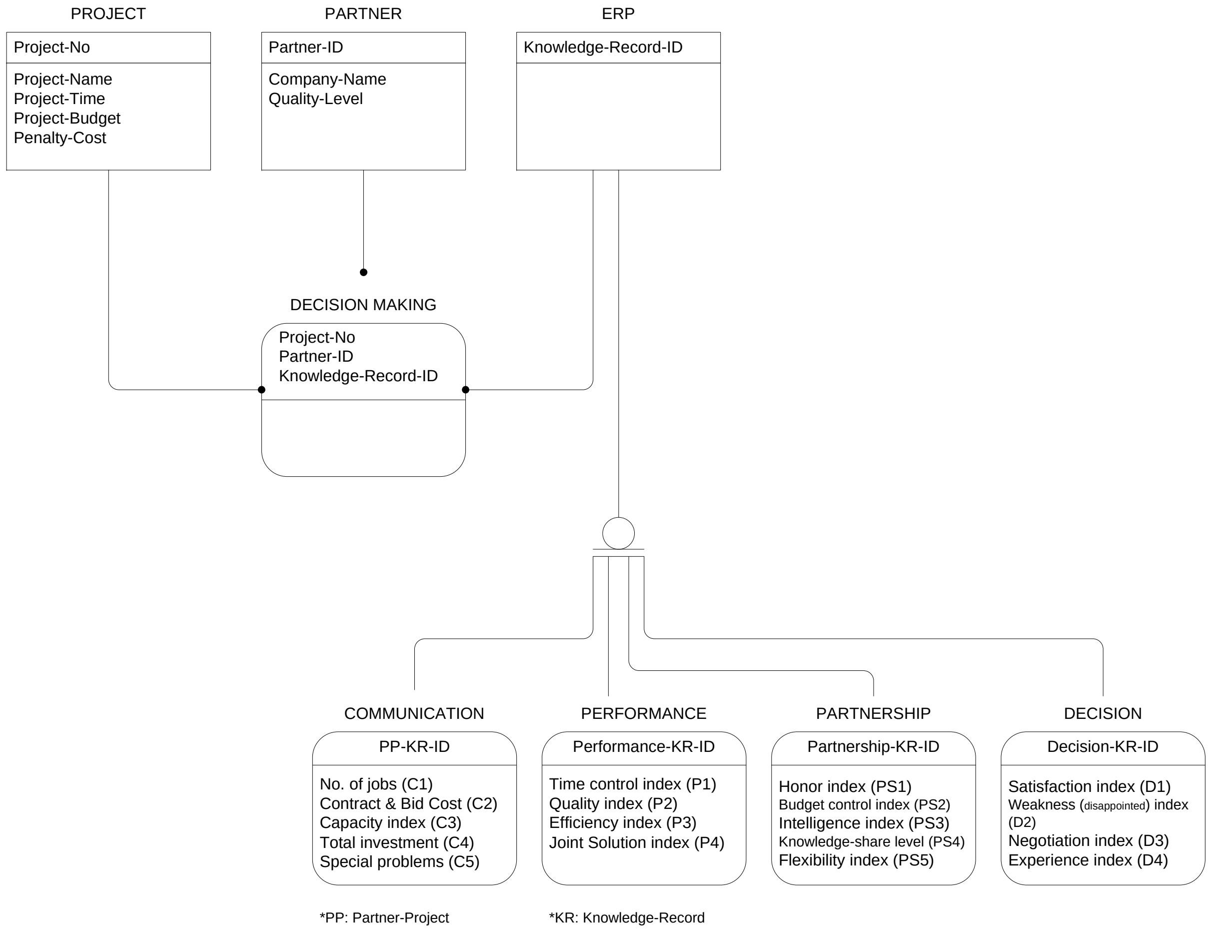


Figure 3.8 IDEF1X of Working Performance (A2) for Partnership Development

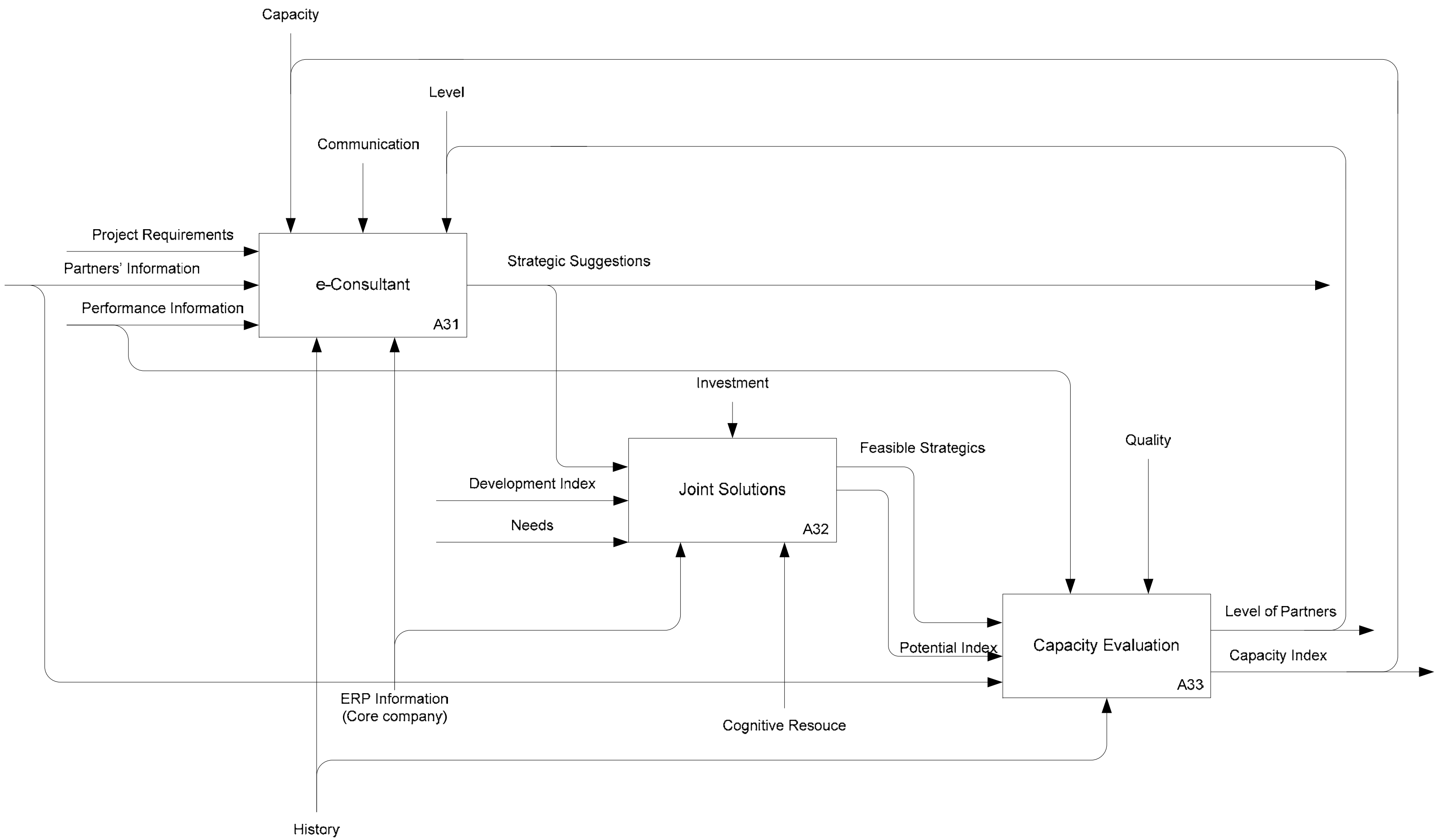
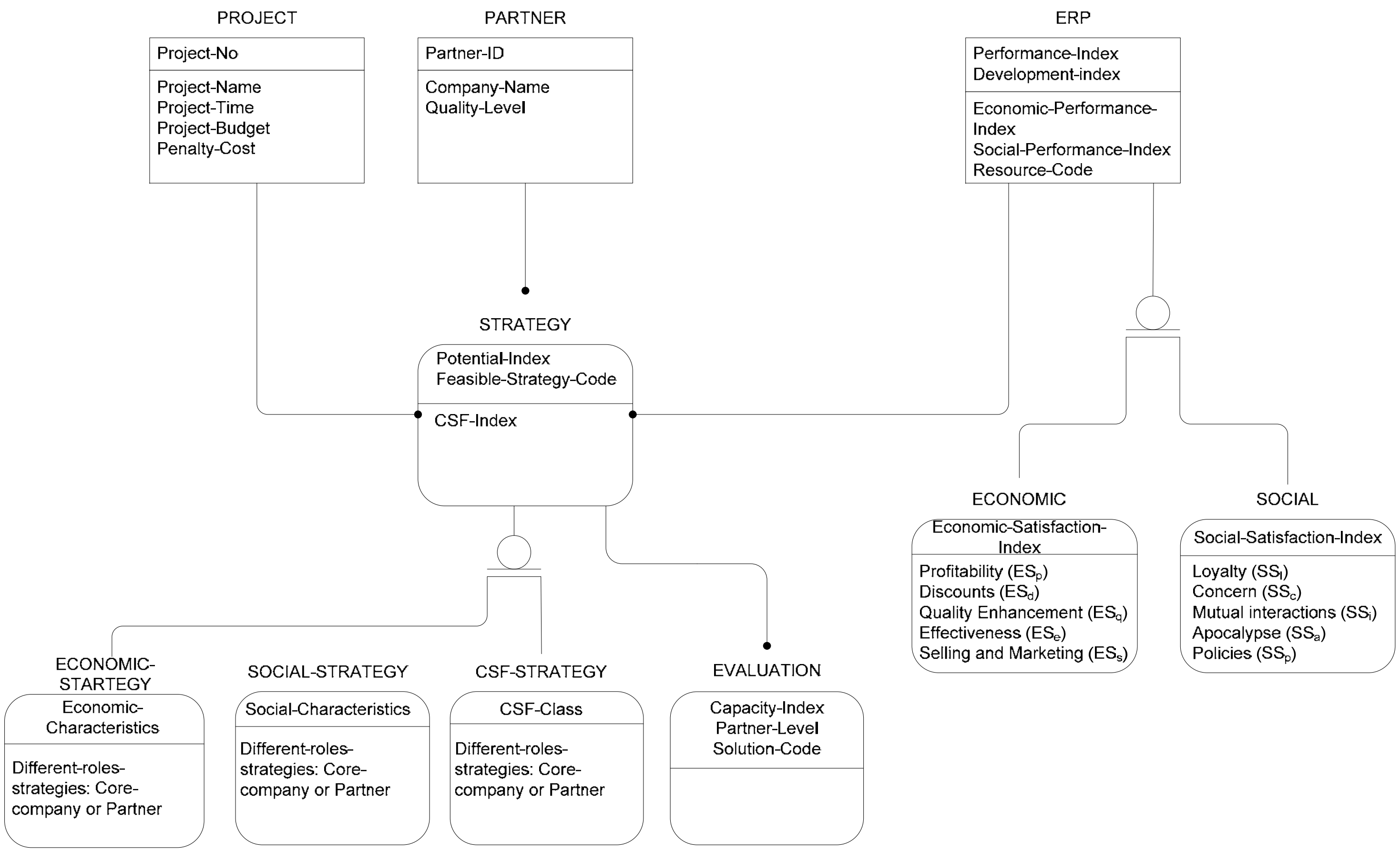


Figure 3.9 IDEF0 of Keeping Partnership Healthy (A3) for Partnership Development



*CSF: Confusing Satisfaction Factors

Figure 3.10 IDEF1X of Keeping Partnership Healthy (A3) for Partnership Development

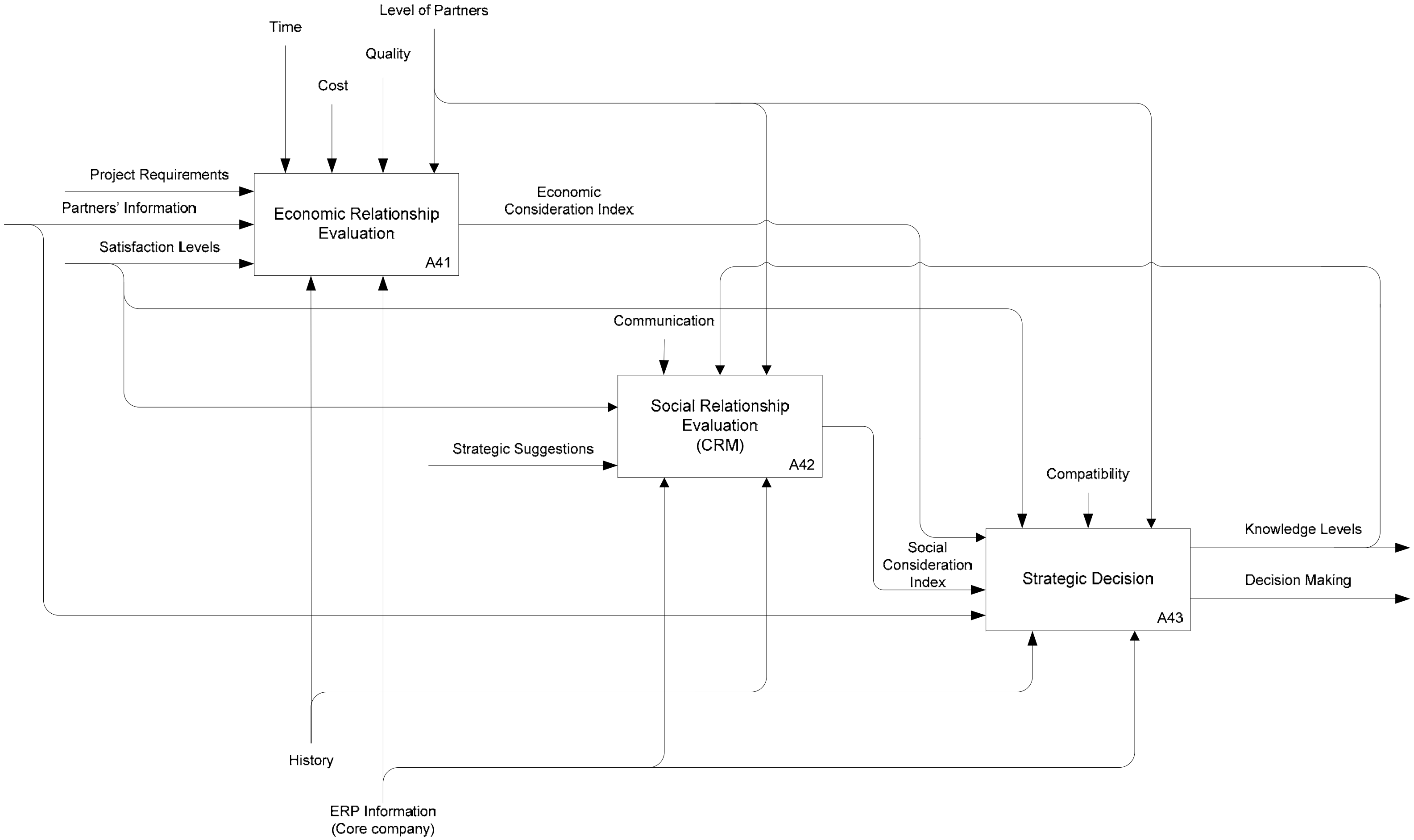


Figure 3.11 IDEF0 of Decision Making (A4) for Partnership Development

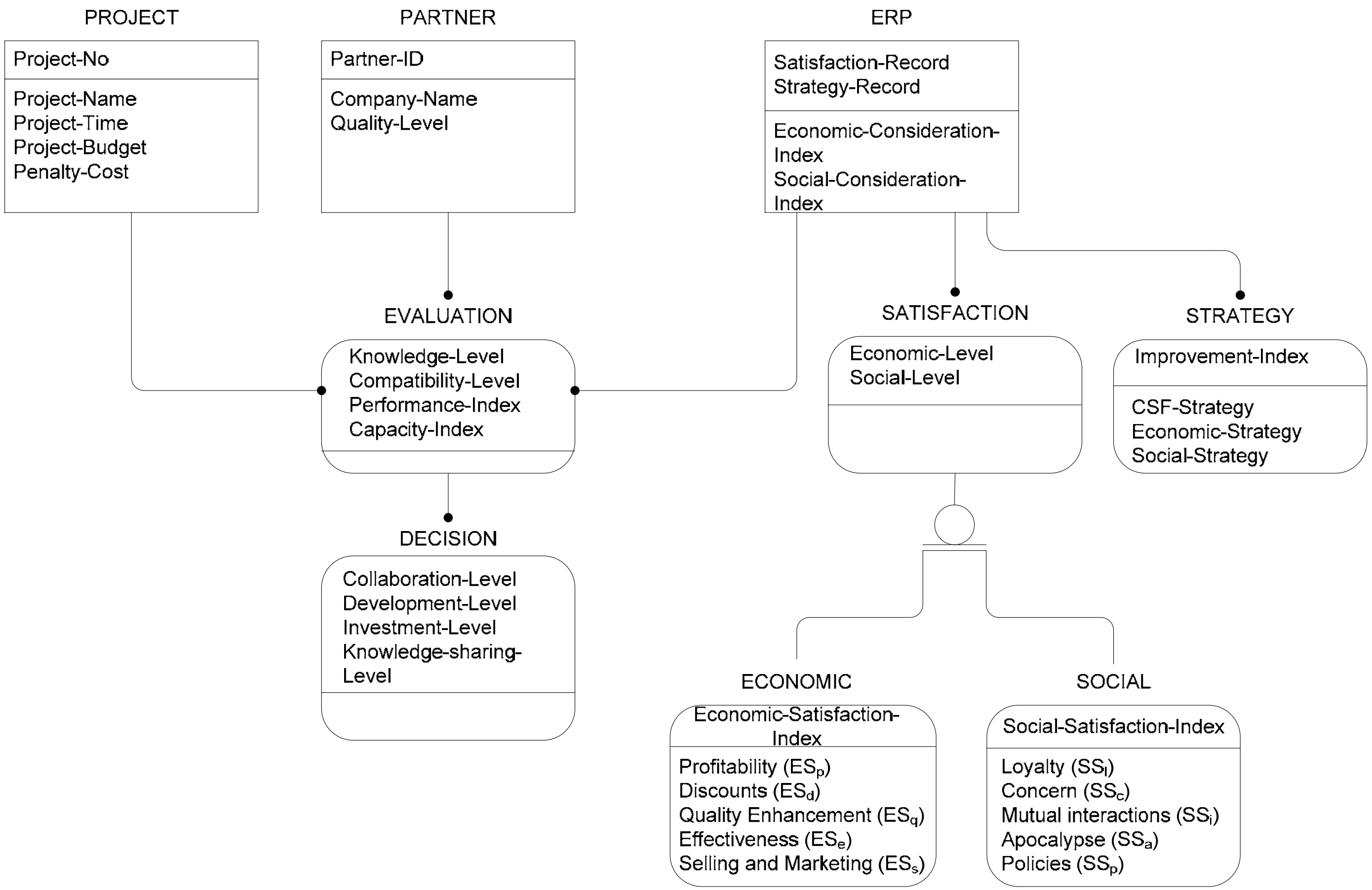


Figure 3.12 IDEF1X of Decision Making (A4) for Partnership Development

CHAPTER 4 INTER-SATISFACTION GAP ALGORITHM

4.1 Introduction

Satisfaction is a vague term. It is quite difficult to determine its level unless fuzzy logic is used. Satisfaction measurement is often done in isolation from one single side of the partnership, often from the side of the core company. Although this approach may be adequate to achieve social and economic results in the case of a small circle with close relationship, it is unable to be competitive in a dynamic world where new partnerships have to be developed from time to time.

However, satisfaction level is one of the key factors which impact partnership development. The contemporary satisfaction measurement for partnership (Geyskens & Steenkamp, 2000) is concentrated in the economic satisfaction and social satisfaction. Contemporary five sub-directions are recommended to support the fine tuning of the economic satisfaction and social satisfaction as follows:

- Economic Satisfaction:
  - Profitability (ES_p)
  - Discounts (ES_d)
  - Quality Enhancement (ES_q)
  - Effectiveness (ES_e)
  - Selling and Marketing (ES_s)
- Social Satisfaction:
  - Feelings of hostility (SS_h)
  - Tactful Criticism (SS_c)
  - Mutual interactions (SS_i)

- Apocalypse (SS_a)
- Policies (SS_p)

Nevertheless, the economic satisfaction and social satisfaction were also discussed through satisfaction strategies (Lai, 2007; Rodríguez et al., 2006; Wiertz et al., 2004; Bantham, 1998 & 2003). The social satisfaction is recommended for modifying the feeling of hostility and tactful criticism to loyalty and concern respectively in this research. Thus, five sub-factors of the social satisfaction are designed for this research as follows:

- Loyalty (SS_l)
- Concern (SS_c)
- Mutual interactions (SS_i)
- Apocalypse (SS_a)
- Policies (SS_p)

Moreover, when the number of supplier or partners is more and long-term relationship is decreased, partnership development needs to consider social and economic satisfaction simultaneously.

Applied fuzzy analytical approach in partnership era was discussed in the optimal partner selection (Mikhailov, 2002). It can advance the decision making in partnership. However, decision making is only one of the key factors in partnership development. When there are gaps between the satisfaction in economic and social area, there are no proposed methods to fix these problems. Hence, the concept can be extended to touch other factors in partnership development to modify the satisfaction indexes in both parties.

Although T-test analysis method can be used to evaluate the satisfaction levels of the core-company and partner, because of their sample size difference it cannot present the real problems embedded in the partnership development. Fuzzy logic is more suitable to describe the expectation of satisfaction, according to their different behavior and culture backgrounds.

4.2 Fuzzy Sets in Satisfaction Harmony through Bi-indexes Analysis

In this section, two main directions, core-company and partners, are discussed with their two subways as social satisfaction and economic satisfaction. The linguistic variable and the ranges of core-company satisfaction index (CSI) and partner's satisfaction index (PSI) can be simply defined and discussed as follows:

Linguistic variable: number of Core-company Satisfaction Index, CSI
and number of Partner's Satisfaction Index, PSI

Linguistic	Notation	Numerical range (normalized)
Very low	VL	[0, 0.30]
Low	L	[0, 0.40]
Medium	M	[0.30, 0.70]
High	H	[0.60, 1]
Very high	VH	[0.70, 1]

Table 4.1 Linguistic variables and their ranges

Two-input single-output Sugeno fuzzy model with nine rules of CSI can be expressed as:

Rule	**CSI_s**	**CSI_e**	**CSI**
1	L	L	VL
2	L	M	L
3	L	H	M
4	M	L	L
5	M	M	M
6	M	H	H
7	H	L	M
8	H	M	H
9	H	H	VH

Table 4.2 The Rule Table of CSI

The fuzzy rules of PSI are as follows:

Rule	PSI_s	PSI_e	PSI
1	L	L	VL
2	L	M	L
3	L	H	M
4	M	L	L
5	M	M	M
6	M	H	H
7	H	L	M
8	H	M	H
9	H	H	VH

Table 4.3 The Rule Table of PSI

When the satisfaction gap is defined as a result of defuzzification of CSI and PSI, the uncertainty factors may be embedded in this simple fuzzy analysis. The crisp input of CSI absorbs the difference of the crisp input of PSI such as the case of figure 4.1 and 4.2. This noise will affect the determination of the satisfaction gap between the core-company and partners. Moreover, when the satisfaction gap can be found by this simple fuzzy analysis, the adjustment indexes for economic satisfaction and social satisfaction are quite difficult to be expressed by the core-company and partners.

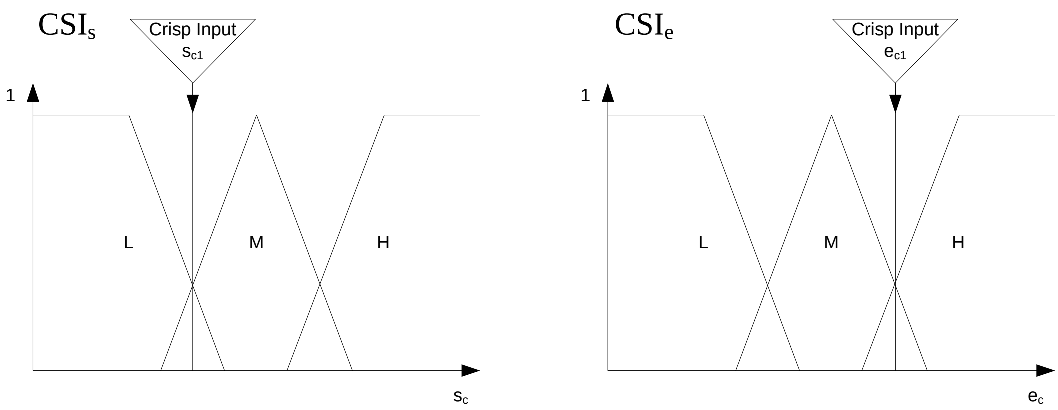


Figure 4.1 Crisp Input for CSI_s and CSI_e

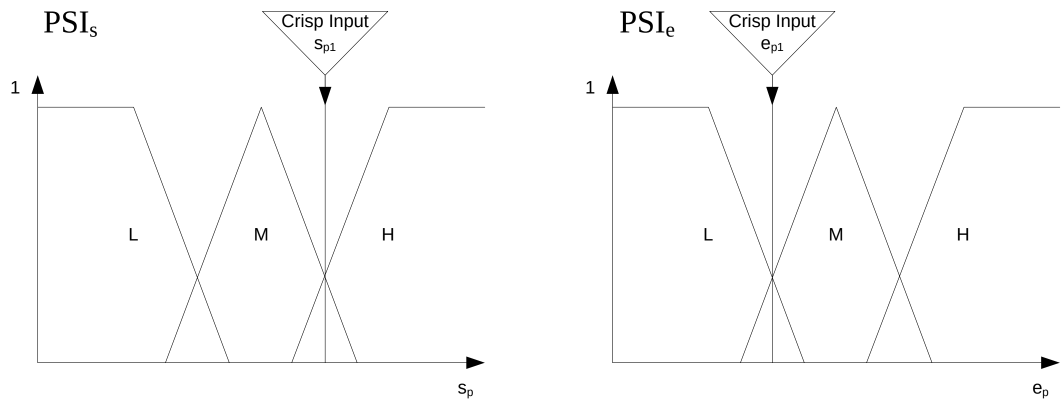


Figure 4.2 Crisp Input for PSI$_s$ and PSI$_e$

Hence, the advanced analysis with two main directions are the core-company and the partners, with their two subways as economic satisfaction and social satisfaction, are classified to nine different cases (shown as table 4.4) as follows:

		Economic Satisfaction		
		$e_c = e_{pi}$	$e_c > e_{pi}$	$e_c < e_{pi}$
Social Satisfaction	$s_c = s_{pi}$	Case I	Case II	Case III
	$s_c > s_{pi}$	Case IV	Case V	Case VI
	$s_c < s_{pi}$	Case VII	Case VIII	Case IX

Table 4.4 Nine Cases of Satisfaction Gap Definition

Where e_c is Core-company Satisfaction Index (CSI) of Economic Satisfaction; e_{pi} is the ith Partner Satisfaction Index (PSI$_i$) of Economic Satisfaction; s_c is CSI of Social Satisfaction; and s_{pi} is PSI$_i$ of Social Satisfaction.

This satisfaction gap analysis can be supported by the information flows of IDEF1X of the Working Performance (A2) (refer to figure 3.5). The knowledge records of the ERP system, including Communication, Performance, Partnership, and Decision, are clustered into a Social group and an Economic group.

The Social group including:

- Special problems (C5) *

- Honor index (PS1) *
- Knowledge-share level (PS4) *
- Flexibility index (PS5) *
- Satisfaction index (D1) *
- Weakness (disappointed) index (D2) *
- Experience index (D4) *

The Economic group including:

- No. of jobs (C1)
- Contract & Bid Cost (C2)
- Capacity index (C3)
- Total investment (C4)
- Time control index (P1)
- Quality index (P2)
- Efficiency index (P3) *
- Joint Solution index (P4) *
- Budget control index (PS2)
- Intelligence index (PS3) *
- Negotiation index (D3) *

This kind of data is defined with Pivotal Fusion Indexes. It can be fully captured from the ERP database in the ideal case. However, the enterprise generally deals with the common economic data in an ERP system. Most of the data for the social satisfaction index and special satisfaction index for the economic aspect, that are remark by a star (*) are necessary for building up an extra-database outside the ERP system to support the fuzzy analysis.

Case I (SE-EE: the **S**ocial satisfaction index is **E**qual for the core-company and partner, and the **E**conomic satisfaction index of the core-company is **E**qual to its partner) or (TCEO: **T**acit **C**ommitment to **E**ach **O**ther) is the ideal case in the partnership development. The satisfaction level of the core-company is equal to the partner in the social aspect. Moreover, the satisfaction level of the partner is equal to the core-company in the economic aspect. The quality level of the partner can be upgraded in this situation, and their information and knowledge exchange can be more sensitive. This operation is presented as:

When $CSI_s = PSI_{si}$ and $CSI_e = PSI_{ei}$;

Then ↑ "PP-KR-ID" and ↑ "Partnership-KR-ID"

With the exception of Case I, Case II to Case IX will have gaps in between the core-company and its business partners. The new model of the knowledge-based ERP system can function in narrowing the satisfaction indexes gap to enhance the opportunities of partnership development.

When CSI is not equal to PSI, it is expected to enhance the lower one to the same level as the higher one. Social and economic satisfaction is representatively affected by five different factors. These factors are simultaneously affected by eighteen indexes. When CSI has an unbalance situation with PSI, it is quite hard to systematically decide the strategy for adjusting the satisfaction index by the heuristics method. Using fuzzy sets to search for the solutions, is more efficient.

Calculate the adjustment of Social Satisfaction by:

$$\delta SS_l = \delta PS1 + \delta PS4 + \delta D2 \tag{4.1}$$

$$\delta SS_c = \delta C5 + \delta D4 \tag{4.2}$$

$$\delta SS_i = \delta C5 + \delta PS4 + \delta PS5 + \delta D1 + \delta D4 \tag{4.3}$$

$$\delta SS_a = \delta C5 + \delta D4 \tag{4.4}$$

$$\delta SS_p = \delta PS5 + \delta D1 + \delta D4 \tag{4.5}$$

s_c or $s_{pi} = \mu(SS_l, SS_c, SS_i, SS_a, SS_p)$ (4.6)

s_c or $s_{pi} \in [0, 1]$

Calculate the adjustment of Economic Satisfaction by:

$$\delta ES_p = \delta C1 + \delta C2 + \delta C3 + \delta C4 + \delta P1 + \delta P2 + \delta P3 + \delta PS2 + \delta PS4 \quad (4.7)$$

$$\delta ES_d = \delta C2 + \delta PS2 + \delta D3 \quad (4.8)$$

$$\delta ES_q = \delta C4 + \delta P1 + \delta P2 + \delta P3 + \delta PS3 \quad (4.9)$$

$$\delta ES_e = \delta P1 + \delta P2 + \delta P3 + \delta P4 + \delta PS3 \quad (4.10)$$

$$\delta ES_s = \delta C3 + \delta C4 + \delta P3 + \delta P4 + \delta PS3 \quad (4.11)$$

e_c or $e_{pi} = \mu(ES_p, ES_d, ES_q, ES_e, ES_s)$ (4.12)

e_c or $e_{pi} \in [0, 1]$

Case II (SE-EM: the **S**ocial satisfaction index is **E**qual to that of the core-company and partner, but the **E**conomic satisfaction index of the core-company is **M**ore than its partner)

When $s_c = s_{pi}$ and $e_c > e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted to balance e_c and e_{pi}. This operation is presented as:

$$\uparrow e_{pi} = \beta_{pp} \bullet \delta ES_p + \beta_{pd} \bullet \delta ES_d + \beta_{pq} \bullet \delta ES_q + \beta_{pe} \bullet \delta ES_e + \beta_{ps} \bullet \delta ES_s \quad (4.13)$$

Where β_{pp}, β_{pd}, β_{pq}, β_{pe}, and β_{ps} are the Economic Satisfaction Coefficients of the Partner P_i for a Profitability, Discounts, Quality Enhancement, Effectiveness, and Selling and Marketing; Partner P_i can consider the strategic guideline to increase its economic satisfaction from the knowledge-based ERP system.

Case III (SE-EL: the **S**ocial satisfaction index is **E**qual to the core-company and partner, but the **E**conomic satisfaction index of core-company is **L**ess than its partner)

When $s_c = s_{pi}$ and $e_c < e_{pi}$, it is necessary to the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted to balance e_c and e_{pi}. This operation is presented as:

$$\uparrow e_c = \beta_{cp} \bullet \delta ES_p + \beta_{cd} \bullet \delta ES_d + \beta_{cq} \bullet \delta ES_q + \beta_{ce} \bullet \delta ES_e + \beta_{cs} \bullet \delta ES_s \quad (4.14)$$

Where β_{cp}, β_{cd}, β_{cq}, β_{cw}, and β_{cs} are the Economic Satisfaction Coefficients of the Core-company for a Profitability, Discounts, Quality Enhancement, Effectiveness, and Selling and Marketing; the Core-company can consider the strategic guideline to increase its economic satisfaction from the knowledge-based ERP system.

Case IV (SM-EE: the **S**ocial satisfaction index of the core-company is **M**ore than its partner, but the **E**conomic satisfaction index of the core-company is **E**qual to its partner)

When $s_c > s_{pi}$ and $e_c = e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance s_c and s_{pi}. This operation is presented as:

$$\uparrow s_{pi} = \beta_{pl} \bullet \delta SS_l + \beta_{pc} \bullet \delta SS_c + \beta_{pi} \bullet \delta SS_i + \beta_{pa} \bullet \delta SS_a + \beta_{ppo} \bullet \delta SS_p \quad (4.15)$$

Where β_{pl}, β_{pc}, β_{pi}, β_{pa}, and β_{ppo} are the Social Satisfaction Coefficients of the Partner P_i for Loyalty, Concern, Mutual interactions, Apocalypse, and Policies; Partner P_i can base on the strategic guideline to increase its social satisfaction from the knowledge-based ERP system.

Case V (SM-EM: the **S**ocial satisfaction index of the core-company is **M**ore than its partner, but the **E**conomic satisfaction index of the core-company is **M**ore than its partner)

When $s_c > s_{pi}$ and $e_c > e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance the two gaps. This operation is presented as:

$\uparrow s_{pi} = \beta_{pl} \bullet \delta SS_l + \beta_{pc} \bullet \delta SS_c + \beta_{pi} \bullet \delta SS_i + \beta_{pa} \bullet \delta SS_a + \beta_{ppo} \bullet \delta SS_p$

$\uparrow e_{pi} = \beta_{pp} \bullet \delta ES_p + \beta_{pd} \bullet \delta ES_d + \beta_{pq} \bullet \delta ES_q + \beta_{pe} \bullet \delta ES_e + \beta_{ps} \bullet \delta ES_s$

Partner P_i can consider the strategic guideline to increase its social and economic satisfaction from the knowledge-based ERP system.

Case VI (SM-EL: the **S**ocial satisfaction index of the core-company is **M**ore than its partner, but the **E**conomic satisfaction index of the core-company is **L**ess than its partner)

When $s_c > s_{pi}$ and $e_c < e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance the two gaps. This operation is presented as:

$\uparrow s_{pi} = \beta_{pl} \bullet \delta SS_l + \beta_{pc} \bullet \delta SS_c + \beta_{pi} \bullet \delta SS_i + \beta_{pa} \bullet \delta SS_a + \beta_{ppo} \bullet \delta SS_p$

$\uparrow e_c = \beta_{cp} \bullet \delta ES_p + \beta_{cd} \bullet \delta ES_d + \beta_{cq} \bullet \delta ES_q + \beta_{ce} \bullet \delta ES_e + \beta_{cs} \bullet \delta ES_s$

Partner P_i can consider the strategic guideline to increase its social satisfaction from the knowledge-based ERP system. Likewise, the core-company can consider the strategic guideline to increase its economic satisfaction from the knowledge-based ERP system.

Case VII (SL-EE: the **S**ocial satisfaction index of the core-company is **L**ess than its partner, but the **E**conomic satisfaction index of the core-company is **E**qual to its partner)

When $s_c < s_{pi}$ and $e_c = e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance s_c and s_{pi}. This operation is presented as:

$$\uparrow s_c = \beta_{cl} \bullet \delta SS_l + \beta_{cc} \bullet \delta SS_c + \beta_{ci} \bullet \delta SS_i + \beta_{ca} \bullet \delta SS_a + \beta_{cpo} \bullet \delta SS_p \quad (4.16)$$

Where β_{cl}, β_{cc}, β_{ci}, β_{ca}, and β_{cpo} are the Social Satisfaction Coefficient of the Core-company for Loyalty, Concern, Mutual interactions, Apocalypse, and

Policies; The core-company can consider the strategic guideline to increase its social satisfaction from the knowledge-based ERP system.

Case VIII (SL-EM: the **S**ocial satisfaction index of the core-company is **L**ess than its partner, but the **E**conomic satisfaction index of the core-company is **M**ore than its partner)

When $s_c < s_{pi}$ and $e_c > e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance the two gaps. This operation is presented as:

$\uparrow s_c = \beta_{cl} \bullet \delta SS_l + \beta_{cc} \bullet \delta SS_c + \beta_{ci} \bullet \delta SS_i + \beta_{ca} \bullet \delta SS_a + \beta_{cpo} \bullet \delta SS_p$

$\uparrow e_{pi} = \beta_{pp} \bullet \delta ES_p + \beta_{pd} \bullet \delta ES_d + \beta_{pq} \bullet \delta ES_q + \beta_{pe} \bullet \delta ES_e + \beta_{ps} \bullet \delta ES_s$

The core-company can consider the strategic guideline to increase its social satisfaction from the knowledge-based ERP system. Likewise, partner P_i can consider the strategic guideline to increase its economic satisfaction from the knowledge-based ERP system.

Case IX (SL-EL: the **S**ocial satisfaction index of the core-company is **L**ess than its partner, but the **E**conomic satisfaction index of the core-company is **L**ess than its partner)

When $s_c < s_{pi}$ and $e_c < e_{pi}$, it is necessary for the knowledge-based ERP model to adjust the satisfaction index. The satisfaction index is targeted balance the two gaps. This operation is presented as:

$\uparrow s_c = \beta_{cl} \bullet \delta SS_l + \beta_{cc} \bullet \delta SS_c + \beta_{ci} \bullet \delta SS_i + \beta_{ca} \bullet \delta SS_a + \beta_{cpo} \bullet \delta SS_p$

$\uparrow e_c = \beta_{cp} \bullet \delta ES_p + \beta_{cd} \bullet \delta ES_d + \beta_{cq} \bullet \delta ES_q + \beta_{ce} \bullet \delta ES_e + \beta_{cs} \bullet \delta ES_s$

The core-company can consider the strategic guideline to increase its social and economic satisfaction from the knowledge-based ERP system.

4.3 Fuzzy Satisfaction Gap Programming Method

The gap index of Social Satisfaction g_s can represent the social satisfaction difference of the core-company and partner. This index can support the analysis for the total satisfaction gap for the fuzzy set.

When $s_c = s_{pi}$ then $g_s = 1$ and F_1^1 and $\mu(g_s) = 0$, otherwise

When $s_c > s_{pi}$,

Then $g_s = s_{pi} / s_c$ and $g_s \in [0, 1]$ and F_1^2 and $\mu(g_s) \in$ [SP, P, LP]

Else $g_s = s_c / s_{pi}$ and $g_s \in [0, 1]$ and F_1^3 and $\mu(g_s) \in$ [SN, N, LN]

Where $\mu(g_s)$ is Adjustable Satisfaction Index (ASI) for Social Aspect

Name	Description
LN	Large negative
N	Negative
SN	Small negative
Z	Zero
SP	Small positive
P	Positive
LP	Large positive

Table 4.5 Fuzzy Set Names and Descriptions of ASI for Social Aspect

When the gap index of Social Satisfaction g_s belongs to F_1^2 , the social satisfaction of the core-company is larger than its partner. In this case, it is preferable to enhance the social satisfaction of the partner according to the feedback control by the final result of the g value. In the case of F_1^3, the social satisfaction of the core-company is looking to enhancing its level.

The gap index of Economic Satisfaction g_e can represent the economic satisfaction difference of the core-company and partner. This index can support the analysis in the total satisfaction gap for the fuzzy set.

When $e_c = e_{pi}$ then $g_e = 1$ and F_2^1 and $\mu(g_e) = 0$, otherwise

When $e_c > e_{pi}$,

Then $g_e = e_{pi} / e_c$ and $g_e \in [0, 1]$ and F_2^2 and $\mu(g_e) \in$ [SP, P, LP]

Else $g_e = e_c / e_{pi}$ and $g_e \in [0, 1]$ and F_2^3 and $\mu(g_e) \in$ [SN, N, LN]

Where $\mu(g_e)$ is Adjustable Satisfaction Index (ASI) for Economic Aspect

Name	Description
LN	Large negative
N	Negative
SN	Small negative
Z	Zero
SP	Small positive
P	Positive
LP	Large positive

Table 4.6 Fuzzy Set Names and Descriptions of ASI for Economic Aspect

When the gap index of Economic Satisfaction g_s belongs to F_1^2, the economic satisfaction of the core-company is larger than its partner. In this case, it is preferable to enhance the economic satisfaction of the partner according to the feedback control by the final result of the g value. In the case of F_1^3, the economic satisfaction of the core-company is looking to enhancing its level.

The Sugeno fuzzy model with nine cases of Satisfaction Gap Adjustment can be expressed as:

$$R^l : If\ g_s\, is F_1^l\, AND\ g_e\, is F_2^l$$
$$Then\ \mu(g) = \min[\mu(g_s), \mu(g_e)]$$
$$l = 1,2,3$$

The defuzzification of the Satisfaction Gap Adjustment (g), by centre of gravity (COG) can be expressed as:

$$COG = \frac{\sum_0^1 \mu(g) g}{\sum_0^1 \mu(g)} \text{ and } g \in [0, 1] \tag{4.17}$$

The result of the g value can help to modify the social satisfaction level and the economic satisfaction level through the feedback control logic. Hence, the satisfaction gap of the core-company and partners will be systematically narrowed by the contribution of g, g_s, and g_e values. The value of g_s and g_e can be affected by the g value and the weight of bi-indexes for social group and economic group.

<table>
<tr><th>$\mu(g_e)$
$\mu(g)$
$\mu(g_s)$</th><th>LN</th><th>N</th><th>SN</th><th>Z</th><th>SP</th><th>P</th><th>LP</th></tr>
<tr><td>LN</td><td colspan="4" rowspan="2">LP</td><td rowspan="2">P</td><td colspan="2" rowspan="2">Z</td></tr>
<tr><td>N</td></tr>
<tr><td>SN</td><td colspan="2" rowspan="2">P</td><td colspan="2">P</td><td>Z</td><td colspan="2">LN</td></tr>
<tr><td>Z</td><td>SP</td><td>Z</td><td>SN</td><td colspan="2">N</td></tr>
<tr><td>SP</td><td colspan="2">SP</td><td>Z</td><td colspan="4">N</td></tr>
<tr><td>P</td><td colspan="2" rowspan="2">Z</td><td rowspan="2">N</td><td colspan="4" rowspan="2">LN</td></tr>
<tr><td>LP</td></tr>
</table>

Table 4.7 Satisfaction Gap Adjustment Index

The partnership development problems are embedded in the core-company and its partners because of ambiguous reasons. It can gain strategic direction from the result of $\mu(g)$. This meaningful value can support g_e and g_s to re-organize the indexes of Economic Satisfaction: Profitability (ES_p), Discounts (ES_d), Quality Enhancement (ES_q), Effectiveness (ES_e), Selling and Marketing (ES_s), and Social Satisfaction: Loyalty (SS_h), Concern (SS_c), Mutual Interactions (SS_i), Apocalypse (SS_a), and Policies (SS_p).

The feedback logic can be based on the impact factors of pivotal fusion indexes that are clustered in seven indexes in the social group and eleven indexes in the economic group to assign the adjustable priority (AP). Moreover, this adjustable priority will be also affected, according to its investment, with enterprise capacity, level of partnership, and adjustable limitation. This AP value can work with the g_s or g_e values to calculate the adjustable level of each PFI (pivotal fusion index). The updated satisfaction gap can be measured under the new PFI with the new cooperative project. It can be proved by the simulated result through fuzzy feedback analysis.

Therefore, this closed-loop satisfaction modification is discriminative in the general discussion of partnership development. It can respond more effectively to the satisfaction gap in the knowledge-based ERP database and fit the problems in partnership development.

Although this concept needs to be developed to go with the extra-knowledgebase in the ERP system, the return of its tangible and intangible benefits can enrich the competitive advantages of both parties for facing globalization. The partners can learn the effective g_s and g_e value to adjust their influence strategies. This kind of knowledge will enhance self-improvement senses oriented to both parties.

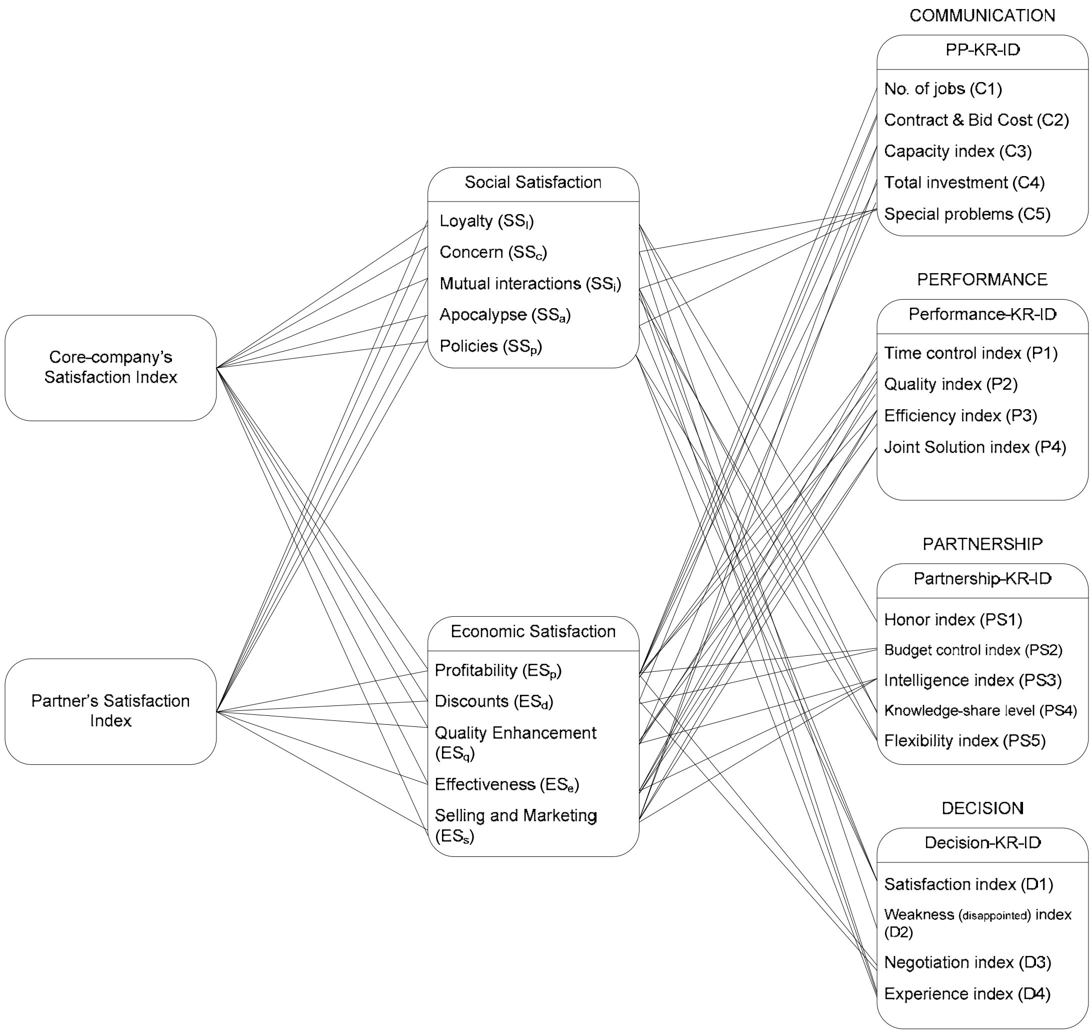


Figure 4.3 Satisfaction Adjustment by Knowledge Based ERP System

CHAPTER 5 INTER-SATISFACTION GAP ANALYSIS

5.1 Introduction

A complete meeting of minds is an ideal form of human communication, and it is expected to have a perfect response in partners' communication in project cooperation. Synchronizing the different perspectives toward satisfaction levels between the core-company and its partners are necessary to minimize their gaps continuously. The analysis arising out of satisfaction surveys can help to reduce the gap in knowledge (Kujala and Ahola, 2005). The significance of satisfaction survey and their implications on economic and social satisfaction have been reported (Geyskens and Steenkamp, 2000; Lai, 2007; Mckee and Wang, 2006; Ramaseshan et al. 2006).

However, contemporary satisfaction improvement strategies often lack support from objective data. Members of the partnership may easily be deceived by their subjective approach to satisfaction improvement strategies, resulting instead in enlarging the satisfaction gap. Normally, the core-companies and their partners concentrate in building up their relationship in terms of cost and profit (Dye, 2004). However, some relationships, such as marriage, cannot be properly developed by money alone. Investigation of the pivotal elements, as given in this research, suggests that satisfaction gap measurement is the key factor that can be used to develop an objective system for partnership development. The development of such an objective system for relationship development is a challenge in engineering management.

Satisfaction is a vague term, while its measurement poses even more uncertainty. Normally, it is measured by fixed period or dynamic communication, interview and questionnaire survey. However, communication and interview capture the tacit knowledge only and are not good enough to support the objective system design. Hence, a questionnaire survey was carried out in five service industries in Macau and their sub-contractors.

This satisfaction gap survey provides an effective method of analyzing the satisfaction gaps among members of the partnership. It is different from other contemporary satisfaction surveys that only consider satisfaction measurement (core-company or its partners).

As for the design of the pilot study of satisfaction questionnaire, firstly an unstructured interview was made by Mr. Chi-Fai Cheung, the manager of procurement and logistics department (PLD) of Macau Power Station (CEM), for gathering the initial information. The contemporary situation of their partnership development was discussed. Although they were using the traditional method of partnership development focused on trust and long-term commitment, they were also interested in the new partnership development method. The fundamental reference information was structured and the background of questionnaire design was built up through this interview. A literature survey confirmed that economic satisfaction variable, social satisfaction variable, and their sub-factors were good predictors of partnership development. A theoretical framework was thus developed based on the interview and the literature survey, and seventeen hypotheses were also developed.

The draft of satisfaction questionnaire was sent to Mr. Scott Ma (General Manager of Business Solutions & Product, Companhia de Telecomuniçães de Macau S.A.R.L [CTM]) and Mr. Miles Choi (Senior Engineer of Customer Services Department, Macau Power Station). Their comments can be reflected in the consideration of the respondent in the field of the management level and technical level. They also gave valuable comments to the section of social satisfaction. They mentioned that normally the section of economic satisfaction was more comprehensible than social satisfaction, because the knowledge of partnership was focused on economic satisfaction. Although the social satisfaction was also discussed in academic studies (Lai, 2007; Rodríguez et al., 2006; Geyskens and Steenkamp, 2000), this concept was not generally introduced to the industries. Therefore, the questions of social satisfaction section were recommended to provide the comprehensible description for each factor and question in the final version of questionnaire. Thus, the respondent can easily understand the contents and provide the correct answers.

Although the targeted respondents were predetermined to general manager and senior staff from the Purchasing, Selling & Marketing, and the Engineering Department, the voice of the general staff cannot be ignored. We know that different staffs had different point of views which were influential in the performance of partnership development. Besides, team work was required for the achievement in partnership development. Thus, this questionnaire survey was expected to capture different voices and opinions from different levels of the staffs and it could identify the problems of partnership development in Macau.

5.2 Satisfaction Biases in Different Roles of Partnership Development

Satisfaction biases are generally investigated with regard to customer satisfaction (Kujala and Ahola, 2005), manufacturer-distributor relationships (Rodríguez et al., 2006), and influence strategies on dealers (Lai, 2007). The biases are considered in the fields of economic satisfaction and social satisfaction (E&S satisfactions), and can contribute to conclusions of their performance after the cooperation.

Geyskens and Steenkamp (2000) recommended that the satisfaction measurement of a partnership should concentrate on E&S satisfactions. The five sub-directions of economic satisfaction are Profitability, Discounts, Quality Enhancement, Effectiveness, and Selling and Marketing. The five sub-directions of Social Satisfaction are Feelings of Hostility, Tactful Criticism, Mutual Interactions, Apocalypse, and Policies. Nevertheless, the E&S satisfactions were also discussed through satisfaction strategies (Lai, 2007; Rodríguez et al., 2006; Wiertz et al., 2004; Bantham, 2003). The social satisfaction is recommended for modifying the feeling of hostility and tactful criticism to loyalty and concern respectively in this research.

The satisfaction difference was also discussed in E&S satisfactions (Lai, 2007). Four influencing strategies (Hard Coercive strategies, Promise strategies, Request strategies, and Perception Altered strategies) were also discussed for E&S satisfactions. When the number of suppliers or partners is increasing and the long-term relationship is diminishing, partnership development needs to consider both the E&S satisfactions simultaneously. Nevertheless, optimal strategies on E&S satisfactions are necessary to lead the studies further.

5.3 Conceptual Model and Hypotheses

The theoretical framework of the satisfaction gap model (shown in figure 5.1) is designed to view satisfaction gap from different angles in order to analyze and find its impact to partnership development. Ten independent satisfaction variables are defined as follows:

- Profitability (ES_p)
- Discounts (ES_d)
- Quality Enhancement (ES_q)
- Effectiveness (ES_e)
- Selling and Marketing (ES_s)
- Loyalty (SS_l)
- Concern (SS_c)
- Mutual Interactions (SS_i)
- Apocalypse (SS_a)
- Policy (SS_p)

Moreover, two mediating variables, E&S satisfactions, are considered when analyzing the dependent variables of satisfaction gaps. Different cultural backgrounds are concerned and may affect the satisfaction gap between the core-company and its sub-contractor. Responsibilities of both parties are shown by the moderating variable between social satisfaction and its independent variable.

Actually, the hypotheses of this research are separated into two sections. Hypotheses 1 to 14 validate the relationship among the satisfaction gap, economic satisfaction, social satisfaction and its sub-factors (refer to figure 5.1). The other section of hypotheses is from 15 to 17 which validate the problems of confusing satisfaction factors. Moreover, the missions of this questionnaire survey shown in figure 5.2 are not only to define the satisfaction gap. The scientific satisfaction improvement strategies are expected to link with the data analysis in accordance with the role characteristics analysis results of the questionnaire survey. Therefore, the results can support four major contributions of partnership development, which are communication, keeping partnership health, working performance and decision making.

Hypotheses 1 to 5 validate the satisfaction gap between economic satisfaction and its sub-factors: profitability, discounts, quality, effectiveness, and selling and marketing. Moreover the results of the analysis revealed that there is contribution to each element of its sub factors in the improvement of the strategic relationship. The satisfaction improvement strategies are thus identified to support the knowledge-based ERP model of partnership development. The hypotheses1 to 5 below are for reference:

H1. The expectation of profitability is the same between partnerships.

H2. The long term relationship between partners will depend on the discount that is offered.

H3. The core company and its partner have no different opinion on the Quality factors of the partnership development.

H4. Effectiveness is important and sensitive for partnership development.

H5. The needs of selling and marketing of the core-company and partner are at the same level.

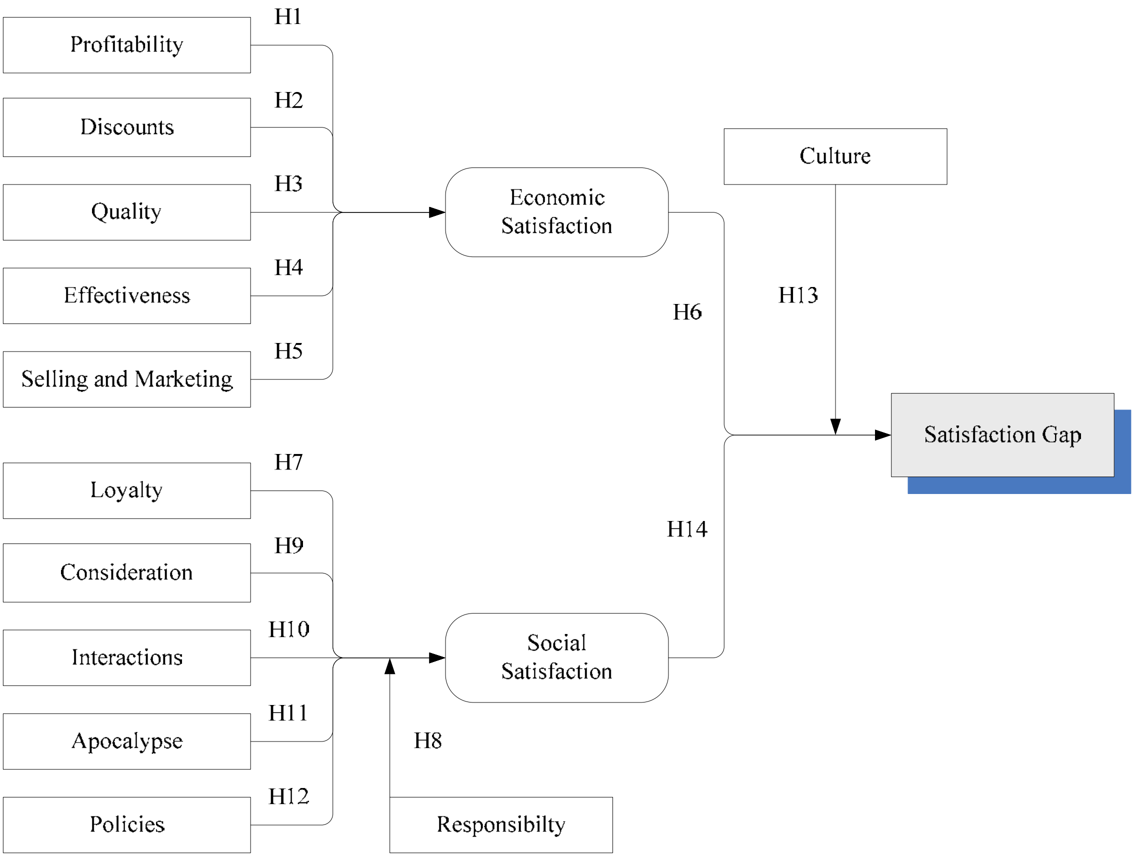


Figure 5.1 Theoretical Framework of Satisfaction Gap Model

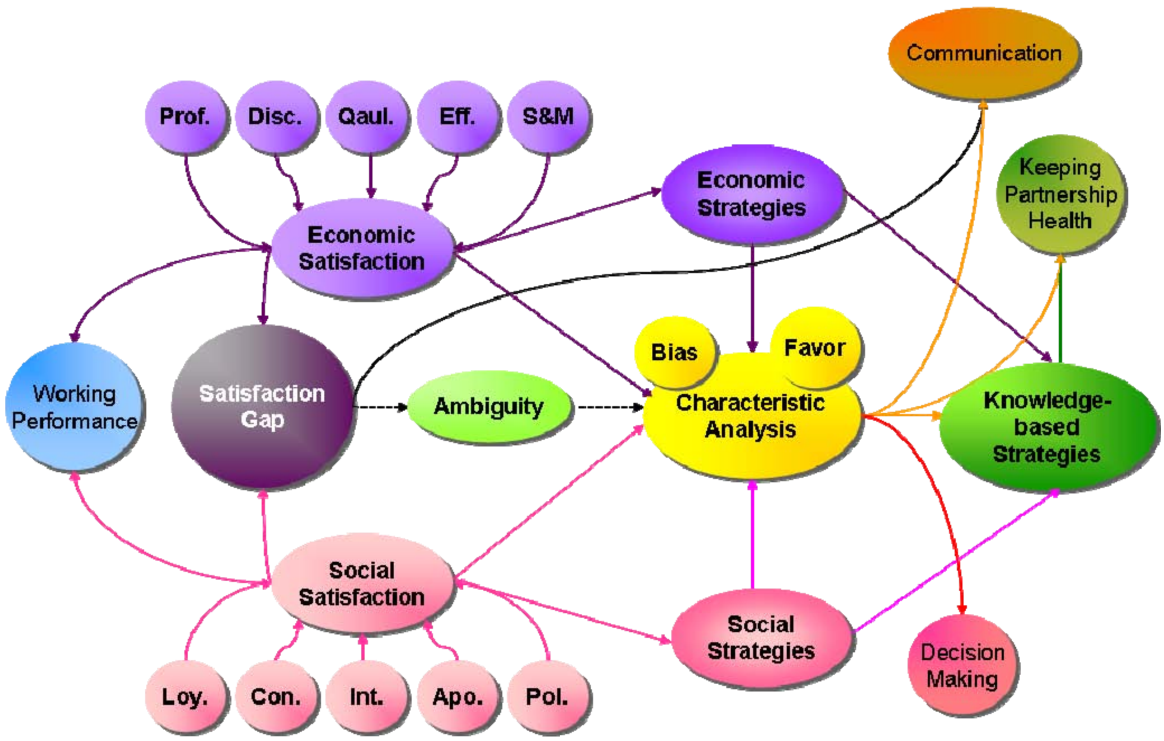


Figure 5.2 Missions of Questionnaire Design

Hypotheses 7, 9, 10, 11 and 12 validate the satisfaction gap between social satisfaction and its sub-factors: loyalty, concern, interaction, apocalypse and policy. The results of the analysis also contribute the strategic relationship of each element of its sub-factors and support to identify the satisfaction improvement strategies for the knowledge-based ERP model of partnership development. Moreover, the responsibility should indirectly affect the social satisfaction in partnership development. Therefore, hypothesis 8 can validate the relationship between responsibility and social satisfaction in partnership development. Hypotheses 7 to 12 are below are for reference:

H7. There is no difference between different partnership roles for the part regarding loyalty.

H8. Responsibility is most important for both parties in the field of loyalty factors.

H9. The partner appreciates the concern strategies more than the core-company.

H10. Communication is important and critical in partnership development, so that the core-company and partner have consistent requests.

H11. The trends of apocalypse are the same between the core-company and partner.

H12. There will be a relationship between satisfaction enhancement and policy.

Hypotheses 6 and 14 can validate the relationships between the partnership roles and their choices of economic and social factors. Therefore, the satisfaction gap can further be validated for its impact factors in partnership development. According to the result of the questionnaire analysis, the choices of economic factors will be changed with regard to different roles. Therefore, the economic strategies for partnership development need to consider the subjective factors of different roles. Nevertheless, the choices of social factors are independent of role difference. Thus, it is quite hard to handle the social satisfaction problems according to the subjective satisfaction approach, because there is often a lack of objective data in the contemporary satisfaction improvement strategies.

Hypotheses 6 and 14 below are for reference:

$H6_O$. The partnership roles and the choices of economic factors will be independent.

$H6_A$. The roles partnership and the choices of economic factors will be dependent.

$H14_O$. The partnership roles and the choices of social factors will be independent.

$H14_A$. The partnership roles and the choices of social factors will be dependent.

Different cultural backgrounds are examined for their effects to satisfaction gaps between the core-company and its sub-contractor because the Chinese and the Western culture cross-over in Macau. Therefore hypothesis 13 is made to investigate this variability. Hypothesis 13 below is for reference:

H13. The effectiveness of the culture factor is not different between different partnership roles.

Actually, this satisfaction gap model has attempted to offer a platform for an in-depth study of the multidimensionality of the difference in satisfaction measurement for partnership development in a special small town environment of Macau with its service industries facing rapid growth and the challenge of globalization.

In normal partnership development, the partners' perspective on their satisfaction level may be distorted by their subjective view of the cooperation. Subjective factors such as conflict and trust were discussed with respect to their influences in satisfaction measurement and relationship development (Geyskens et al. 1999; Leonidou and Kaleka 1998). Nevertheless, social satisfaction can be justified by the direct effect of communication, and the indirect effect through three variables: credibility, benevolence and economic satisfaction (Rodríguez et al. 2006). Moreover, economic satisfaction often is not the only aspect that contributes to partnership development. The influence of subjective views in partnership development is to be clarified in this research. Therefore, hypotheses 15 to 17 are made:

H15. The conventional satisfaction improvement strategies are by subjective methods, the partners are easily confused by their subjective view of satisfaction level.

H16. Having a better opportunity for the collection of a higher level of objective data from the past and present subcontracting work, the core-company has a more accurate view on the level of economic satisfaction.

H17. Consequently the core-company also has a more accurate view of its social satisfaction.

5.4 Survey Method

The questionnaire is designed with 35 questions for satisfaction measurement and 7 questions for personal information (refer to Appendix A1). The satisfaction measurement is divided into the economic satisfaction section and the social satisfaction section. Four questions in the satisfaction measurement are designed to test the priority and confusion level of the economic and social satisfaction factors.

Economic satisfaction measurement covers 5 main factors such as profitability, discount, quality enhancement, effectiveness, and selling and marketing. Each main factor is described by the sub-factors with explanations. The questions are then designed to address these factors in a way such that respondents can understand them easily and give the correct answer quickly using a 5-point Likert scale. Social satisfaction measurement is also organized into 5 main factors such as loyalty, concern, mutual interactions, apocalypse and policies. The sub-factors with explanations are designed to enhance the comprehension level.

The personal information can assist in analyzing the E&S satisfactions gap through their different roles, genders, nationalities, ages, departments, positions and working times. The data was analyzed by descriptive statistical methods, correlation, data reduction, t-test, Chi-Square tests and comparison by means of SPSS.

Main Factor	**Relevant sub-factors**
Profitability (ES_p)	Win-win situation, Profit (Economic), Profit (Social), Contract & Bid Cost, Total investment
Discounts (ES_d)	Discount
Quality Enhancement (ES_q)	Quality
Effectiveness (ES_e)	Cooperation, Specialization, Efficiency, Capacity Time control, Intelligence
Selling and Marketing (ES_s)	Selling ability, Reputation

Table 5.1 The Relevant sub-factors of Main-factor for Economic Satisfaction

Main Factor	Relevant sub-factors
Loyalty (SS_l)	Position in the market, Respect, Responsibility
Concern (SS_c)	Trust, Criticism, Weakness
Mutual interactions (SS_i)	Communication, Right decisions
Apocalypse (SS_a)	Apocalypse, Special problems
Policies (SS_p)	Policy, Experience, Negotiation, Culture, Number of partners, Jobs

Table 5.2 The Relevant sub-factors of Main-factor for Social Satisfaction

5.5 Data Collection

The empirical research addresses the relevant service industries sector. Core-companies and their business partners were requested to answer the questions related to different satisfaction aspects of partnership development for Macau Power Station, Macau Water Supply Company, three Macau Telecommunication Companies and their sub-contractors. Personal surveys were used to aid data collection. The samples were selected through a two-stage sampling procedure: stratification by areas and proportional allocation according to the market share of the core-companies and business partners in the area. Finally, 279 valid questionnaire returns were obtained. Contact with the key respondents was carried out with the relevant companies between April and June in 2007.

5.6 Survey Result

Different view points of the satisfaction gaps are analyzed to find out the impact of partnership development for the core-companies and partners. It is no doubt that the contribution from profit can help partnership development because results of the survey give a mean of 3.9642 out of 5 for the contribution from Economic Profit and a mean of 3.7993 out of 5 for the contribution from Social Profit. However, some respondents still disagree with the contribution from profit in the partnership development. It was found that 10 respondents disagreed with the contribution from economic profit and 62 respondents neither disagreed nor agreed. Moreover, it was found that 47.22% (34 respondents) of the 72 respondents simultaneously ignored the contributions from economic and social profit in partnership development. Therefore, profit alone does not seem to be contributive to partnership development.

In this survey, 34 respondents (79.41%) were found to belong to the core-company, 64.71% were general staff and 64.71% had working experience less than 6 years. Hence, subjective views of staff in such positions and working experience will directly affect their contributions to partnership development of the core-company. Survey results of this kind of respondents show that 70.59% of the staff considered the economic factors to be the most important when compared to the social factors in partnership development. Hence, their analysis in partnership development is fuzzy and an effective tool is required to give an objective guide to the analysis which will be addressed later in the sections of Confusing Factors in Partnership Development, Further CSF Analysis, and Satisfaction Gap of Economic and Social Analysis.

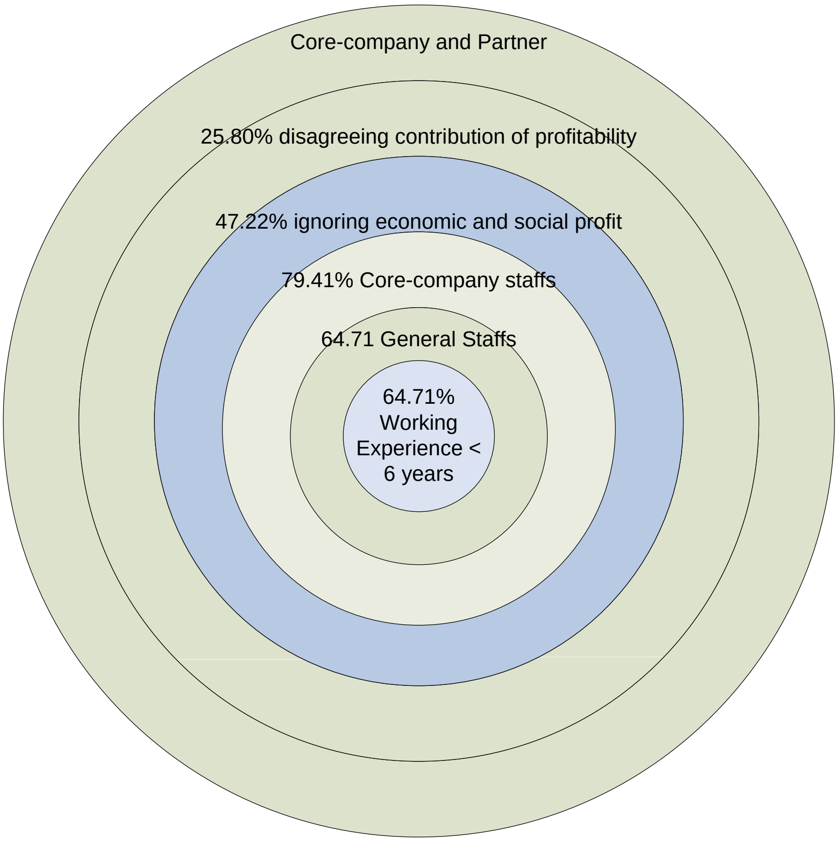


Figure 5.3 Descriptive Chart of Satisfaction Opinions of Core-company and Partner

		Profit (Economic)	Profit (Social)
N	Valid	279	279
	Missing	0	0
Mean		3.9642	3.7993
Median		4.0000	4.0000
Mode		4.0000	4.0000
Std. Deviation		0.7903	0.7699
Variance		0.6250	0.5930
Range		3.0000	3.0000
Minimum		2.0000	2.0000
Maximum		5.0000	5.0000

Table 5.3 Statistical Result of Economic Profit and Social Profit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	10	3.6	3.6	3.6
	Neither disagree nor agree	62	22.2	22.2	25.8
	Agree	135	48.4	48.4	74.2
	Strongly Agree	72	25.8	25.8	100.0
	Total	279	100.0	100.0	

Table 5.4 Statistic Result of Economic Profit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	5.0	5.0	5.0
	Neither disagree nor agree	74	26.5	26.5	31.5
	Agree	145	52.0	52.0	83.5
	Strongly Agree	46	16.5	16.5	100.0
	Total	279	100.0	100.0	

Table 5.5 Statistic Result of Social Profit

5.6.1 Economic Satisfaction Analysis

Measurement of satisfaction difference for economics is considered with profitability, discounts, quality, effectiveness and selling & marketing support.

Hypothesis 1	The expectation of profitability is the same between partnerships.
Factor	Profitability
Question	Q.1,2,3,4,5
Method	T-test

Profitability is analyzed by questions 1 to 5. The hypothesis of profitability is "*The expectation of profitability is the same between partnerships*".

Profitability questions:

1. Win-win situation - If partners can achieve the win-win situation, it would be more effective in improving the partnership development.
2. Profit (Economic) - When you get higher profits, the motive for partnership continuation will be higher.
3. Profit (Social) - Increasing profits in the partnership is the main reason that helps you to gain a feeling of achievement.
4. Contract & Bid Cost - Less Contract & Bid Cost between partners can make higher profits.
5. Total investment - More investment of each partner will make it easier for running their businesses.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
WinWin	Core-company	235	4.2043	.76849	.05013
	Partner	44	3.9318	.78940	.11901
Profit (Economic)	Core-company	235	3.9915	.78442	.05117
	Partner	44	3.8182	.81477	.12283
Profit (Social)	Core-company	235	3.8043	.75954	.04955
	Partner	44	3.7727	.83146	.12535
Contract & Bid Cost	Core-company	235	3.4426	.78982	.05152
	Partner	44	3.8409	.68005	.10252
Total Investment	Core-company	235	3.4766	.77521	.05057
	Partner	44	3.6364	.91730	.13829

Table 5.6 Descriptive Result of Profitability for Core-company and Partner

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Win Win	EVA	2.509	.114	2.149	277	.033	.27244	.12677	.02287	.52200
	EVNA			2.110	59.272	.039	.27244	.12913	.01407	.53081
Profit Economic	EVA	1.227	.269	1.337	277	.182	.17331	.12964	-.08189	.42851
	EVNA			1.302	58.894	.198	.17331	.13306	-.09296	.43958
Profit Social	EVA	.802	.371	.249	277	.804	.03153	.12667	-.21783	.28089
	EVNA			.234	57.230	.816	.03153	.13479	-.23835	.30141
C. & B. Cost	EVA	5.290	.022	-3.134	277	.002	-.39836	.12711	-.64858	-.14813
	EVNA			-3.472	66.681	.001	-.39836	.11474	-.62740	-.16931
Total Invest.	EVA	1.896	.170	-1.217	277	.224	-.15977	.13123	-.41811	.09858
	EVNA			-1.085	55.088	.283	-.15977	.14724	-.45484	.13531

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.7 T-test Result for Profitability

The significance values of Levene's test for the factors of Profit (Economic), Profit (Social) and Total investment are greater than 0.15. Hence, their significance values (2-tailed) assume equal variances. However, the significance values of Levene's test for the factors of Win-Win situation and Contract & Bid Cost are smaller than 0.15, hence, their significance values (2-tailed) do not assume equal variances.

The significant levels of the Win-Win situation and Contract & Bid Cost factors are 0.039 and 0.001 respectively that are smaller than 0.05. The results show that:

- The ***Win-Win situation*** means of the core-company and partner are significantly different. This means the Win-Win situation of the core-company is greater than the mean of the partner, so the ***core-company*** is focused more on the Win-Win situation in its business.
- The ***Contract & Bid Cost*** means of the core-company and partner are significantly different. The mean Contract & Bid Cost of the partner is

greater than the mean of the core-company, which means that the ***partner*** is focused more on the Contract & Bid Cost in its business.

The significant levels of the Profit (Economic), Profit (Social) and Total Investment factors are 0.182, 0.804 and 0.224 respectively, and are greater than 0.05. Hence the means of these factors of the core-company and partner have no significant difference, meanwhile, their concerns are Profit (Economic), Profit (Social) and Total Investment.

Discussion on profitability factor

The main expectations of profitability, including profit (economic), profit (social) and total investment, are the same. When the cooperation meets obstacles that are relevant to profitability in partnership development, the suggestion is to take action regarding these three factors. Otherwise, strategies are necessary for the different expectations of the core-company and partner in the Win-Win situation and Contract & Bid Cost factors.

Hypothesis 2	The long term relationship between partners will depend on the discount that is offered
Factor	Discounts
Question	Q.6
Method	T-test and Factor Analysis

Discount is analyzed by question 6. The hypothesis of discount is "*The long term relationship between partners will depend on the discount that is offered*".

Discount question:

6. Discount - Special discount for some permanent partners.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Discount	Core-company	235	3.8681	.76491	.04990
	Partner	44	3.7500	.83874	.12645

Table 5.8 Descriptive Result of Discount Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Discount	EVA	.808	.369	.925	277	.356	.11809	.12761	-.13311	.36928
	EVNA			.869	57.180	.389	.11809	.13593	-.15410	.39027

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.9 T-test Result of Discount Factor

The significance value of Levene's test for the Discount factor is greater than 0.15, so, its significance value (2-tailed) assumes equal variances. The significance level of the Discount factor is 0.356, and is greater than 0.05. Hence the mean of this factor of the core-company and partner has no significant difference.

Discussion on discounts factor

The Core-company and Partner has the same opinion on discount factor. Nevertheless, this is not enough to prove the discount factor can enhance the long-term relationship development. The further discussion is given in section, 5.6.5 Satisfaction Gap of Economic and Social Analysis.

Hypothesis 3	The core company and its partner have no different opinion on the Quality factors of the partnership development.
Factor	Quality
Question	Q.7
Method	T-test

Quality is analyzed by question 7. The hypothesis of quality is "*The core company and its partner have no different opinion on the Quality factors of the partnership development*".

Quality question:

7. Quality - If the partner's service has a high quality, you will maintain this partnership.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Quality	Core-company	235	4.0723	.72728	.04744
	Partner	44	3.7955	.73388	.11064

Table 5.10 Descriptive Result of Transaction Quality

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Quality	EVA	.673	.413	2.314	277	.021	.27689	.11963	.04138	.51239
	EVNA			2.300	59.895	.025	.27689	.12038	.03608	.51769

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.11 T-test Result of Transaction Quality Factor

The significance value of Levene's test for the Quality factor is greater than 0.15, hence it significance value (2-tailed) assumes equal variances. The significant level of the Quality factor is 0.021, and is smaller than 0.05. The result shows that:

- The ***Quality*** means of the core-company and partner are significant different. The mean Quality of the core-company is greater than the mean of the partner, which means that the ***core-company*** is focused more on Quality in its business.

Discussion in quality factor

Although the core-company and partner appreciate the contribution of the quality factor, the core-company is focused more on Quality in its business.

Hypothesis 4	Effectiveness is important and sensitive for partnership development.
Factor	Effectiveness
Question	Q. 8, 9, 10, 11, 12, 13
Method	T-test

The ***Effectiveness*** factor is analyzed by questions 8 to 13. The hypothesis of effectiveness is "*Effectiveness is important and sensitive for partnership development*".

Effectiveness questions:

8. Cooperation - Partners can cooperatively solve technical or non-technical problems.
9. Specialization - To allow a firm to concentrate its resources on critical activities.
10. Efficiency - Partnership between companies can work better if every task is done efficiently.
11. Capacity - Higher capacity of the partner has higher satisfaction for the core company.
12. Time control - If the partner has better control of time, you will be more satisfied with the partner.
13. Intelligence - More intelligence by each partner, better decisions will be made, and profit will be increased.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Cooperation	Core-company	235	3.7149	.70981	.04630
	Partner	44	3.6136	.92046	.13876
Specialization	Core-company	235	3.6511	.78279	.05106
	Partner	44	3.7727	.83146	.12535
Efficiency	Core-company	235	3.9447	.72289	.04716
	Partner	44	3.8864	.68932	.10392
Capacity	Core-company	235	3.8894	.67660	.04414
	Partner	44	3.9318	.66114	.09967
Time control	Core-company	235	3.9064	.67918	.04430
	Partner	44	4.0455	.60826	.09170
Intelligence	Core-company	235	3.9106	.79830	.05208
	Partner	44	3.8864	.78402	.11820

Table 5.12 Descriptive result of Work Done Effectively

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference Lower	Upper
Cooperation	EVA	9.046	.003	.826	277	.410	.10126	.12261	-.14011	.34262
	EVNA			.692	52.988	.492	.10126	.14629	-.19216	.39467
Specialization	EVA	.000	.988	-.937	277	.350	-.12166	.12986	-.37730	.13397
	EVNA			-.899	58.162	.372	-.12166	.13535	-.39258	.14925
Efficiency	EVA	.130	.719	.495	277	.621	.05832	.11791	-.17379	.29042
	EVNA			.511	62.049	.611	.05832	.11412	-.16980	.28643
Capacity	EVA	.001	.976	-.383	277	.702	-.04246	.11075	-.26048	.17556
	EVNA			-.389	61.086	.698	-.04246	.10901	-.26042	.17551
Time control	EVA	.465	.496	-1.266	277	.207	-.13907	.10984	-.35529	.07715
	EVNA			-1.366	64.771	.177	-.13907	.10184	-.34248	.06433
Intelligence	EVA	.427	.514	.186	277	.853	.02427	.13077	-.23316	.28170
	EVNA			.188	60.892	.852	.02427	.12916	-.23400	.28255

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.13 T-test Result of Effectiveness Factor

The significance values of Levene's test for the factors of Specialization, Efficiency, Capacity, Time control and Intelligence are greater than 0.15, so, their significant values (2-tailed) assume equal variances. Nevertheless, the significance value of Levene's test for the factors of Cooperation is smaller than 0.15, hence its significant value (2-tailed) means equal variances are not assumed.

The significant levels of the Cooperation, Specialization, Efficiency, Capacity, Time control and Intelligence factors are greater than 0.05. Hence the means of these factors of the core-company and partner have no significant difference. Meanwhile, their means are very high.

Discussion on effectiveness factor

The means of all effectiveness factors have no significant difference. Moreover, the value is very high so that Efficiency, Capacity, Time control and Intelligence are close to 4. Hence these factors are quite sensitive to enhance the satisfaction level for the core-company and partner.

Hypothesis 5	The needs of selling and marketing of the core-company and partner are at the same level.
Factor	Selling and Marketing
Question	Q.14, 15
Method	T-test

Selling and Marketing is analyzed by question 14 to 15. The hypothesis of marketing and selling support is "*The needs of selling and marketing of the core-company and partner are at the same level*".

Selling and Marketing questions:

14. Selling ability - If your partner can sell effectively, you will still do business together.
15. Reputation - If one of the partners has a higher reputation, promoting products in the name of that partner will gain better response.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Selling ability	Core-company	235	3.8979	.73830	.04816
	Partner	44	4.0000	.68199	.10281
Reputation	Core-company	235	3.9617	.64270	.04192
	Partner	44	3.7500	.81054	.12219

Table 5.14 Descriptive Result of Selling and Marketing Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Selling ability	EVA	3.197	.075	-.852	277	.395	-.10213	.11989	-.33813	.13388
	EVNA			-.900	63.380	.372	-.10213	.11354	-.32898	.12473
Reputation	EVA	13.212	.000	1.919	277	.056	.21170	.11030	-.00544	.42884
	EVNA			1.639	53.583	.107	.21170	.12919	-.04735	.47075

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.15 T-test Result of Selling and Marketing

The significance values of Levene's test for the factors of Selling Ability and Reputation are smaller than 0.15. Their significant values (2-tailed) are equal and variances are not assumed. The significant levels of the Selling Ability and Reputation factors are greater than 0.05, hence the means of these factors of the core-company and partner have no significant difference.

Discussion on selling and marketing factor

Although the reputation means of the core-company and partner are 3.9617 and 3.7500 respectively, the t-test results prove that they need the same level of selling and marketing.

Hypothesis 6	$H6_O$: The partnership roles and the choices of economic factors will be independent $H6_A$: The partnership roles and the choices of economic factors will be dependent
Factor	Impact factor of economic satisfaction
Question	Q. 33
Method	Chi-Square Test

The impact factor of economic satisfaction for the core-company and partner is analyzed by question 33. The hypothesis of economic factors' choices is "*The partnership roles and the choices of economic factors will be independent*".

Question of impact factors of economic satisfaction:

33. Which of the following is the most important factor which can make you feel more satisfied with your partner? (Choose one)

Economic Factor	**Core-company**	**Partner**	**Total**
Profitability	100	16	116
Discounts	6	6	12
Quality	65	10	75
Effectiveness	43	6	49
Selling and Marketing	21	6	27
Total:	235	44	279

Table 5.16 Impact Factor of Economic Satisfaction for Core-company and Partner

Factor * Role Crosstabulation

			Role		Total
			Core-company	Partner	
Factor	Profitability	Count	100	16	116
		Expected Count	97.7	18.3	116.0
	Discounts	Count	6	6	12
		Expected Count	10.1	1.9	12.0
	Quality	Count	65	10	75
		Expected Count	63.2	11.8	75.0
	Effectiveness	Count	43	6	49
		Expected Count	41.3	7.7	49.0
	Selling and Marketing	Count	21	6	27
		Expected Count	22.7	4.3	27.0
Total		Count	235	44	279
		Expected Count	235.0	44.0	279.0

Table 5.17 Result of Economic Factor and Role Crosstabulation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.566(a)	4	.014
Likelihood Ratio	9.551	4	.049
Linear-by-Linear Association	.067	1	.796
N of Valid Cases	279		

a 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.89.

Table 5.18 Impact Factor of Economic Satisfaction for Core-company and Partner

Profitability factor belongs to top priority of economic satisfaction with regard to different roles simultaneously. Nevertheless, the discount factor is not paid attention to by both parties. The significance level of economic factor choices is 0.014 for the Chi-Square tests. This is smaller than 0.05, and is significant. In other words, the roles of the partnership and the choices of economic factors are related. Hence the null hypothesis is rejected.

Discussion on economic factors' choices

The choices of economic factors will be changed with regard to different roles. Therefore, the design of economic strategies for partnership development needs to consider different expectations in economic factors for different roles.

5.6.2 Social Satisfaction Analysis

Measurement of social satisfaction difference is considered with loyalty, concern, mutual interaction, apocalypse and policy.

Hypothesis 7	There is no difference between different partnership roles for the part regarding loyalty.
Hypothesis 8	Responsibility is most important for both parties in the field of loyalty factors.
Factor	Loyalty
Question	Q.16,17, 18
Method	T-test

Loyalty factor is analyzed by question 16 to 18. The hypotheses of loyalty are "*There is no difference between different partnership roles for the part regarding loyalty*" and "*Responsibility is most important for both parties in the field of loyalty factors*".

Loyalty questions:

16. Position in the market - The market position of each partner can be ensured through the high cooperative relationship between the partners.
17. Respect - Any decisions (which are) made should be thoroughly discussed between the business partners in order to show respect and trust.
18. Responsibility - If your partner has more responsibility, you will be more satisfied with the partner.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Position in market	Core-company	235	3.6596	.73020	.04763
	Partner	44	3.7955	.70148	.10575
Respect	Core-company	235	3.7574	.76565	.04995
	Partner	44	3.7045	.87815	.13239
Responsibility	Core-company	235	4.0255	.72750	.04746
	Partner	44	3.9318	.87332	.13166

Table 5.19 Descriptive Result of Loyalty Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Position in market	EVA	1.484	.224	-1.140	277	.255	-.13588	.11922	-.37058	.09882
	EVNA			-1.172	61.750	.246	-.13588	.11598	-.36775	.09599
Respect	EVA	2.284	.132	.411	277	.682	.05290	.12881	-.20067	.30647
	EVNA			.374	55.904	.710	.05290	.14149	-.23056	.33636
Responsibility	EVA	1.843	.176	.759	277	.449	.09371	.12353	-.14945	.33688
	EVNA			.670	54.730	.506	.09371	.13995	-.18678	.37421

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.20 T-test Result of Loyalty Factor

The significance value of Levene's test for the factor of Respect is smaller than 0.15. Its significance value (2-tailed) does not assume equal variances. However, the significance values of Levene's test for the factors of Position in the market and Responsibility are greater than 0.15.The significant levels of the Position in the market, Respect and Responsibility factors are greater than 0.05, hence the means of these factors of the core-company and partner have no significant difference.

Discussion on loyalty factor

The expectation of loyalty is the same between partnerships with regard to the null hypothesis 7 being significant. Moreover, the responsibility mean is a top priority to be considered between both parties. Therefore, it is most important for both parties in the field of loyalty factors.

Hypothesis 9	The partner appreciates the concern strategies more than the core-company
Factor	Concern
Question	Q. 19, 20, 21
Method	T-test

Concern factor is analyzed by question 19 to 21. The hypothesis of concern is "*The partner appreciates the concern strategies more than the core-company*".

Concern questions:

19. Trust - If sensitive information and technology can be safely shared between both partners, a stable relationship can be developed.
20. Criticism - After you make constructive criticisms about your partner, they will do better next time.
21. Weakness - Weaknesses of partners can be solved through effective communication between organizations.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Trust	Core-company	235	3.5830	.74859	.04883
	Partner	44	3.7727	.67733	.10211
Criticism	Core-company	235	3.5404	.72903	.04756
	Partner	44	3.8864	.68932	.10392
Weakness	Core-company	235	3.4553	.72878	.04754
	Partner	44	4.0000	.64700	.09754

Table 5.21 Descriptive Result of Concern Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Trust	EVA	4.834	.029	-1.565	277	.119	-.18975	.12122	-.42839	.04889
	EVNA			-1.676	64.300	.099	-.18975	.11319	-.41585	.03635
Criticism	EVA	3.568	.060	-2.913	277	.004	-.34594	.11876	-.57973	-.11214
	EVNA			-3.027	62.394	.004	-.34594	.11428	-.57436	-.11752
Weakness	EVA	18.387	.000	-4.627	277	.000	-.54468	.11773	-.77643	-.31293
	EVNA			-5.020	65.181	.000	-.54468	.10851	-.76137	-.32799

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.22 T-test Result of Concern Factor

The significant values of Levene's test for the factors of Trust, Criticism, and Weakness are smaller than 0.15, hence, their significant values (2-tailed) do not assume equal variances.

The significant levels of the Criticism and Weakness factors are 0.004 and 0.000 respectively and are smaller than 0.05. The results show that:

- The ***Criticism*** means of the core-company and partner are significantly different. The mean Criticism of the core-company is smaller than the mean of the partner, which means that the ***partner*** is focused more on Criticism in its business.
- The ***Weakness*** means of the core-company and partner are significantly different. The mean Weakness of the partner is greater than the mean of

the core-company, which means that the ***partner*** is focused more on addressing the problems of weakness in its business.

The significant levels of the Trust is 0.099 and are greater than 0.05. Hence the means of this factor of the core-company and partner has no significant difference.

Discussion on concern factor

The means of criticism and weakness of the partner are greater than the core-company. Nevertheless, the trust means of the core-company and partner are the same. Therefore, it has been substantiated that the partner appreciates the concern strategies more than the core-company.

Hypothesis 10	Communication is important and critical in partnership development, so that the core-company and partner have consistent requests.
Factor	Mutual Interaction
Question	Q. 22, 23
Method	T-test

Mutual interaction factor is analyzed by question 22 and 23. The hypothesis of mutual interaction is "*Communication is important and critical in partnership development, so that the core-company and partner have consistent requests*".

Mutual interaction questions:

22. Communication - You will be satisfied if you know what your partners are doing, through sufficient communication.
23. Right decisions - If partners can solve problems with joint solutions, the tendency of making the right decisions will be higher.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Communication	Core-company	235	3.8511	.71548	.04667
	Partner	44	3.8864	.86846	.13093
Right Decisions	Core-company	235	3.8128	.66590	.04344
	Partner	44	3.8182	.75553	.11390

Table 5.23 Descriptive Result of Mutual Interaction Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference: Lower	Upper
Communication	EVA	2.725	.100	-.290	277	.772	-.03530	.12177	-.27501	.20441
	EVNA			-.254	54.462	.800	-.03530	.13900	-.31392	.24332
Right Decisions	EVA	1.817	.179	-.048	277	.961	-.00542	.11180	-.22549	.21466
	EVNA			-.044	56.200	.965	-.00542	.12190	-.24960	.23876

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.24 T-test Result of Mutual Interaction Factor

The significance value of Levene's test for the factor of Communication is smaller than 0.15, hence, its significant value (2-tailed) for equal variances is not assumed. However, the significance value of Levene's test for the factor of Right decisions is greater than 0.15, hence, its significant value (2-tailed) assumes equal variances.

The significance levels of the Communication and Right Decisions factors are 0.800 and 0.961 respectively and are greater than 0.05. Thus, the core-company and partner have consistent requests.

Discussion on mutual interaction factor

Bantham (1998) suggested the critical success factors for a partnership as:

- Increasingly electronic communication environment (ie. Characterized by heavy reliance on e-mail, fax and shared databases)
- Face-to-face communication

Therefore, communication is the most important for both the Core-company and the Partner. The communication and right decisions means are around 3.8. Moreover, different roles of the partnership have a consistent expectation in these two factors. Hence, mutual interaction strategies are important in improving partnership development.

Hypothesis 11	The trends of apocalypse are the same between the core-company and partner.
Factor	Apocalypse
Question	Q.24, 25
Method	T-test

The ***Apocalypse*** factor is normally ignored in partnership development. In this analysis the target is to find out its characteristics in partnership development. Apocalypse is analyzed by question 24 and 25. The hypothesis of apocalypse is "*The trends of apocalypse are the same between the core-company and partner*".

Apocalypse questions:

24. Apocalypse - If partners can stimulate apocalypse in your policies, this would strengthen cooperation in the partnership.
25. Special problems - If the business partners can effectively solve any unexpected problems, the satisfaction between them will be better.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Apocalypse	Core-company	235	3.7277	.71184	.04644
	Partner	44	3.9545	.64536	.09729
Special Problems	Core-company	235	3.8723	.65428	.04268
	Partner	44	3.9091	.70935	.10694

Table 5.25 Descriptive Result of Apocalypse Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Apocalypse	EVA	4.852	.028	-1.968	277	.050	-.22689	.11530	-.45386	.00009
	EVNA			-2.105	64.209	.039	-.22689	.10780	-.44224	-.01153
Special Problems	EVA	.137	.712	-.337	277	.736	-.03675	.10893	-.25118	.17768
	EVNA			-.319	57.522	.751	-.03675	.11514	-.26727	.19377

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.26 T-test Result of Apocalypse Factor

The significance value of Levene's test for the factor of Apocalypse is smaller than 0.15, hence, its significance value (2-tailed) for equal variances is not assumed. However, the significance values of Levene's test for the factor of Special Problems is greater than 0.15, hence, its significant value (2-tailed) for equal variances is assumed.

The significance level of the Special Problems is greater than 0.05, thus, the core-company and partner have consistent needs regarding this factor. Nevertheless, the significance level of the Apocalypse is smaller than 0.05, so, they have different opinions for apocalypse.

The ***apocalypse*** mean of the partner is 3.9545, but it is 3.7277 for the core-company. Therefore, the expectation of the ***partner*** is higher than the core-company with regard to this factor.

Discussion on apocalypse factor

The opinions for special problems are similar for both parties. However, there are different expectations of apocalypse from the core-company and partner. Moreover, the needs of apocalypse are higher for the partner.

Hypothesis 12	There will be a relationship between satisfaction enhancement and policy.
Hypothesis 13	The effectiveness of the culture factor is not different between different partnership roles.
Factor	Policy
Question	Q. 26, 27, 28, 29, 20, 31
Method	T-test and Factor Analysis

The Policy factor is analyzed by question No.26 to 31. The hypothesis of policy is “*There will be a relationship between satisfaction enhancement and policy*” and “*The effectiveness of the culture factor is not different between different partnership roles*”.

Policy questions:

26. Policy - Better operational management within a firm can make the partnership last longer.
27. Experience - You will be more satisfied if the partner has more experience.
28. Negotiation - Higher negotiation skill of the partner means higher satisfaction for you.
29. Culture - You will be more satisfied to do business with a partner of the same cultural background.
30. No. of partners - Sharing of work with more partners, you will be more satisfied.
31. Jobs - More jobs in each company will give more fulfillment.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Policy	Core-company	235	3.8596	.71721	.04679
	Partner	44	3.8409	.86113	.12982
Experience	Core-company	235	3.8894	.62403	.04071
	Partner	44	3.6818	.77077	.11620
Negotiation	Core-company	235	3.6298	.71847	.04687
	Partner	44	3.7955	.59375	.08951
Culture	Core-company	235	3.4936	.79727	.05201
	Partner	44	3.7273	.65994	.09949
No. of partners	Core-company	235	3.2340	.82205	.05362
	Partner	44	3.3636	.83780	.12630
Jobs	Core-company	235	3.5319	.72945	.04758
	Partner	44	3.5455	.87483	.13189

Table 5.27 Descriptive Result of Policy Factor

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Policy	EVA	2.031	.155	.153	277	.878	.01867	.12178	-.22107	.25840
	EVNA			.135	54.725	.893	.01867	.13799	-.25791	.29524
Experience	EVA	7.347	.007	1.947	277	.053	.20754	.10661	-.00232	.41740
	EVNA			1.686	54.053	.098	.20754	.12312	-.03929	.45438
Negotiation	EVA	6.154	.014	-1.440	277	.151	-.16567	.11508	-.39221	.06087
	EVNA			-1.640	68.858	.106	-.16567	.10104	-.36724	.03591
Culture	EVA	3.784	.053	-1.829	277	.068	-.23366	.12772	-.48509	.01777
	EVNA			-2.081	68.769	.041	-.23366	.11226	-.45763	-.00968
No. of partners	EVA	.178	.674	-.957	277	.339	-.12959	.13544	-.39621	.13702
	EVNA			-.944	59.544	.349	-.12959	.13721	-.40411	.14492
Jobs	EVA	3.049	.082	-.109	277	.913	-.01354	.12383	-.25731	.23023
	EVNA			-.097	54.753	.923	-.01354	.14021	-.29455	.26747

EVA - Equal variances assumed; EVNA - Equal variances not assumed

Table 5.28 T-test Result of Policy Factor

The significance values of Levene's test for the factors of Experience, Negotiation, Culture and Jobs are smaller than 0.15, hence, their significant values (2-tailed) for equal variances are not assumed. However, the significance values of Levene's test for the factors of Policy and Number of Partners are greater than 0.15, hence, their significant values (2-tailed) assume equal variances.

Although the policy strategies consider six different factors for support, the significance level of the ***Culture*** is a unique factor that is smaller than 0.05. Hence, the different roles of the partnership have different opinions on this factor. The culture mean of the ***partner*** 3.7273 is higher than the culture mean of the core-company 3.4936. Therefore, the culture factor is most important for the partner in social satisfaction.

The significance levels of another five factors that including Policy, Experience, Negotiation, Number of Partners and Jobs are greater than 0.05. Thus, their means are same for the core-company and the partners. Meanwhile, the policy and experience means are quite high in the satisfaction measurement. These two factors effectively support the policy strategies for partnership development.

Discussion on policy factor

The hypothesis 13 has not been substantiated. Hence, the opinions of culture factor are different between the core-company and partner. When the cooperation is affected by the culture background, the satisfaction improvement strategies for the partner concern the culture factor more. Moreover, the policy and experience factors effectively support the policy strategies for partnership development. The further relationship discussion of policy and satisfaction enhancement is investigated in section 5.6.3 Confusing Factors in Partnership Development and section 5.6.5 Satisfaction Gap of Economic and Social Analysis through factor analysis.

Hypothesis 14	$H14_O$: The partnership roles and the choices of social factors will be independent $H14_A$: The partnership roles and the choices of social factors will be dependent
Factor	Impact factor of social satisfaction
Question	Q. 34
Method	Chi-Square Test

The impact factor of social satisfaction for core-company and partner is analyzed by question 34. The hypothesis of social factors' choices is "*The partnership roles and the choices of social factors will be independent*".

Question of impact factors of social satisfaction:

34. Which of the following is the most important factor which can make you feel more satisfied with your partner? (Choose one)

Social Factor	Core-company	Partner	Total
Loyalty	39	11	50
Concern	98	19	117
Interaction	43	8	51
Apocalypse	5	1	6
Policy	50	5	55
Total:	235	44	279

Table 5.29 Impact Factor of Social Satisfaction for Core-company and Partner

Factor * Role Crosstabulation

			Role		Total
			Core-company	Partner	
Factor	Loyalty	Count	39	11	50
		Expected Count	42.1	7.9	50.0
	Concern	Count	98	19	117
		Expected Count	98.5	18.5	117.0
	Interaction	Count	43	8	51
		Expected Count	43.0	8.0	51.0
	Apocalypse	Count	5	1	6
		Expected Count	5.1	.9	6.0
	Policy	Count	50	5	55
		Expected Count	46.3	8.7	55.0
Total		Count	235	44	279
		Expected Count	235.0	44.0	279.0

Table 5.30 Result of Social Factor and Role Crosstabulation

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.331(a)	4	.504
Likelihood Ratio	3.476	4	.481
Linear-by-Linear Association	2.933	1	.087
N of Valid Cases	279		

a 1 cells (10.0%) have expected count less than 5. The minimum expected count is .95.

Table 5.31 Impact Factor of Social Satisfaction for Core-company and Partner

The Concern factor belongs to the top priority of social satisfaction with regard to different roles simultaneously. Nevertheless, the apocalypse factor is also not paid attention to by both parties. Thus, the apocalypse factor is shown to be normally ignored in partnership development. The significance level of the social factors' choices is 0.504 for the Chi-Square tests. This is greater than 0.05, and is insignificant. In other words, the roles of partnership and the choices of social factors are not related. Hence the null hypothesis is accepted.

Discussion on social factors' choices

The choices of social factors are independent regarding different roles. Thus, it is quite hard to handle the social satisfaction problems according the subjective satisfaction approach, because contemporary satisfaction improvement strategies often have a lack of objective data.

5.6.3 Confusing Factors in Partnership Development

According to the mean, the profit factor is the most important between the Core-company and its Partner. The mean profit of the Partners is higher than that of the Core-company, which means that the Partners emphasize more on profit in their business.

The means for apocalypse of the Core-company and Partners are 2.6553 and 2.4545 respectively. According to the mean for importance, apocalypse is the least important factor between the Core-company and the Partner. The apocalypse mean of the Partners is smaller than that of the Core-company, which means that Partners generally ignore apocalypse in their business.

Group Statistics

	Role	N	Mean	Std. Deviation	Std. Error Mean
Profit	Core-company	235	7.8511	2.43706	0.15898
	Partner	44	8.1591	2.20932	0.33307
Discounts	Core-company	235	3.5191	2.35944	0.15391
	Partner	44	3.5000	2.86519	0.43194
Quality	Core-company	235	7.2255	2.25040	0.14680
	Partner	44	7.2955	2.47386	0.37295
Effectiveness	Core-company	235	6.4894	2.18847	0.14276
	Partner	44	6.7273	2.07268	0.31247
Selling & Marketing	Core-company	235	5.7191	2.37999	0.15525
	Partner	44	6.7727	2.02155	0.30476
Loyalty	Core-company	235	5.0043	2.52085	0.16444
	Partner	44	4.6364	2.69445	0.40620
Concern	Core-company	235	6.1957	2.91987	0.19047
	Partner	44	5.3182	2.54972	0.38438
Interactions	Core-company	235	4.6723	2.50450	0.16338
	Partner	44	4.5909	2.65293	0.39994
Apocalypse	Core-company	235	2.6553	2.10116	0.13706
	Partner	44	2.4545	1.60601	0.24212
Policies	Core-company	235	5.6553	2.65951	0.17349
	Partner	44	5.5682	2.02769	0.30569

Table 5.32 Statistic Result of Comparison of 10 Factors for Both Parties

		Profit	Discounts	Quality	Effective	Sell & Market	Loyalty	Concern	Interaction	Apocalypse	Policies
N	Valid	279	279	279	279	279	279	279	279	279	279
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		7.8996	3.5161	7.2366	6.5269	5.8853	4.9462	6.0573	4.6595	2.6237	5.6416
Median		9.0000	3.0000	8.0000	7.0000	6.0000	5.0000	6.0000	4.0000	2.0000	5.0000
Mode		10.00	1.00	9.00	7.00	5.00	4.00	10.00	3.00	1.00	4.00
S. D.		2.40143	2.44042	2.28255	2.16873	2.35541	2.54753	2.87828	2.52374	2.02989	2.56720
Minimum		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum		10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Table 5.33 Statistic Result of 10 Factors of All Core-company and Partner

Role / Priority	**Core-company**	**Partner**	**Total**
1	Profit	Profit	Profit
2	Quality	Quality	Quality
3	Effectiveness	Selling and Marketing	Effectiveness
4	Concern	Effectiveness	Concern
5	Selling and Marketing	Policy	Selling and Marketing
6	Policy	Concern	Policy
7	Loyalty	Loyalty	Loyalty
8	Interaction	Interaction	Interaction
9	Discount	Discount	Discount
10	Apocalypse	Apocalypse	Apocalypse

Table 5.34 Impact Factors of Partnership Development by Different Roles

The priorities of the ten factors (refer to Table 5.34) can be useful indicators to guide the core-company and its partners to enhance the satisfaction through self-improvement. On the other hand, the core-company and sub-contractors can view the issues through the perspective of the other side in order to adjust their strategy to enhance the respective satisfaction level. It is interesting to note that priorities 3 to 6 are different amongst the core-company and its business partners. Hence the satisfaction gap may be widened due to these four factors. Thus, these four factors are grouped together and called Confusing Satisfaction Factors (CSF).

Further analysis was thus carried out on these four factors and their sub-factors. A contribution of this research is the comprehensive usage of the correlation analysis and factor analysis results. This comprehensive analysis result can determine the satisfaction improvement strategies for CSF.

The components of satisfaction improvement strategies include characteristic groups and affecting factors. The characteristic groups are outcomes of the factor analysis where the relevant sub-factors are grouped together with their respective coefficients representing their specific weight within the same group. Affecting factors are the analysis results of inter-relationship with each characteristic group and each sub-factor. It can interpret the chain-reaction with other sub-factors from different groups.

The satisfaction level of the core-company and partner will be effectively enhanced when the characteristic group has a good affecting factor. For some less important sub-factors improvement action may not be recommended. These are valuable data for isolating the important factors to support the development of an objective system with relationship design for the knowledge-based enterprise resource planning (ERP) model.

	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation	Trust	Criticism	Weakness	Policy	Experience	Negotiation	Culture	No. of partners	Jobs
Cooperation	1.000																
Specialization	**0.474**	1.000															
Efficiency	**0.419**	**0.381**	1.000														
Capacity	0.308	0.274	**0.503**	1.000													
Time control	0.343	0.187	**0.407**	**0.489**	1.000												
Intelligence	0.309	0.347	**0.399**	0.330	**0.418**	1.000											
Selling ability	0.336	0.249	**0.398**	**0.362**	**0.390**	**0.398**	1.000										
Reputation	0.304	0.271	0.336	0.305	**0.354**	0.268	**0.523**	1.000									
Trust	**0.354**	0.290	0.313	0.187	0.268	0.080	0.294	0.313	1.000								
Criticism	0.258	0.205	0.292	0.191	0.232	0.230	0.294	0.190	**0.368**	1.000							
Weakness	0.202	0.115	0.170	0.198	0.181	0.202	0.127	0.065	0.248	0.315	1.000						
Policy	**0.400**	0.202	0.348	0.276	**0.403**	0.329	**0.384**	0.276	**0.368**	0.334	**0.360**	1.000					
Experience	0.199	0.166	0.346	0.325	**0.409**	0.220	0.328	0.245	0.276	0.254	0.243	**0.528**	1.000				
Negotiation	0.303	0.187	0.298	0.267	0.288	0.195	0.315	0.312	0.339	0.326	0.340	**0.446**	**0.385**	1.000			
Culture	0.114	0.113	0.122	0.181	0.204	0.204	0.188	0.196	0.232	0.208	0.148	0.241	0.299	0.313	1.000		
No. of partners	0.115	0.134	0.108	0.047	0.108	0.169	0.033	0.041	0.187	0.152	0.335	0.150	0.059	0.220	0.325	1.000	
Jobs	0.261	0.274	0.242	0.163	0.179	0.280	0.157	0.217	0.251	0.261	0.250	0.241	0.177	0.296	**0.377**	**0.355**	1.000

Table 5.35 Correlation of Effectiveness, Selling and Marketing, Concern, and Policy for Core-company

In table 5.35, "weakness", "culture", and "number of partners" are found to have little correlation with other factors in the role of the core-company. When the core-company adjusts the concern and policy factors to reduce the satisfaction gap, it is recommended to consider contributions from the sub-factors such as trust, criticism, policy, experience, negotiation and jobs.

The factor analysis result, as shown in Table 5.36, the CSF of core-companies can be formed into five characteristic groups:

- Group 1: Time control, Intelligence, Capacity, and Efficiency
- Group 2: Policy, Experience, Negotiation, Trust, Weakness, and Criticism
- Group 3: Number of partners, Jobs, and Culture
- Group 4: Specialization, and Cooperation
- Group 5: Reputation, and Selling Ability

In this respect Group 2 in table 5.35 and 5.36 represent core-companies which are more effective to remove their unclear concept of E&S satisfaction gap than the other groups.

Rotated Factor Matrix(a)

	Factor				
	1	2	3	4	5
Time control	**0.592**	0.290	0.071	0.084	0.182
Intelligence	**0.582**	0.042	0.244	0.228	0.052
Capacity	**0.579**	0.188	0.038	0.170	0.129
Efficiency	**0.513**	0.232	0.052	0.383	0.142
Policy	0.321	**0.637**	0.115	0.127	0.107
Experience	0.370	**0.535**	0.077	-0.064	0.171
Negotiation	0.167	**0.511**	0.269	0.113	0.205
Trust	-0.020	**0.469**	0.159	0.352	0.281
Weakness	0.115	**0.463**	0.308	0.121	-0.186
Criticism	0.124	**0.405**	0.200	0.225	0.104
No. of partners	0.010	0.139	**0.597**	0.097	-0.103
Jobs	0.121	0.139	**0.572**	0.231	0.103
Culture	0.133	0.200	**0.540**	-0.088	0.238
Specialization	0.239	0.042	0.151	**0.599**	0.108
Cooperation	0.269	0.261	0.068	**0.577**	0.119
Reputation	0.285	0.139	0.077	0.214	**0.601**
Selling ability	0.424	0.242	0.023	0.188	**0.466**

Table 5.36 Factor Analysis of Effectiveness, Selling and Marketing, Concern, and Policy for Core-company

According to Table 5.37, “selling ability” is found to have no relationship with “cooperation”, “specialization”, and “efficiency” in the role of partners. Moreover, there are strong relationships in Specialization 0.824, Efficiency 0.658, and Cooperation 0.592, for the same group, by factor analysis (refer Table 5.38). The partners can ignore the contribution in “selling ability” depending on whether their characteristics belong to the “co-operation”, “specialization”, “efficiency” and “weakness” groups.

	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation	Trust	Criticism	Weakness	Policy	Experience	Negotiation	Culture	No. of partners	Jobs
Cooperation	1.000																
Specialization	**0.551**	1.000															
Efficiency	**0.479**	**0.644**	1.000														
Capacity	**0.376**	0.267	0.340	1.000													
Time control	0.074	0.297	0.290	0.239	1.000												
Intelligence	**0.582**	0.316	0.234	0.433	0.206	1.000											
Selling ability	**0.000**	**0.000**	**0.000**	0.103	0.336	0.217	1.000										
Reputation	0.304	0.121	0.156	**0.532**	**0.354**	**0.430**	**0.505**	1.000									
Trust	**0.527**	**0.402**	**0.491**	**0.432**	0.251	**0.520**	-0.201	0.275	1.000								
Criticism	**0.369**	**0.522**	0.315	**0.391**	0.290	**0.406**	0.049	**0.364**	**0.591**	1.000							
Weakness	**0.351**	**0.432**	0.209	0.109	0.295	0.229	0.211	0.310	0.159	0.209	1.000						
Policy	0.331	0.306	**0.400**	0.226	0.192	**0.352**	**0.515**	**0.375**	0.216	0.243	0.167	1.000					
Experience	0.282	0.247	**0.368**	0.048	-0.117	0.324	0.177	0.130	**0.348**	0.149	-0.093	**0.483**	1.000				
Negotiation	0.150	-0.049	-0.001	0.023	-0.038	0.099	-0.057	-0.060	0.344	0.226	-0.303	0.253	**0.413**	1.000			
Culture	-0.024	-0.031	0.084	0.063	0.205	0.118	0.155	0.000	-0.194	-0.172	-0.054	0.331	0.054	0.151	1.000		
No. of partners	0.066	0.255	**0.395**	0.130	0.286	-0.006	0.000	-0.068	0.108	0.154	0.086	0.275	0.255	0.200	0.310	1.000	
Jobs	0.152	0.110	**0.375**	0.186	0.127	0.330	-0.078	0.131	**0.410**	**0.375**	-0.123	0.210	**0.401**	**0.444**	0.264	0.262	1.000

Table 5.37 Correlation of Effectiveness, Selling and Marketing, Concern, and Policy for Partner

The factor analysis result, using Principal Axis Factoring and Varimax rotation method of Kaiser Normalization, as shown in Table 5.38, for the CSF of partners, can be formed into five characteristic groups:

- Group 1: Trust, Reputation, Criticism, Capacity, and Intelligence
- Group 2: Specialization, Efficiency, Cooperation, and Weakness.
- Group 3: Negotiation, Experience, and Jobs
- Group 4: Selling ability, and Policy
- Group 5: Number of partners, Time control, and Culture

According to the result of Tables 5.37 and 5.38, when the partners belong to group 2, their "selling ability" and "policy" will have no contribution in narrowing the satisfaction gap. However, it is found that 14 factors converged after several iterations. These factors can help to form the second group class and present the deviation of factor relationship. The second group class can contribute in narrowing the satisfaction gap in the case of non-efficiency by the first group class. Nevertheless, the number of these factors is14 that means the deviation of factor relationship is wider.

Rotated Factor Matrix(a)

	Factor				
	1	2	3	4	5
Trust	**0.719**	0.369	0.332	-0.209	-0.050
Reputation	**0.636**	-0.006	-0.118	0.551	-0.033
Criticism	**0.629**	0.293	0.111	-0.038	0.071
Capacity	**0.583**	0.150	0.003	0.128	0.079
Intelligence	**0.562**	0.263	0.197	0.280	-0.085
Specialization	0.261	**0.824**	-0.094	-0.020	0.149
Efficiency	0.253	**0.658**	0.140	-0.005	0.326
Cooperation	0.422	**0.592**	0.141	0.113	-0.165
Weakness	0.217	**0.411**	-0.409	0.203	0.020
Negotiation	0.140	-0.076	**0.677**	-0.049	0.125
Experience	0.026	0.350	**0.674**	0.268	-0.003
Jobs	0.353	0.046	**0.551**	-0.077	0.323
Selling ability	0.075	-0.056	-0.112	**0.828**	0.130
Policy	0.126	0.344	0.328	**0.621**	0.244
No. of partners	-0.018	0.266	0.182	-0.023	**0.605**
Time control	0.411	0.079	-0.276	0.169	**0.534**
Culture	-0.098	-0.063	0.164	0.231	**0.478**

Table 5.38 Factor Analysis of Effectiveness, Selling and Marketing, Concern, and Policy for Partner

The different characteristics of both parties with respect to "selling ability" are that the core-companies will group "reputation" together with "selling ability", but the partners will group "policy" together with "selling ability". Therefore, when handling the aspect of satisfaction gap that relates to "selling ability", members of the partnership have to consider these different characteristics.

The CSF can be analyzed and classified as shown in Figure 5.4, where S is Social Satisfaction Factor, E is Economic Satisfaction Factor, c is Concern sub-factors for Social Satisfaction, p is Policy sub-factors for Social Satisfaction, e is Effectiveness sub-factors for Economic Satisfaction, and s is Selling and Marketing sub-factors for Economic Satisfaction.

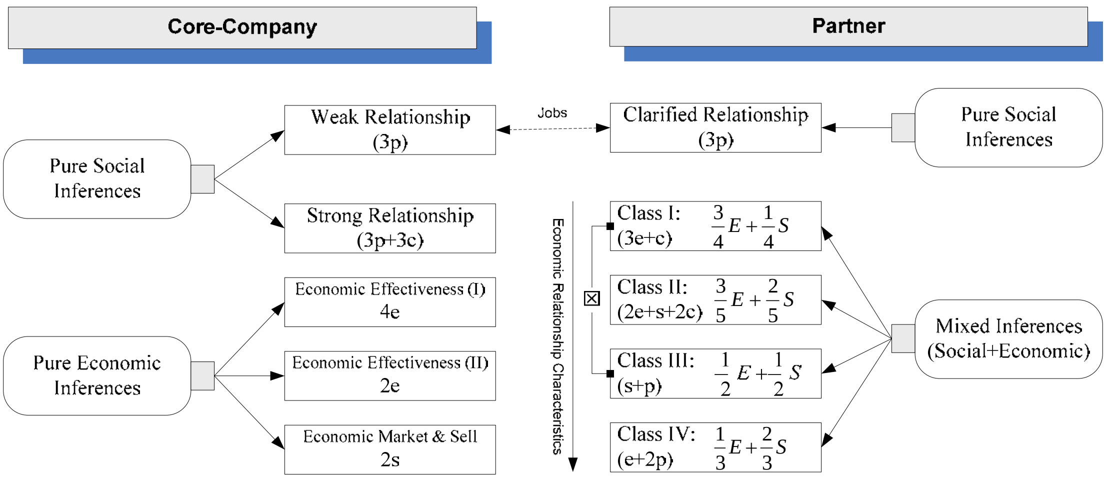


Figure 5.4 The Classification of Confusing Satisfaction Factors for Both Parties

The core-companies can clearly be classified into the Pure Social Inferences Type and the Pure Economic Inferences Type. Thus, it is found that the core-companies will have clear-cut roles in solving CSF problems. The pure social inferences category has a weak relationship group. This group concerns only about policy in partnership development, because three elements under the policy factor fully support this kind of core-company. However, the “number of partners” and “culture” have a weak relationship with other factors. This type of core-company will be alone and helpless in comparing to the other four types of core-companies. It is recommended to strengthen the support by increasing the “number of partners” and “jobs”, and emphasize more on culture differences.

Another type of core-company under the category of pure social inferences is the strong relationship group. In this group, satisfaction can be more effectively enhanced by three policy factors and three concern factors. Although the supporting weakness factor has fair relationship as effect on other factors, another five factors of this group have strong relationships with different types of special group factors, such as “policy” and “experience”. Hence, when these five factors can be systematically enriched, they can link up with other types of factors. These CSF problems can clear the cloudy relationship through the development of an objective system for the relationship model.

The core-companies have another main CSF type which is called pure economic inferences. The economic effectiveness (class I) has four effective sub-factors. These types of core-companies place more emphasis on effectiveness than class II, because class II only consists of two sub-factors of effectiveness, namely “specialization” and “cooperation”. Their partners can contribute more efforts in “effectiveness” to clarify their economic satisfaction gap. A type of economic selling and marketing belongs to pure economic inferences. These core-companies only consider contributions in selling and marketing under the CSF.

Hence the core-companies can be easily identified in the CSF by their characteristics. However, from the CSF analysis the characteristics of social and economic factors are mixed with respect to the partners. The situation of the partners is more complex than for the core-companies. Fortunately, some partners can clearly sense their needs in social satisfaction concerning policy characteristics. Moreover, consideration for the number of jobs is a joint factor with a weak relationship type in pure social inferences for the core-companies.

When both parties (the core-companies and their partners) have large social satisfaction gaps, improving the job factor may be a good solution. However, the other four types of partners have different expectations in social satisfaction and economic satisfaction in the CSF analysis. They have to be classified in their level according to their economic relationship characteristics. This classification is to effectively narrow the satisfaction gap of the CSF for the partners.

5.6.4 Further CSF Analysis

To further investigate the effect of factor analysis in the CSF, “loyalty” was put in place of “policy” in the CSF analysis, because the characteristic testing was necessary in the fine tuning. The loyalty factor is the seventh level that was agreed between the core-companies and their partners. Since the policy factors were embedded in the pure social inferences, both of the core-companies and their partners, further analysis was performed on a 50-50 exchange between “policy” and “loyalty”. It can help to analyze the inference problems in the satisfaction gap.

Correlation Matrix

	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation	Pos. in market	Respect	Responsibility	Trust	Criticism	Weakness
Cooperation	1.000													
Specialization	0.474	1.000												
Efficiency	0.419	0.381	1.000											
Capacity	0.308	0.274	0.503	1.000										
Time control	0.343	0.187	0.407	0.489	1.000									
Intelligence	0.309	0.347	0.399	0.330	0.418	1.000								
Selling ability	0.336	0.249	0.398	0.362	0.390	0.398	1.000							
Reputation	0.304	0.271	0.336	0.305	0.354	0.268	**0.523**	1.000						
Pos. in market	0.381	0.292	0.361	0.278	0.306	0.307	0.332	0.327	1.000					
Respect	0.313	0.136	0.261	0.154	0.236	0.251	0.168	0.181	0.417	1.000				
Responsibility	0.403	0.286	0.433	0.310	0.420	0.401	0.403	0.413	0.427	0.418	1.000			
Trust	0.354	0.290	0.313	0.187	0.268	0.080	0.294	0.313	0.419	0.367	0.271	1.000		
Criticism	0.258	0.205	0.292	0.191	0.232	0.230	0.294	0.190	0.315	0.266	0.151	0.368	1.000	
Weakness	0.202	0.115	0.170	0.198	0.181	0.202	0.127	0.065	0.260	0.275	0.155	0.248	0.315	1.000

Table 5.39 Correlation of Effectiveness, Selling and Marketing, Concern, and Loyalty for Core-company

In this analysis it was found that “selling ability” has a strong relationship with “reputation” and “responsibility” as shown in Table 5.39. Hence, the image of the core-company is quite important when the partners emphasize their partnership building in “selling ability”.

Three groups were found from the factor analysis of the core-companies as shown in Table 5.40. They are:

- Group 1: Intelligence, Capacity, Efficiency, Time control, Responsibility, and Specialization
- Group 2: Trust, Respect, Position in market, Criticism, Weakness, and Cooperation
- Group 3: Reputation, and Selling ability

Moreover, this result only has 4 factors which rotationally converged after several iterations showing that there are fewer factors affecting the satisfaction gap of the core-companies.

Rotated Factor Matrix(a)

Core-company	Factor 1	Factor 2	Factor 3	Partner	Factor 1	Factor 2	Factor 3
Intelligence	**0.614**	0.174	0.091	Trust	**0.779**	0.258	-0.212
Capacity	**0.604**	0.136	0.149	Responsibility	**0.700**	0.217	0.087
Efficiency	**0.595**	0.291	0.204	***Intelligence***	**0.674**	0.167	0.237
Time control	**0.57**	0.202	0.216	***Capacity***	**0.579**	0.162	0.117
Responsibility	**0.466**	0.316	0.308	Criticism	**0.556**	0.335	0.074
Specialization	**0.365**	0.268	0.187	Cooperation	**0.546**	0.463	-0.094
Trust	0.046	**0.625**	0.331	Reputation	**0.531**	0.091	0.522
Respect	0.178	**0.562**	0.075	Specialization	0.249	**0.897**	-0.080
Pos. in market	0.284	**0.549**	0.242	Efficiency	0.379	**0.611**	-0.089
Criticism	0.189	**0.465**	0.107	***Respect***	0.363	**0.601**	0.245
Weakness	0.175	**0.437**	-0.08	***Weakness***	0.089	**0.465**	0.230
Cooperation	0.407	**0.412**	0.218	***Selling ability***	0.010	0.075	**0.902**
Reputation	0.298	0.119	**0.718**	Pos. in market	-0.016	-0.037	**0.688**
Selling ability	0.445	0.167	**0.493**	Time control	0.180	0.309	**0.374**

Table 5.40 Factor Analysis of Effectiveness, Selling and Marketing, Concern, and Loyalty for Core-company and Partner

For the partners, three groups were also found from the factor analysis, and 5 factors rotationally converged, after only a number of iterations as shown in Table 5.40. The groups are as follows:

- Group 1: Trust, Responsibility, Intelligence, Capacity, Criticism, Cooperation, and Reputation

- Group 2: Specialization, Efficiency, Respect, and Weakness
- Group 3: Selling ability, Position in market, and Time control

Correlation Matrix

	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation	Pos. in market	Respect	Responsibility	Trust	Criticism	Weakness
Cooperation	1.000													
Specialization	**0.551**	1.000												
Efficiency	**0.479**	**0.644**	1.000											
Capacity	**0.376**	0.267	0.340	1.000										
Time control	0.074	0.297	0.290	0.239	1.000									
Intelligence	**0.582**	0.316	0.234	**0.433**	0.206	1.000								
Selling ability	**0.000**	**0.000**	**0.000**	0.103	0.336	0.217	1.000							
Reputation	0.304	0.121	0.156	**0.532**	**0.354**	**0.430**	**0.505**	1.000						
Pos. in market	-0.197	-0.082	-0.097	-0.031	0.295	0.253	**0.632**	0.235	1.000					
Respect	**0.488**	**0.575**	**0.558**	**0.365**	0.287	**0.389**	0.272	**0.384**	0.164	1.000				
Responsibility	**0.429**	**0.395**	**0.528**	**0.354**	0.137	**0.566**	0.156	**0.435**	0.091	**0.398**	1.000			
Trust	**0.527**	**0.402**	**0.491**	**0.432**	0.251	**0.520**	-0.201	0.275	-0.149	**0.354**	**0.602**	1.000		
Criticism	**0.369**	**0.522**	0.315	**0.391**	0.290	**0.406**	0.049	**0.364**	0.095	**0.404**	**0.489**	**0.591**	1.000	
Weakness	**0.351**	**0.432**	0.209	0.109	0.295	0.229	0.211	0.310	0.102	**0.368**	0.041	0.159	0.209	1.000

Table 5.41 Correlation of Effectiveness, Selling and Marketing, Concern, and Loyalty for Partner

The second classification of CSF by the analytical method focuses on the behavior analysis, as both parties met the unclear relationship development (Figure 5.5), where S is the Social Satisfaction Factor, E is the Economic Satisfaction Factor, l is the Loyalty sub-factors for Social Satisfaction, c is the Concern sub-factor for Social Satisfaction, e is the Effectiveness sub-factors for Economic Satisfaction, and s is the Selling and Marketing sub-factors for Economic Satisfaction.

The result of this analysis further validates the characteristics of the core-companies, because they can maintain the pure economic inferences characteristic. Moreover, the types for mixed inferences can be classified according to the strong economic sector and the strong social sector. Nevertheless, the result of the partner side has the opposite situation to the core-company side. They consider the mixed factors as meeting the satisfaction inferences. They can be classified into three groups according to their economic relationship characteristics.

Regarding the grouping result of both parties as shown in Table 5.40, it is recommended to use “intelligence” and “capacity” for narrowing the satisfaction gap when the core-company belongs to class I of mixed inferences and its partner belongs to class II of mixed inferences. Moreover, “respect” and “weakness” can effectively narrow the satisfaction gap when the core-company belongs to class II of mixed inferences and its partner belongs to class III of mixed inferences. If the core-company belongs to pure economic inferences and its partner belongs to class I of mixed inferences, only the “selling ability” can effectively help the partnership development. However, “selling ability” has no relationship with “cooperation”, “specialization” and “efficiency”, but these factors support the factor of Effectiveness. Therefore, the numerical relationship model needs to raise an alarm and convey this negative information to the core-company. Otherwise, time will be wasted in unproductive activities for partnership development.

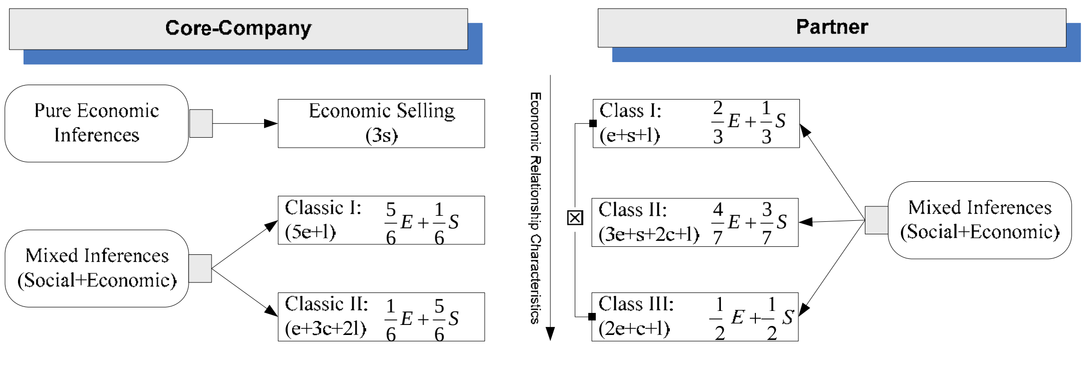


Figure 5.5 Second Classification of Confusing Satisfaction Factors for Both Parties

Although "selling ability" does not have a contribution in "cooperation", "specialization", and "efficiency", it has a strong relationship with "position in the market" and "reputation". Thus these two factors belong to social satisfaction and the partners believe these two social factors can enhance their economic satisfaction.

5.6.5 Satisfaction Gap of Economic and Social Analysis

When the characteristics of the economic factors and the social factors can be deeply analyzed then the relationship model can effectively provide information to the core-company and its partners. The data of the core-companies and their partners in the field of economic satisfaction and social satisfaction can thus be analyzed by factor analysis of the data reduction, as well as for their partners.

Further analysis as shown in Table 5.42, the contribution of social consideration in the profit factor is not as sensitive as other factors, except for economic consideration in profit. Likewise, the contribution of total investment factor is not as sensitive as other factors, except for "contract and bid cost". The factor of contract and bid cost is only relevant to "profit" (economic consideration) and "total investment".

The core-companies have three different characteristics for economic satisfaction according to the analysis as shown in Table 5.43, and can be grouped as:

- Group 1: Quality, Time control, Discount, Selling ability, Capacity, and Reputation
    - Second class of group 1: Cooperation, Efficiency, Win-Win, Profit

(economic consideration), and Intelligence

- Group 2: Specialization, Cooperation, Efficiency, Win-Win, Profit (economic consideration), and Intelligence
- Group 3: Contract and bid cost, Total investment, Profit (social consideration)

The features of group 2 are the same as the second class of group 1, except for “specialization”. Therefore, the characteristics of group 2 may be more effective in enhancing economic satisfaction in the core-company for partnership development.

Correlation Matrix

	Win Win	Profit E.	Profit S.	C. B. Cost	Total in	Discount	Quality	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation
Win Win	1.000														
Profit E.	**0.613**	1.000													
Profit S.	0.332	**0.392**	1.000												
C. B. Cost	0.181	**0.379**	0.245	1.000											
Total in	0.044	0.211	0.261	**0.359**	1.000										
Discount	0.322	0.276	0.220	0.217	0.164	1.000									
Quality	**0.425**	**0.436**	0.196	0.242	0.098	0.501	1.000								
Cooperation	**0.413**	0.341	0.277	0.157	0.132	0.292	**0.388**	1.000							
Specialization	0.311	0.315	0.194	0.216	0.134	0.144	0.180	**0.474**	1.000						
Efficiency	**0.451**	**0.429**	0.292	0.245	0.162	0.280	**0.406**	**0.419**	**0.381**	1.000					
Capacity	0.298	**0.369**	0.224	0.196	0.085	0.211	0.372	0.308	0.274	**0.503**	1.000				
Time control	**0.405**	0.327	0.196	0.277	0.126	**0.379**	**0.455**	0.343	0.187	**0.407**	**0.489**	1.000			
Intelligence	**0.378**	**0.415**	0.330	0.334	0.111	0.268	0.320	0.309	**0.347**	**0.399**	0.330	**0.418**	1.000		
Selling ability	**0.391**	**0.367**	0.216	0.239	0.130	0.241	**0.396**	0.336	0.249	**0.398**	**0.362**	**0.390**	**0.398**	1.000	
Reputation	**0.362**	0.305	0.195	0.193	0.131	0.268	0.289	0.304	0.271	0.336	0.305	**0.354**	0.268	**0.523**	1.000

Table 5.42 Correlation Analysis for Economic Satisfaction of Core-companies

Rotated Factor Matrix(a)

	Factor		
	1	2	3
Quality (q)	**0.700**	0.176	0.124
Time control (e)	**0.631**	0.234	0.140
Discount (d)	**0.531**	0.085	0.197
Selling ability (s)	**0.470**	0.373	0.133
Capacity (e)	**0.450**	0.368	0.087
Reputation (s)	**0.395**	0.348	0.109
Specialization (e)	0.054	**0.642**	0.148
Cooperation (e)	0.314	**0.544**	0.091
Efficiency (e)	0.420	**0.520**	0.160
Win Win (p)	0.461	**0.481**	0.119
Profit E. (p)	0.389	**0.436**	0.368
Intelligence (e)	0.356	**0.407**	0.272
C. B. Cost (p)	0.203	0.129	**0.610**
Total in (p)	0.040	0.057	**0.548**
Profit S. (p)	0.178	0.303	**0.375**

Table 5.43 Factor Analysis for Economic Satisfaction of Core-companies

The analysis as shown in Table 5.44 can determine the insignificant social satisfaction factors for the core-companies. The number of job factors is sensitive in the “cultural aspect” and “number of partners” only. However, the “cultural aspect” and “number of partners” are not sensitive to other factors, so this group is quite weak in the contribution to partnership development. The development of an objective system for relationship model can alert the core-companies to avoid wasting time in unproductive activities.

\

Correlation Matrix

	Pos. in market	Respect	Responsibility	Trust	Criticism	Weakness	Communication	Right decisions	Apocalypse	Special problems	Policy	Experience	Negotiation	Cultural	No. of partners	Jobs
Pos. in market	1.000															
Respect	**0.417**	1.000														
Responsibility	**0.427**	0.418	1.000													
Trust	**0.419**	**0.367**	0.271	1.000												
Criticism	0.315	0.266	0.151	**0.368**	1.000											
Weakness	0.260	0.275	0.155	0.248	0.315	1.000										
Communication	0.246	0.176	**0.385**	0.243	0.294	0.196	1.000									
Right decisions	0.273	0.263	**0.363**	0.246	0.201	0.326	**0.542**	1.000								
Apocalypse	0.314	0.286	0.294	0.259	0.301	0.133	**0.373**	**0.379**	1.000							
Special problems	0.284	0.211	0.411	0.222	0.244	0.167	**0.416**	**0.435**	**0.494**	1.000						
Policy	**0.365**	0.327	**0.359**	**0.368**	0.334	**0.360**	**0.442**	**0.383**	**0.352**	**0.435**	1.000					
Experience	0.292	0.230	**0.345**	0.276	0.254	0.243	**0.422**	**0.372**	0.278	**0.363**	**0.528**	1.000				
Negotiation	0.337	0.310	0.231	0.339	0.326	0.340	0.275	0.265	0.328	0.272	**0.446**	**0.385**	1.000			
Culture	0.283	0.281	0.192	0.232	0.208	0.148	0.144	0.223	0.178	0.154	0.241	0.299	0.313	1.000		
No. of. partners	0.204	0.220	0.019	0.187	0.152	0.335	-0.013	0.182	0.058	0.056	0.150	0.059	0.220	0.325	1.000	
Jobs	0.221	0.331	0.176	0.251	0.261	0.250	0.136	0.171	0.124	0.116	0.241	0.177	0.296	**0.377**	**0.355**	1.000

Table 5.44 Correlation Analysis for Social Satisfaction of Core-companies

Further analysis as shown in Table 5.45 can be divided into three groups for social satisfaction of the core-companies as follows:

- Group 1: Communication, Special problems, Right decisions, Policy, Experience, and Apocalypse
- Group 2: Number of partners, Jobs, Weakness, Negotiation, Culture, and Criticism
- Group 3: Respect, Responsibility, Position in market, and Trust

Nevertheless, the sub-factors of group 2 are not recommended for narrowing the satisfaction gap for social satisfaction of the core-companies, because their affecting factors have little relationship with other factors in the role of the core-company.

Rotated Factor Matrix(a)

	Factor		
	1	2	3
Communication (i)	**0.714**	0.053	0.106
Special problems (a)	**0.619**	0.037	0.237
Right decisions (i)	**0.603**	0.200	0.133
Policy (p)	**0.594**	0.333	0.203
Experience (p)	**0.558**	0.230	0.154
Apocalypse (a)	**0.506**	0.100	0.271
No. of partners (p)	-0.042	**0.600**	0.038
Jobs (p)	0.066	**0.543**	0.190
Weakness (c)	0.257	**0.490**	0.053
Negotiation (p)	0.367	**0.457**	0.184
Culture (p)	0.140	**0.455**	0.205
Criticism (c)	0.306	**0.367**	0.178
Respect (l)	0.150	0.354	**0.564**
Responsibility (l)	0.416	0.014	**0.557**
Pos in market (l)	0.260	0.301	**0.537**
Trust (c)	0.252	0.357	**0.364**

Table 5.45 Factor Analysis for Social Satisfaction of Core-companies

From Table 5.46, the correlation analysis resulting in the economic satisfaction of the partners shows that five factors including cooperation, specialization, time control, efficiency, and intelligence have a negative relationship with the discount factor. The most serious item is “time control” that has a factor of -0.342. Hence “discount” will have negative effect on partners in partnership development, and core-companies that emphasize on “discount” will decrease partnership development.

“Specialization” has very important contribution to “efficiency” because its correlation is the best (0.644). Likewise, “cooperation” is helpful in a “win-win situation”. In the economic partner satisfaction, the “win-win situation” is the most important, because 9 factors are relevant to this. It is therefore recommended that the members of partnership put more effort into a “win-win situation”. It can narrow the economic satisfaction gap and enrich the partnership development.

From the result of Table 5.46, “selling ability” still has weakness in “discount”, “cooperation”, “specialization” and “efficiency”. Moreover, the “discount” is a single group by itself as shown in Table 5.47, and its coefficient is -0.565. It means that the partners do not prefer “discount” as a contributor to partnership development.

Correlation Matrix

	Win Win	Profit E.	Profit S.	C. B. Cost	Total in	Discount	Quality	Cooperation	Specialization	Efficiency	Capacity	Time control	Intelligence	Selling ability	Reputation
Win Win	1.000														
Profit E.	**0.559**	1.000													
Profit S.	**0.543**	**0.350**	1.000												
C. B. Cost	0.283	0.156	0.099	1.000											
Total in	0.190	**-0.059**	**-0.111**	0.054	1.000										
Discount	**-0.167**	**-0.204**	**-0.217**	0.092	0.151	1.000									
Quality	**0.417**	0.131	0.341	**0.353**	0.025	0.104	1.000								
Cooperation	**0.635**	**0.431**	**0.581**	0.197	0.050	**-0.158**	**0.431**	1.000							
Specialization	**0.507**	0.212	0.361	0.058	**0.438**	**-0.150**	0.265	**0.551**	1.000						
Efficiency	**0.370**	0.211	**0.522**	0.308	0.227	**-0.010**	0.321	**0.479**	**0.644**	1.000					
Capacity	**0.481**	0.322	0.310	0.234	**0.380**	0.052	**0.354**	0.376	0.267	0.340	1.000				
Time control	0.249	**0.439**	0.205	0.130	0.155	***-0.342***	0.021	0.074	0.297	0.290	0.239	1.000			
Intelligence	**0.551**	0.185	**0.459**	**0.358**	0.071	**-0.186**	**0.444**	**0.582**	0.316	0.234	**0.433**	0.206	1.000		
Selling ability	0.173	0.335	0.164	**-0.050**	0.074	0.000	0.139	***0.000***	***0.000***	***0.000***	0.103	0.336	0.217	1.000	
Reputation	**0.373**	**0.387**	0.121	0.221	0.063	0.077	**0.381**	0.304	0.121	0.156	**0.532**	**0.354**	**0.430**	**0.505**	1.000

Table 5.46 Correlation Analysis for Economic Satisfaction of Partners

From Table 5.47, the economic satisfaction of partners can be categorized into 4 groups as follows:

- Group 1: Cooperation, Win-Win, Quality, Intelligence, Profit (social consideration), Capacity, Efficiency, Contract and bid cost.
- Group 2: Reputation, Selling ability, Time control, and Profit (economic

consideration)

- Group 3: Total investment, and Specialization
- Group 4: Discount

Since the "win-win situation" has a strong relationship with other factors, group 1 is highly recommended in narrowing economic satisfaction for the role of partners.

Rotated Factor Matrix(a)

	Factor			
	1	2	3	4
Cooperation (e)	**0.777**	-0.023	0.147	0.304
Win Win (p)	**0.663**	0.243	0.225	0.292
Quality (q)	**0.654**	0.123	0.034	-0.146
Intelligence (e)	**0.651**	0.237	0.050	0.106
Profit S. (p)	**0.598**	0.012	0.036	0.453
Capacity (e)	**0.487**	0.365	0.325	-0.098
Efficiency (e)	**0.476**	-0.037	0.458	0.223
C. B. Cost (p)	**0.390**	0.110	0.059	-0.115
Reputation (s)	0.404	**0.776**	0.016	-0.150
Selling ability (s)	0.045	**0.585**	-0.026	0.080
Time control (e)	-0.017	**0.543**	0.285	0.456
Profit E. (p)	0.296	**0.452**	0.021	0.425
Total in (p)	-0.011	0.111	**0.766**	-0.228
Specialization (e)	0.397	-0.074	**0.687**	0.333
Discount (d)	0.016	-0.041	0.045	**-0.565**

Table 5.47 Factor Analysis for Economic Satisfaction of Partners

From Table 5.48, the negotiation factor has a negative relationship (-0.303) with weakness factors. Thus, when the partners need support to solve their weakness problems, they would not expect their core-company to contribute to the "negotiation". Since "negotiation" is relevant to the policy of a company, the core-company needs to adjust its policy to narrow the satisfaction gap.

Although “apocalypse” is normally neglected in partnership development, it has good relationship with “responsibility” (0.407) and the “right decision” (0.364). It shows the core-company that if they have good responsibility and smart decision making, their partners still want to pay attention to “apocalypse”.

In the contributions for “Solving Special Problems”, there is strong relationship with “respect” (0.516), “policy” (0.585) and “experience” (0.371). Thus, if the core-company expects the partners to solve the “joint problems”, they need to consider these three characteristics.

A smart core-company expects its partners to raise their criticisms in order to enhance their relationship and competitiveness. However, this is not a simple matter. The partners will worry about how the criticism will affect their image. Regarding the result in Table 5.48, the core-company needs to contribute to “respect”, “responsibility”, and “trust”. Otherwise, it will affect the partners’ confidence.

The “position in the market” is relevant for “policy” only, and its important rate of partnership development is weak. However, “responsibility” has a strong relationship with “trust” (0.602) and “communication” (0.603). These are quite important factors when core-companies want to narrow the social satisfaction with their partners.

Correlation Matrix

	Pos. in market	Respect	Responsibility	Trust	Criticism	Weakness	Communication	Right decisions	Apocalypse	Special problems	Policy	Experience	Negotiation	Culture	No. of partners	Jobs
Pos. in market	1.000															
Respect	0.164	1.000														
Responsibility	0.091	**0.398**	1.000													
Trust	**-0.149**	**0.354**	**0.602**	1.000												
Criticism	0.095	**0.404**	**0.489**	**0.591**	1.000											
Weakness	0.102	**0.368**	0.041	0.159	0.209	1.000										
Communication	**-0.001**	0.290	**0.603**	**0.469**	0.289	0.248	1.000									
Right decisions	0.279	0.338	0.157	0.190	0.183	0.285	**0.358**	1.000								
Apocalypse	0.184	0.222	0.407	0.242	0.093	0.167	0.240	**0.364**	1.000							
Special problems	0.289	**0.516**	0.290	0.053	0.026	0.203	0.172	0.229	0.296	1.000						
Policy	**0.368**	**0.428**	**0.480**	0.216	0.243	0.167	0.286	**0.383**	**0.489**	**0.585**	1.000					
Experience	0.178	**0.373**	**0.554**	**0.348**	0.149	**-0.093**	**0.431**	0.258	**0.531**	**0.371**	**0.483**	1.000				
Negotiation	**-0.047**	0.104	0.107	0.344	0.226	***-0.303***	0.089	0.071	0.339	0.065	0.253	**0.413**	1.000			
Culture	0.279	0.219	0.048	**-0.194**	**-0.172**	**-0.054**	0.026	**-0.148**	0.025	0.194	0.331	0.054	0.151	1.000		
No. of. partners	0.090	0.244	**-0.029**	0.108	0.154	0.086	0.090	0.107	**-0.098**	0.135	0.275	0.255	0.200	0.310	1.000	
Jobs	0.110	0.305	**0.385**	**0.410**	**0.375**	**-0.123**	0.237	0.118	0.169	0.119	0.210	**0.401**	**0.444**	0.264	0.262	1.000

Table 5.48 Correlation Analysis for Social Satisfaction of Partners

Partners' Social satisfaction factors cannot identify the group by factor analysis, so it presents a social satisfaction that is quite fuzzy in the role of partners. It is necessary to use the development of an objective system for a satisfaction model in this aspect. Otherwise, the partners cannot have a clear and systematic direction to narrow their gap with the core-companies.

Further analysis as shown in Table 5.48 shows that when the correlation coefficient is greater than 0.35, it indicates a strong relationship. The accumulated strong relationships are defined by chain-reaction weight. Since social satisfaction cannot clearly separate the group by the factor analysis method, the chain-reaction weight can reflect the relationship of each sub-factor and is summarized in Table

5.49. Since “negotiation” is of negative relationship (-0.303) to “weakness”, it is defined as a negative reaction in social satisfaction.

	Loyalty			Concern			Interaction		Apocalypse		Policy					
	Pos. in market	Respect	Responsibility	Trust	Criticism	Weakness	Communication	Right decisions	Apocalypse	Special problems	Policy	Experience	Negotiation	Culture	No. of partners	Jobs
Chain-Reaction	1	7	7	6	4	-1+1	4	3	3	3	7	9	-1+2	0	0	5

Table 5.49 The Chain-Reaction Weight of Each Sub-factor for Social Satisfaction

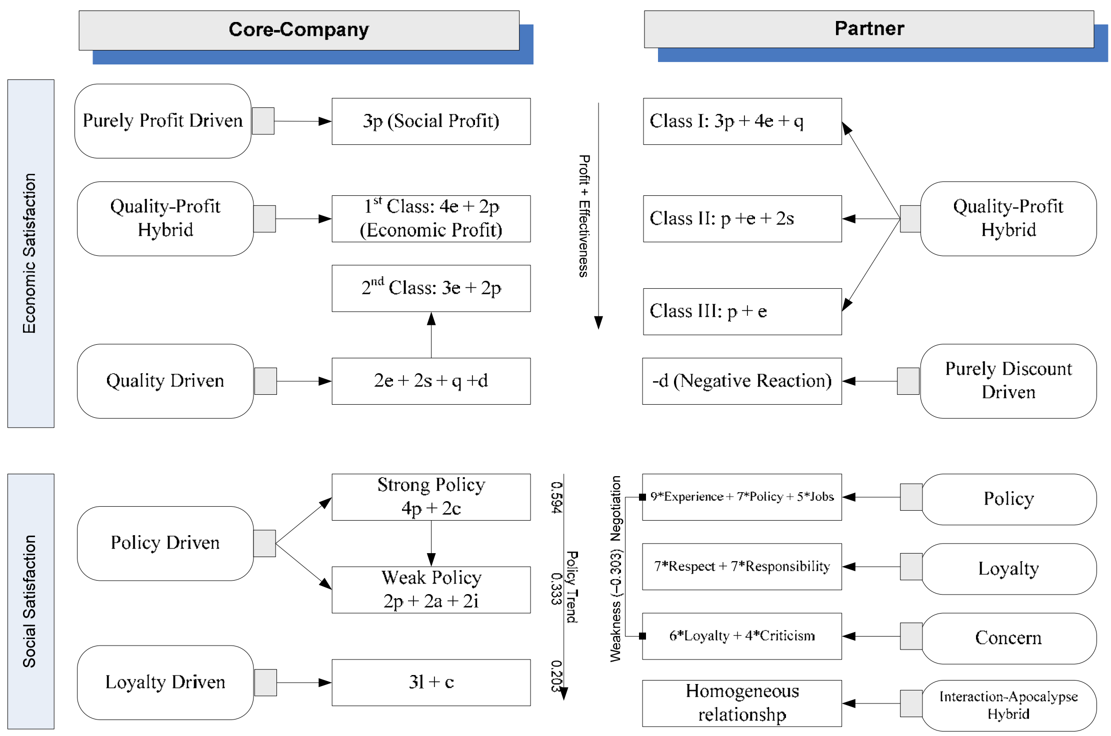


Figure 5.6 Analytical Chart of Economic and Social Satisfaction for Both Parties

The Satisfaction Gap of Economic and Social Analysis should have the following attributes:

- ***Economic satisfaction for core-companies***: The analytical chart (Figure 5.6) shows that the core-companies have two special styles, namely purely profit driven and quality driven. The purely profit driven style of core-companies only concentrates on the contribution of profitability factors in partnership development. The quality driven style of core-companies is double characteristics, because normally it only concerns "effectiveness", "selling and marketing", "quality" and "discount" to enrich satisfaction. This style of core-companies ignores the contribution of profitability factors that affect partnership development. However, in the case where the quality driven support is not working, the second strategy should be adopted. Quality-profit hybrid is another style for core-companies. They only consider "effectiveness" and "profitability" to enhance the satisfaction level of partnership development. Its characteristics are the same as those in the second class of the quality driven category, except "specialization".
- ***Economic satisfaction for partners***: In the analytical chart, there are three classes of quality-profit hybrid. The expectation of quality-profit hybrid will decrease from class I to class III. There is a type of partners that strongly dislike applying a discount to keep a healthy relationship, so care is needed.
- ***Social satisfaction for core-companies***: In the analytical chart there are two main styles of core-companies. They are policy driven and loyalty driven. Some partners are more concerned about contributions to policy enhancement. However, the loyalty driven style companies favor a more conventional way of partnership development. They emphasize "Trust" in building relationships.

- ***Social satisfaction for partners***: Although partners cannot be separated in a group through factor analysis, taking the correlation coefficient and chain-reaction weight into consideration will be helpful to show a clean-cut. It is assumed that a greater chain-reaction weight can enrich the satisfaction level for partners according to “policy”, “loyalty” and “concern”. The contributions of “interaction” and “apocalypse” in narrowing the satisfaction gap are often mixed together and cannot be separately identified for this kind of partner.

5.7 Summary

One-side satisfaction measurement can show social and economic results in conventional partnership development. Although a core-company and its partners will have their own definition of satisfaction level, this one-side approach still works for development because of the closed relationship. However, it doesn’t work in dynamic partnership development in the global market.

The results of the questionnaire survey of satisfaction gap measurement have shown that the main expectations of profitability that including profit (economic), profit (social) and total investment are the same. Thus, Hypothesis 1 has been supported. When cooperation meets obstacles that are relevant to profitability in partnership development, the suggestion is to take actions with regard to the three factors. Otherwise, strategies are necessary concerning the different expectations of the core-company and partner in the Win-Win situation and Contract & Bid Cost factors.

Moreover, the Core-company and Partner has the same opinion on discount factor. Nevertheless, the discount factor cannot contribute the long-term relationship development in the dynamic partnership environment, because further discussion in factor analysis for the economic satisfaction of partners has shown that “discount” is a single group by itself and its coefficient is -0.565. It means that the partners don’t prefer “discount” as a contribution to partnership development. Thus, Hypothesis 2 has not been supported.

Although the core-company and partner appreciate the contribution of the quality factor, Hypothesis 3 has not been supported. Meanwhile, the core-company is focused more on Quality in its business. This is a valuable signal for determining the satisfaction improvement strategies, because the priority of satisfaction factors for the core-company and partner is the same level, which belongs to the second priority, regarding the descriptive results of ten satisfaction factors.

All effectiveness factors’ means have no significant differences. Moreover, the value is very high in that Efficiency, Capacity, Time control and Intelligence are close to 4. These factors are quite sensitive in enhancing the satisfaction level of the core-company and partner. Therefore, Hypothesis 4 has been substantiated.

Although the reputation means of the core-company and partner are 3.9617 and 3.7500 respectively, the t-test results prove that they need the same level of marketing and selling support. Hence, Hypothesis 5 has been supported.

Nevertheless, the null Hypothesis 6 has not been supported. The roles of partnership and the choices of economic factors will be dependent. Thus, the choices of economic factors will be changed regarding different roles. The design of economic strategies for partnership development needs to consider different expectations in economic factors for different roles.

According to the factor analysis results of economic satisfaction for core-companies, it shows the core-companies having two special styles, namely purely profit driven and quality driven. The quality driven style of core-companies is a double characteristic, because normally it only concerns “effectiveness”, “selling and marketing”, “quality”, and “discount” to enrich satisfaction. However, the second strategy needs the elements of profit in the case of the quality driven support not working. Another style for core-companies is quality-profit hybrid, because it only concerns the elements of “effectiveness” and “profitability” to enhance the satisfaction level in partnership development. Its characteristics are the same as the second class of quality driven, except specialization.

However, the characteristics of the partners are three classes of quality-profit hybrid with regard to the factor analysis results of economic satisfaction for partners. The expectation of quality-profit hybrid will be decreasing from class I to class III. There is a type of partner that strongly disfavors applying a discount to keep a healthy relationship, so care is needed for this problem.

The expectation of loyalty is the same between partnerships with regard to the null Hypothesis 7 being significant. Moreover, the responsibility mean is a top priority that considers both parties. Hence, it is most important for both parties in field of loyalty factors. The further discussion in factor analysis for CSF analysis was that loyalty was used instead of policy for the CSF analysis, and it was found that “selling ability” has a strong relationship with “reputation” and “responsibility”. Hence, the image of the core-company is quite important when the partners emphasize their partnership building in “selling ability”.

The means of criticism and weakness of the partner are greater than the core-company. Nevertheless, the trust means of the core-company and partner are only the same. Therefore, Hypothesis 9 has been substantiated in that the partner appreciates the concern strategies more than core-company.

Bantham (1998) suggested the critical success factors for a partnership as:

- Increasingly electronic communication environment (ie. Characterized by heavy reliance on e-mail, fax, and shared databases)
- Face-to-face communication

Therefore, communication is the most important for both the Core-company and the Partner. The communication and right decisions means are around 3.8. Moreover, different partnership roles have a consistent expectation in these two factors. Hence, the mutual interaction strategies are important in improving partnership development. Hypothesis 10 has been supported.

The opinions for special problems are similar for both parties. However, there are different expectations of apocalypse from the core-company and partner. Moreover, the needs of apocalypse are higher for the partner, although normally the apocalypse factor may be ignored in the partnership development. Thus, Hypothesis 11 has not been supported.

Hypothesis 13 has not been substantiated. Hence, the opinions of the culture factor are different between the core-company and the partner. When the cooperation is affected by the culture background, the satisfaction improvement strategies need to be aware that the partner is more concerned with culture factor. Moreover, the policy and experience factors effectively support the policy strategies for partnership development.

Policy factor belongs to the sixth level of core-company and the fifth level of partner with regard to the descriptive result of impact factors of partnership development by different roles. Thus, the policy factor is important for both parties. Hypothesis 12 has been supported. Moreover, the core-company and partner have the clear-cut group of pure social inferences, supported by policy factor, when these are analyzed by the CSF analysis. On the other hand, the core-company has a strong policy group or a weak policy group after the factor analysis for social satisfaction. The policy trend effectively supports the policy driven group and loyalty driven group too.

The choices of social factors are independent with regard to different roles. Thus, it is quite hard to handle the social satisfaction problems according a subjective satisfaction approach, because contemporary satisfaction improvement strategies often lack support using objective data.

Two main styles of core-companies are policy driven and loyalty driven with regard to factor analysis of the social satisfaction for the core-company. Some partners are more concerned about contributions to policy enhancement. However, the loyalty driven style is a conventional partnership development. “Trust” is appreciated in building the relationship. Moreover, good policy support is effective in policy driven and loyalty driven.

Although the partners cannot be separated in the group through factor analysis of the social satisfaction for the partner, considering the correlation coefficient and chain-reaction weight are helpful in showing clean-cut aspects. It is assumed a greater chain-reaction weight can enrich the satisfaction level for partners according to policy, loyalty and concern aspects. However, the contributions are homogeneous in the case of “interaction” and “apocalypse”, so the features are lacking for this kind of partner.

Issues such as the cultural difference and individual factors will affect the measurement of satisfaction. The survey result proves that the core-companies and their partners acknowledge the contribution of economic profit in partnership development. At the same time they do not ignore other factors that can contribute to partnership development. The data analysis also shows that both parties are quite unclear with regard to satisfaction, so this research is valuable in clarifying the satisfaction gap.

Our results of the questionnaire analysis demonstrate that the satisfaction gap is widened by four CSF such as effectiveness, concern, selling and marketing, and policy. In the factor analysis of the CSF, the core-companies can clearly be classified into the Pure Social Inferences Type and the Pure Economic Inferences Type. Thus, the core-companies will have clear-cut roles in solving CSF related problems, but the situations of their partners are more complex. They have different expectations in social satisfaction and economic satisfaction in the CSF analysis except for those who can clearly sense their needs in social satisfaction concerning policy characteristics.

The effective groupings by factor analysis in full-scale analysis (anatomic characteristics) of economic satisfaction and social satisfaction further validate our findings in CSF. It does not only support the core-companies or partners to determine their characteristics in CSF, but also extend the findings to develop an objective relationship model. This objective relationship model can focus the solutions on the characteristics for recommending corrective actions to narrow the satisfaction gap. Moreover, the effective knowledge-based indexes derived from the effective grouping of the factor analysis can be used to further enrich the partnership development.

This research contributes to the general discussion on partnership development not only in traditional actions such as *Exit, Voice, Loyalty, and Neglect*. It also provides an objective and scientific method to maintain relationships and healthy growth. It is a challenge to do research on the area of engineering management because it is necessary to convert the tacit concept to an explicit model.

	Hypothesis	Testing Method	Hypothesis Supported?
H1.	The expectation of profitability is the same between partnerships.	T-test	Yes
H2.	The long term relationship between partners will depend on the discount that is offered.	Factor Analysis, T-test	No
H3.	The core company and its partner have no different opinion on the Quality factors of the partnership development.	T-test	No
H4.	Effectiveness is important and sensitive for partnership development.	T-test	Yes
H5.	The needs of selling and marketing of the core-company and partner are at the same level.	T-test	Yes
$H6_O$.	The partnership roles and the choices of economic factors will be independent.	Chi-SquareTest	No
$H6_A$.	The partnership roles and the choices of economic factors will be dependent.	Chi-SquareTest	Yes
H7.	There is no difference between different partnership roles for the part regarding loyalty.	T-test	Yes
H8.	Responsibility is most important for both parties in the field of loyalty factors.	T-test	Yes
H9.	The partner appreciates the concern strategies more than the core-company.	T-test	Yes
H10.	Communication is important and critical in partnership development, so that the core-company and partner have consistent requests.	T-test	Yes
H11.	The trends of apocalypse are the same between the core-company and partner.	T-test	No
H12.	There will be a relationship between satisfaction enhancement and policy.	Factor Analysis, T-test	Yes
H13.	The effectiveness of the culture factor is not different between different partnership roles.	T-test	No
$H14_O$.	The partnership roles and the choices of social factors will be independent.	Chi-SquareTest	Yes
$H14_A$.	The partnership roles and the choices of social factors will be dependent.	Chi-SquareTest	No
H15.	The conventional satisfaction improvement strategies are by subjective methods, the partners are easily confused by their subjective view of satisfaction level.	Factor Analysis	Yes
H16.	Having a better opportunity for the collection of a higher level of objective data from the past and present subcontracting work, the core-company has a more accurate view on the level of economic satisfaction.	Factor Analysis	Yes
H17.	Consequently the core-company also has more accurate view of its social satisfaction.	Factor Analysis	Yes

Table 5.50 Summary of Hypothesis Results

CHAPTER 6 DEVELOPMENT OF AN OBJECTIVE RELATIONSHIP MODEL

6.1 Introduction

The traditional partnership development mainly emphasizes on heuristics. It lacks objective assessments for building up partnership development. Hence, traditional partnership development will lead to a sub-optimal solution. In the new way of partnership development, scientific and objective methods are used to organize outsourcing technical services in service industries. The method enables the exploitation of the complicated sub-contractors' relationships and networks to attain the optimal benefit.

Although the scientific methods were applied in partner selection (Huanget al., 2000 and 2003; Ip et al., 2003; Ip et al., 2004; Hajidimitriou et al., 2002; Narazaki et al., 1993; Chen et al., 1994; Choy et al., 2002; Lau et al. 2001), these models only concerned the relationship of customer requirements and supplier capabilities. Nevertheless, these solutions did not offer a closed-loop method to help the sub-contractors to enhance their competences.

Satisfaction surveys can help to reduce the gap in knowledge concerning values (Kujala & Ahola, 2005). It discussed the significant implications on economic and social satisfaction (Geyskens & Steenkamp, 2000; Lai, 2007; Mckee & Wang, 2006; Ramaseshan, Yip, & Pae, 2006). The satisfaction gap program thus integrates knowledge-based techniques and concept models of impact factors of economic and social satisfaction. Undifferentiated satisfaction levels between the core-company and partner are necessary to continuously minimize their gaps. Satisfaction surveys can help to reduce the gap in knowledge (Kujala & Ahola, 2005). The significant implications on economic and social satisfaction have been reported (Geyskens & Steenkamp, 2000; Lai, 2007; Mckee & Wang, 2006; Ramaseshan, Yip, & Pae, 2006).

An objective system for relationship development is a challenge in engineering management. The core-companies and their partners normally concentrate in building up their relationship in terms of cost and profit. However, a relationship such as marriage cannot be well developed by money only. Investigation of the pivotal elements is valuable, and in this research, the satisfaction gap measurement is suggested as contributing to an objective system for relationship development in a partnership. Strategic solutions are recommended to minimize satisfaction gaps by a fuzzy satisfaction gap program and its feedback analysis program. The partnership development can be continuously enriched on the basis of this contribution.

Human attitude (A) and behavior (B) will be affected by their concepts (C). Nevertheless, their concepts will be changed with regard to the impact of knowledge (K). This is the KCAB cycle (K→C→A+B) (Liu, 2002). Thus, this research suggests to apply a knowledge-based ERP to enrich the partnership knowledge through an objective system for relationship model. The updating concept of partnerships is stirred from this new knowledge. It can guide the partnerships to modify their attitude and behavior in keeping a healthy partnership development.

6.2 State of the Art in Scientific Methods for Partnership Development

Partnership indexes were proposed to create WeBid for the Partnership Explorer for contributing to extending to new partners (Huang, Mak, Humphreys, 2000 and 2003). Four types of distinctive index were:

- Satisfaction index;
- Flexibility index;
- Risk index;
- Confidence index.

Artificial intelligence (AI) techniques in solving partner selection problems by scientific method were proposed while considering the factors of cost, due date, precedence of sub-project, the probability of success and time (Ip et al., 2003; Ip et al., 2004; Hajidimitriou et al., 2002).

Knowledge-based tools in decision making (Narazaki et al., 1993; Chen et al., 1994, Choy et al., 2002) and performance scores (Lau et al. 2001) were proposed to assist partner selection, but these scientific methods are only concerned in selecting potential partners for contracting out activities.

Applied fuzzy analytical approach in partnership era was discussed in the optimal partner selection (Mikhailov, 2002). It can advance the decision making in partnerships. However, decision making is only one of the key factors in partnership development, so the concept can be extended to touch other factors in partnership development to modify the satisfaction indexes in both parties.

6.3 Objective Relationship Model Design

An objective system for a relationship model for partnership development (shown in figure 6.1) is designed for contributing to an objective method of narrowing gaps between different perspectives of good service partnership development through harmonizing satisfaction.

Five main components support this model. The ***role component*** captures the role's ID, project code and satisfaction gaps from the knowledge-based ERP. The ***characteristics analysis component*** determines the types of satisfaction gaps regarding the information from role's ID. The ***knowledge-based strategy component*** provides the intelligent indexes to narrow the satisfaction gap for the core-company and its partner. Updating ***satisfaction measurement*** is necessary for evaluation according to different project periods, which are long period project and short period project. The fuzzy satisfaction gap program helps to evaluate their updating satisfaction gaps to validate the effectiveness of knowledge-based strategies.

New knowledge-based strategies will be offered in terms of long period projects or short period projects. The knowledge-based ERP will refresh the updated data by ***fuzzy satisfaction gap evaluation***. The characteristics of the core-company and its partner are also updated.

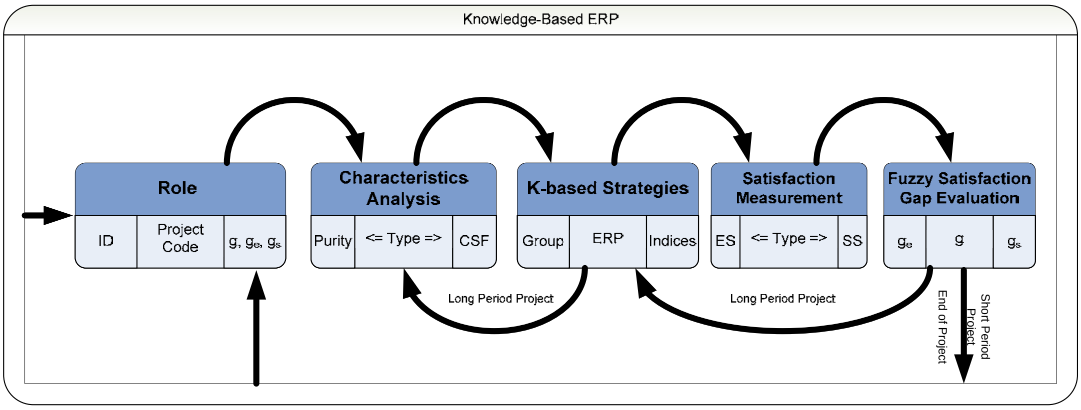


Figure 6.1 Numerical Relationship Model of Partnership Development

6.3.1 Fuzzy Satisfaction Gap Concept

Ten independent satisfaction variables are defined to find the impact of partnership development as follows:

- Profitability (ES_p)
- Discounts (ES_d)
- Quality Enhancement (ES_q)
- Effectiveness (ES_e)
- Selling and Marketing (ES_s)
- Loyalty (SS_l)
- Concern (SS_c)
- Mutual Interactions (SS_i)
- Apocalypse (SS_a)
- Policies (SS_p)

The satisfaction gap program is mainly used to obtain the change of satisfaction gap with different situations and different values of each factor. That means when the value of each factor has changed, the satisfaction gap is changed between the partners in the program. Hence, the company can use the program to try to narrow the gap with its partner. Meanwhile, the partners can find the solutions for the partnership problems regarding the core-company from satisfaction improvement strategies through the knowledge-based ERP system. The advanced analysis with two main directions is the core-company and the partners, with their two subways as economic satisfaction and social satisfaction.

The fuzzy satisfaction gap program is designed in two parts. The main program functions in the economic satisfaction gap analysis (g_e), social satisfaction gap analysis (g_s), and total satisfaction gap (g). The core-company and its subcontractor can find out their satisfaction gap after they input the grading for the ten satisfaction factors that include profitability, discounts, quality enhancement, effectiveness, selling and marketing, loyalty, concern, mutual interactions, apocalypse and policies. Updating satisfaction gap measurement is recommended through more concise format that compares the detail satisfaction gap measurement (refer to Appendix A). The detail satisfaction gap measurement needs to find the relationship of satisfaction improvement strategies with the core-company and partner. Updating satisfaction gap measurement only concerns the grading for the ten satisfaction factors.

The satisfaction coefficient (β) is preset according to the result of questionnaire survey of updating satisfaction gap measurement in the programming analysis. The user can adjust it, depending on the actual situation. The custom-made information of the core-companies and their sub-contractors is recorded in the ***Access database*** in the current design. It is recommended to be combined with the ***ERP system*** in the implementation design.

Section 4.3 Fuzzy Satisfaction Gap Programming Method discusses the gap index of Social Satisfaction g_s which can present the social satisfaction difference of the core-company and partner. This index can support the analysis in the total satisfaction gap for a fuzzy set.

When $s_c = s_{pi}$ then $g_s = 1$ and F_1^1 and $\mu(g_s) = 0$, otherwise

When $s_c > s_{pi}$,

Then $g_s = s_{pi} / s_c$ and $g_s \in [0, 1]$ and F_1^2 and $\mu(g_s) \in$ [SP, P, LP]

Else $g_s = s_c / s_{pi}$ and $g_s \in [0, 1]$ and F_1^3 and $\mu(g_s) \in$ [SN, N, LN]

Where $\mu(g_s)$ is Adjustable Satisfaction Index (ASI) for Social Aspect

The linguistic variable and their ranges of ASI for Social Aspect are defined and discussed for a case study of satisfaction gap program as follows:

Fuzzy Set GS			
Name	Description	Condition	Numerical range (normalized)
LN	Large negative	$s_c < s_{pi}$	[0.7, 1.0]
N	Negative	$s_c < s_{pi}$	[0.3, 0.7]
SN	Small negative	$s_c < s_{pi}$	[0.0, 0.3]
Z	Zero	$s_c = s_{pi}$	[1.0, 1.0]
SP	Small positive	$s_c > s_{pi}$	[0.0, 0.3]
P	Positive	$s_c > s_{pi}$	[0.3, 0.7]
LP	Large positive	$s_c > s_{pi}$	[0.7, 1.0]

Table 6.1 Fuzzy Set Names and Descriptions of ASI for Social Aspect with Numerical Range

When the gap index of Social Satisfaction g_s belongs to F_1^2, the social satisfaction of the core-company is larger than its partner. In this case, it is preferable to enhance the social satisfaction of its partner, according to the feedback control, by the final result of the g value. In the case of F_1^3, the social satisfaction of the core-company looks forward to enhancing its level.

The gap index of Economic Satisfaction g_e can present the economic satisfaction difference of the core-company and the partner. This index can support the analysis in the total satisfaction gap for a fuzzy set.

When $e_c = e_{pi}$ then $g_e = 1$ and F_2^1 and $\mu(g_e) = 0$, otherwise

When $e_c > e_{pi}$,

Then $g_e = e_{pi} / e_c$ and $g_e \in [0, 1]$ and F_2^2 and $\mu(g_e) \in [SP, P, LP]$

Else $g_e = e_c / e_{pi}$ and $g_e \in [0, 1]$ and F_2^3 and $\mu(g_e) \in [SN, N, LN]$

Where $\mu(g_e)$ is the Adjustable Satisfaction Index (ASI) for the Economic Aspect

The linguistic variable and their ranges of ASI for Economic Aspect are defined and discussed for a case study of satisfaction gap program as follows:

Fuzzy Set GE			
Name	Description	Condition	Numerical range (normalized)
LN	Large negative	$e_c < e_{pi}$	[0.7, 1.0]
N	Negative	$e_c < e_{pi}$	[0.3, 0.7]
SN	Small negative	$e_c < e_{pi}$	[0.0, 0.3]
Z	Zero	$e_c = e_{pi}$	[1.0, 1.0]
SP	Small positive	$e_c > e_{pi}$	[0.0, 0.3]
P	Positive	$e_c > e_{pi}$	[0.3, 0.7]
LP	Large positive	$e_c > e_{pi}$	[0.7, 1.0]

Table 6.2 Fuzzy Set Names and Descriptions of ASI for Economic Aspect with Numerical Range

When the gap index of Economic Satisfaction g_s belongs to F_1^2, the economic satisfaction of the core-company is larger than its partner. In this case, it is preferable to enhance the economic satisfaction of its partner, according to the feedback control, by the final result of the g value. In the case of F_1^3 , the economic satisfaction of the core-company looks forward to enhancing its level.

The Sugeno fuzzy model with nine cases of Satisfaction Gap Adjustment can be expressed as:

$$R^l : If\ g_s\, is F_1^l\, AND\ g_e\, is F_2^l$$
$$Then\ \mu(g) = \min[\mu(g_s), \mu(g_e)]$$
$$l = 1,2,3$$

The defuzzification of the Satisfaction Gap Adjustment (g) by the centre of gravity (COG) can be expressed as:

$$COG = \frac{\sum_0^1 \mu(g)g}{\sum_0^1 \mu(g)} \text{ and } g \in [0, 1]$$

The result of the g value can help to modify the social satisfaction level and economic satisfaction level through the feedback control logic. Therefore, the satisfaction gap of the core-company and partners will be systematically narrowed by the contribution of g, g_s, and g_e values. The values of g_s and g_e can be affected by the g value and the weight of the bi-indexes for the social and the economic groups.

The partnership development problems are embedded in the core-company and its partners because of ambiguous reasons. The strategic direction can be gained from the result of μ(g). This meaningful value can support g_e and g_s in re-organizing the Economic Satisfaction and Social Satisfaction indexes.

6.3.2 Characteristics Analysis for Different Role IDs

The characteristics of the core-company and the partners are determined by the different role IDs (*id*), cooperative project code and current satisfaction gap.

Company information is available in the ERP for different core-companies and their partners. The registration information can link with the cooperative project information. The satisfaction gap indexes include the economic satisfaction gap, social satisfaction gap and total satisfaction gap.

The fuzzy set G (Total Satisfaction Gap) that refers to table 4.7 and figure 6.2 is defined for the satisfaction gap program as follows:

$$G = GE \times GS \qquad (6.1)$$

The characteristics analysis components (*CAC*) determine their needs of satisfaction improvement strategies (*SIS*) regarding the fuzzy satisfaction gap index. When the total satisfaction gap (*g*) belongs to a large negative level (*LN*) or a large positive level (*LP*) in terms of gap situation $\mu(g)$, the core-company or partner needs to take action using the confusing satisfaction factors (*CSF*) strategies. The CSF strategies include the Class I of CSF strategies (CSF_1) that tends to the policy factor (*p*) and the Class II of CSF strategies (CSF_2) that tends to the loyalty factor (*l*). Otherwise, they can solve satisfaction problems by the purity economic satisfaction strategies (*ESS*) or purity social satisfaction strategies (*SSS*).

$$\mu(g) \in G \qquad (6.2)$$

$$SIS_{id}(g) = \begin{cases} CSF_1, & if \mu(g) \in [LN, LP], CAC \in p \\ CSF_2, & if \mu(g) \in [LN, LP], CAC \in l \\ ESS, & if \mu(g) \notin [LN, LP], g_e > g_s \\ SSS, & if \mu(g) \notin [LN, LP], g_e < g_s \end{cases} \quad \forall g, id \qquad (6.3)$$

The characteristics are continuously being modified in case the updating feedback from the fuzzy satisfaction gap evaluation. The contribution of the ERP system is to offer a channel to communicate with the core-company and its partner, using this kind of data refreshment. Otherwise, conventional partnership development is hard to check in terms of the dynamic and systematic satisfaction gap.

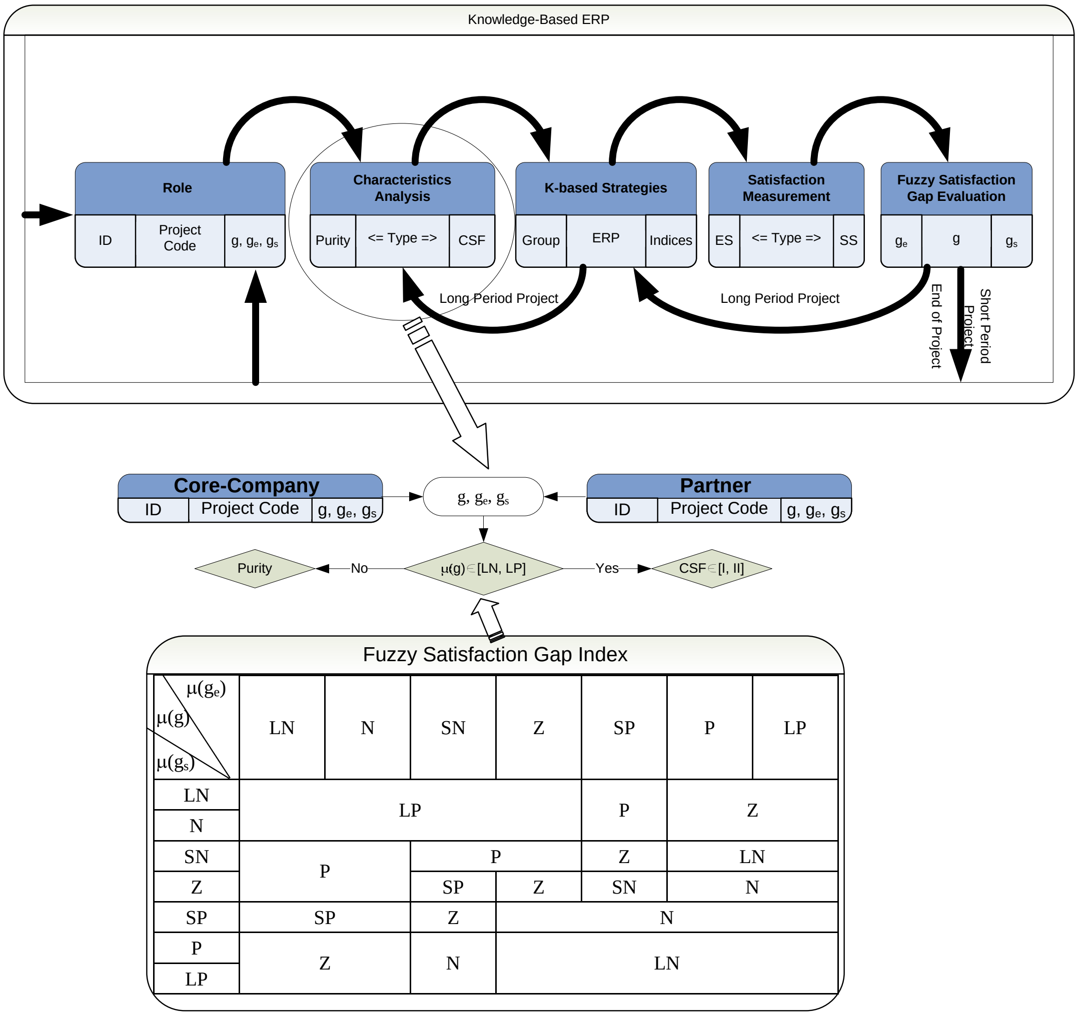


Figure 6.2 Characteristics Analysis for Different Role IDs

6.3.3 Knowledge-based Strategies

The knowledge-based strategies have two main directions, namely purity and CSF. These directions were analyzed through the factor analysis results from the satisfaction questionnaire survey. This survey was done for the service industries sector in Macau.

Core-companies and their business partners were requested to answer a questionnaire that evaluated different satisfaction aspects for partnership development with the Macau Power Station, three Macau Telecommunication Companies and their sub-contractors.

The priorities of the ten factors (refer to Table 6.3) can be useful indicators to guide the core-company and its partners to enhance the satisfaction through self-improvement. It is interesting to note that priorities 3 to 6 are different amongst the core-company and its business partners. Hence the satisfaction gap may be widened due to these four factors. Thus, these four factors are grouped together and called Confusing Satisfaction Factors (CSF).

Priority	**Core-company**	**Partner**
1	Profit	Profit
2	Quality	Quality
3	Effectiveness	Selling and Marketing
4	Concern	Effectiveness
5	Selling and Marketing	Policy
6	Policy	Concern
7	Loyalty	Loyalty
8	Interaction	Interaction
9	Discount	Discount
10	Apocalypse	Apocalypse

Table 6.3 Confusing Satisfaction Factors by Different Roles

The characteristics of these satisfaction improvement strategies are Purity Satisfaction Factors Strategies and Confusing Satisfaction Factors Strategies, and are analyzed and discussed in Chapter 5 with regard to the factor analysis method. The satisfaction improvement strategies are determined to the characteristics analysis components (CAC).

The ***Purity Satisfaction Factors Strategies*** include four different types that are the purity economic satisfaction factors strategies for the core-companies and the partners, and the purity social satisfaction factors strategies for the core-companies and the partners.

Purity Economic Satisfaction Strategies for the Core-companies are presented as having three styles.

- Purely Profit Driven style only concentrates on the contribution of “social profit”, “contract and bid cost”, “total investment factors”.
- The Quality Driven style of core-companies is a double characteristic, because normally it only concerns “effectiveness”, “selling and marketing”, “quality”, and “discount” to enrich satisfaction. This style of core-companies ignores the contribution of profitability factors that affect partnership development. However, in the case where the quality driven support is not working, the second strategy should be adopted.
- Quality-Profit Hybrid style only considers the elements of “effectiveness” and “profitability” to enhance the satisfaction level of partnership development. Its characteristics are the same as those in the second class of the quality driven category, except “specialization”.

Purity Economic Satisfaction Strategies for the Partners have three classes of quality-profit hybrid. The expectation of quality-profit hybrid will decrease from class I to class III. There is a type of partner that strongly dislike applying a discount to keep a healthy relationship, so care is needed in this situation.

Purity Social Satisfaction Strategies for the Core-companies have two main styles of the core-companies. They are policy driven and loyalty driven. Some partners are more concerned about contributions to policy enhancement. However, the loyalty driven style companies favor a more conventional way of partnership development. They emphasize "Trust" in building relationships.

Purity Social Satisfaction Strategies for the Partners cannot be separated in a group through factor analysis, taking the correlation coefficient and chain-reaction weight into consideration will be helpful to show a clean-cut. It is assumed that a greater chain-reaction weight can enrich the satisfaction level for partners according to "policy", "loyalty" and "concern". The contributions of "interaction" and "apocalypse" in narrowing the satisfaction gap are often mixed together and cannot be separately identified for this kind of partner.

Further discussion of confusing satisfaction factors determines two classes of ***CSF strategies***. Class I of CSF studies Effectiveness, Concern, Selling and Marketing, and Policy factors, because the partnerships have different opinions on these four factors. Loyalty was used instead of policy for the study of the CSF Class II.

C*lass I of the confusing satisfaction factors* can be classified by the analytical method (refer to figure 6.3), where S is the Social Satisfaction Factor, E is the Economic Satisfaction Factor, c is the Concern sub-factors for Social Satisfaction, p is the Policy sub-factors for Social Satisfaction, e is the Effectiveness sub-factors for Economic Satisfaction, and s is the Selling and Marketing sub-factors for Economic Satisfaction.

The core-companies can clearly be classified into the Pure Social Inferences Type and the Pure Economic Inferences Type. Thus, it is found that the core-companies will have clear-cut roles in solving CSF problems. The pure social inferences category has a weak relationship group. This group concerns only about policy in partnership development, because three elements under the policy factor fully support this kind of core-company. However, the "number of partners” and “culture” have a weak relationship with other factors. This type of core-company will be alone and helpless in comparing to the other four types of core-companies. It is recommended to strengthen the support by increasing the “number of partners” and “jobs”, and emphasize more on culture differences.

Another type of core-company under the category of pure social inferences is the strong relationship group. In this group, satisfaction can be more effectively enhanced by three policy factors and three concern factors. Although the supporting weakness factor has fair relationship as effect on other factors, another five factors of this group have strong relationships with different types of special group factors, such as “policy” and “experience”. Hence, when these five factors can be systematically enriched, they can link up with other types of factors. These CSF problems can clear the cloudy relationship through the development of an objective system for the relationship model.

The core-companies have another main CSF type which is called pure economic inferences. The economic effectiveness (class I) has four effective sub-factors. These types of core-companies place more emphasis on effectiveness than class II, because class II only consists of two sub-factors of effectiveness, namely “specialization” and “cooperation”. Their partners can contribute more efforts in “effectiveness” to clarify their economic satisfaction gap. A type of economic selling and marketing belongs to pure economic inferences. These core-companies only consider contributions in selling and marketing under the CSF.

Hence the core-companies can be easily identified in the CSF by their characteristics. However, from the CSF analysis the characteristics of social and economic factors are mixed with respect to the partners. The situation of the partners is more complex than for the core-companies. Fortunately, some partners can clearly sense their needs in social satisfaction concerning policy characteristics. Moreover, consideration for the number of jobs is a joint factor with a weak relationship type in pure social inferences for the core-companies. When both parties (the core-companies and their partners) have large social satisfaction gaps, improving the job factor may be a good solution.

Unfortunately, the other four types of partners have different expectations in social satisfaction and economic satisfaction in the CSF analysis. They have to be classified in their level according to their economic relationship characteristics. This classification is to effectively narrow the satisfaction gap of the CSF for the partners. The objective system for relationship modeling can be based on the characteristics of the economic considerations of the partners in offering the strategies. CSF analysis is thus very helpful in narrowing the satisfaction gap by a scientific method.

C*lass II of confusing satisfaction factors* by the analytical method focused on behavior analysis, as both parties met the cloudy relationship development (refer to figure 6.3). S is the Social Satisfaction Factor, E is the Economic Satisfaction Factor, l is the Loyalty sub-factors for Social Satisfaction, p is the Policy sub-factor for Social Satisfaction, e is the Effectiveness sub-factors for Economic Satisfaction, and s is the Selling & Marketing sub-factors for Economic Satisfaction.

The result of this analysis further validates the characteristics of the core-companies, because they can maintain the pure economic inferences characteristic. Moreover, the types for mixed inferences can be classified according to the strong economic sector and the strong social sector.

The result of the partner side has the opposite situation to the core-company side. They consider the mixed factors as meeting the satisfaction inferences. They can be classified into three groups according to their economic relationship characteristics.

Regarding the grouping result of both parties, it is recommended to use “intelligence” and “capacity” for narrowing the satisfaction gap when the core-company belongs to class I of mixed inferences and its partner belongs to class II of mixed inferences. Moreover, “respect” and “weakness” can effectively narrow the satisfaction gap when the core-company belongs to class II of mixed inferences and its partner belongs to class III of mixed inferences. If the core-company belongs to pure economic inferences and its partner belongs to class I of mixed inferences, only the “selling ability” can effectively help the partnership development. However, “selling ability” has no relationship with “cooperation”, “specialization” and “efficiency”, but these factors support the factor of Effectiveness. Therefore, the numerical relationship model needs to raise an alarm and convey this negative information to the core-company. Otherwise, time will be wasted in unproductive activities for partnership development.

Although “selling ability” does not have a contribution in “cooperation”, “specialization”, and “efficiency”, it has a strong relationship with “position in the market” and “reputation”. Thus these two factors belong to social satisfaction and the partners believe these two social factors can enhance their economic satisfaction.

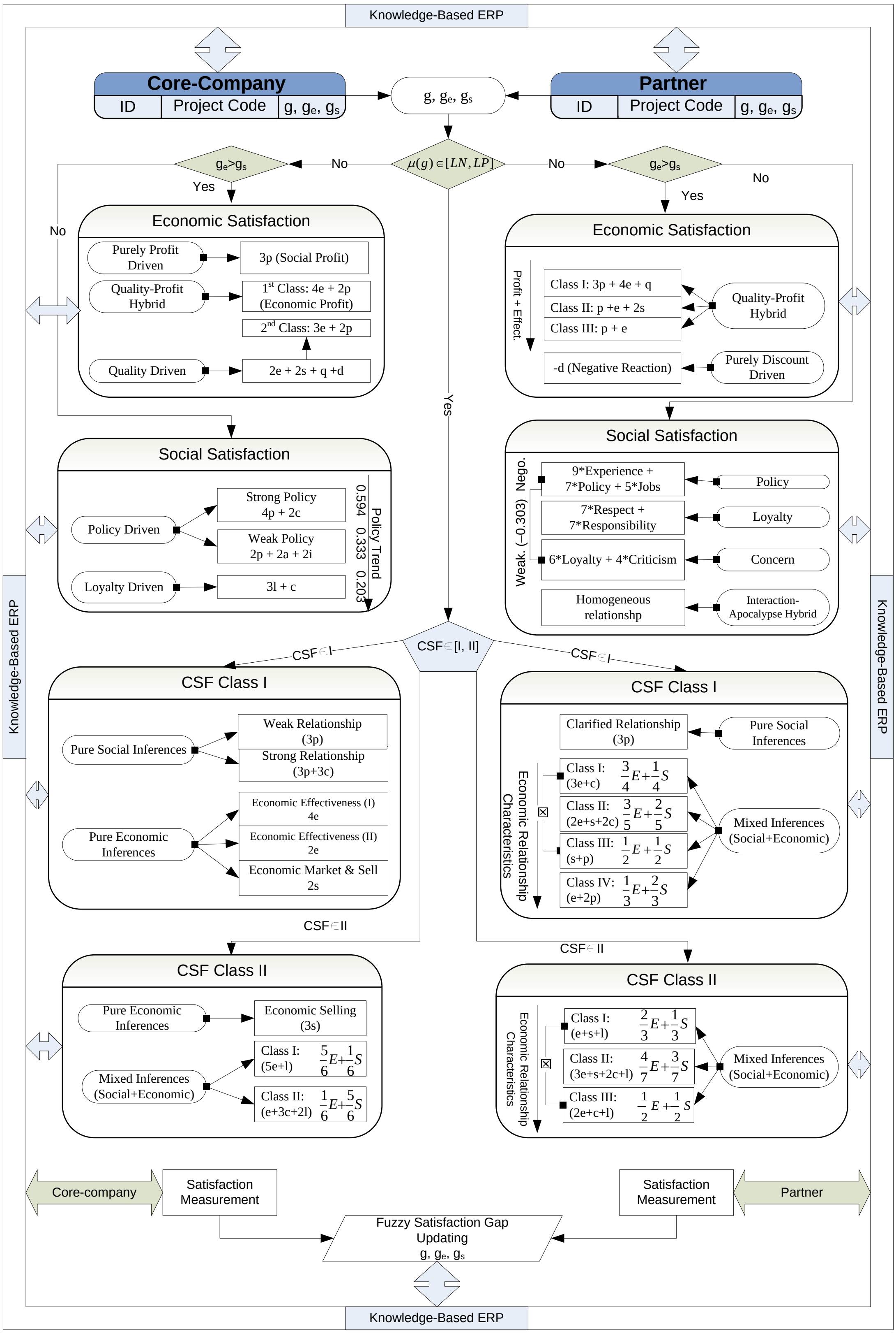


Figure 6.3 Macro Model for Knowledge-based Strategies

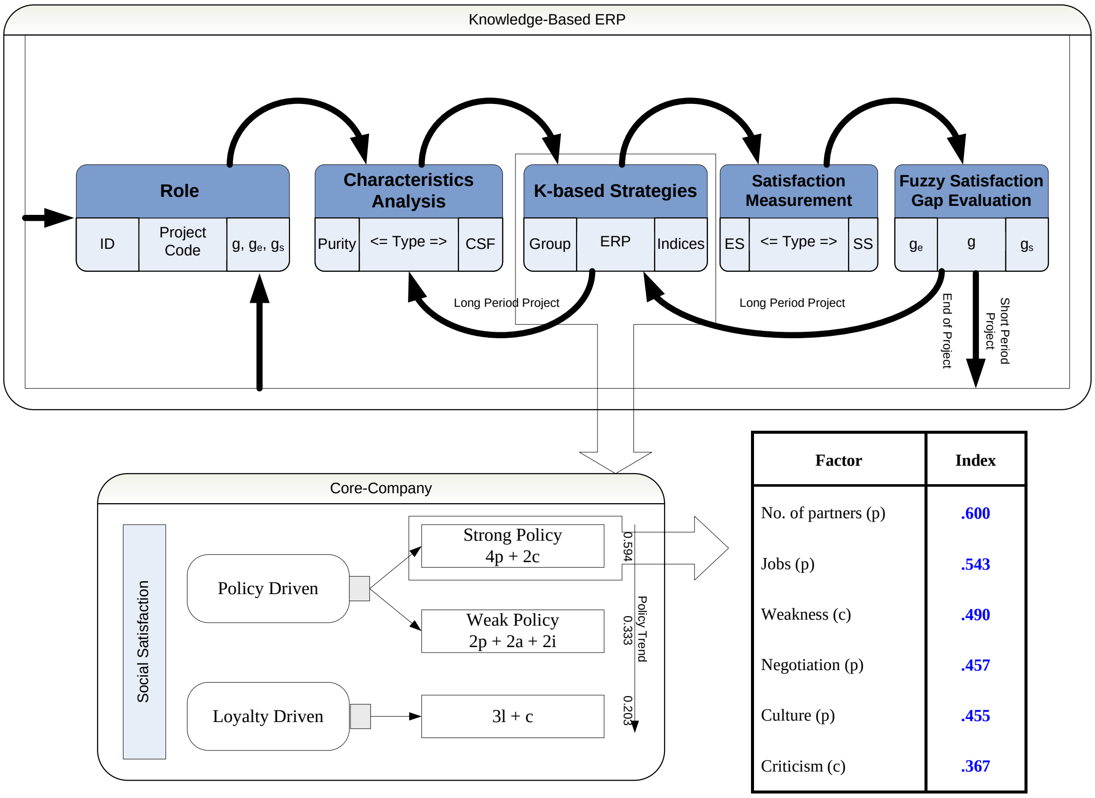
6.3.4 Demonstration of Knowledge-based Strategies

The knowledge-based strategy components can provide intelligence indexes to narrow the satisfaction gaps for both parties. In case the core-companies do not belong to a large total satisfaction gap, they are recommended to use the purity satisfaction gap strategies. The strategy is in the field of social satisfaction as to whether the economic satisfaction gap is less than the social satisfaction gap. As this core-company tends to have a strong type of policy regarding its record from the knowledge-based ERP, it is necessary to refer table 6.4 for the strategic factors and intelligence indexes.

Factor	Index
No. of partners (p)	**.600**
Jobs (p)	**.543**
Weakness (c)	**.490**
Negotiation (p)	**.457**
Culture (p)	**.455**
Criticism (c)	**.367**

Table 6.4 Strategic Indexes of Social Satisfaction for Core-Company

The partners are recommended to take concern of the number of partners and the number of jobs in the first and second priorities. They need to contribute more improvement in these two areas. Otherwise, their relationship may deteriorate in the future. Another four factors, including weakness, negotiation, culture and criticism, need to be monitored in case of unsuitable strategies for the first and second factors.



Factor	Index
No. of partners (p)	.600
Jobs (p)	.543
Weakness (c)	.490
Negotiation (p)	.457
Culture (p)	.455
Criticism (c)	.367

Figure 6.4 Demonstration of Knowledge-based Strategies

6.3.5 Fuzzy Satisfaction Gap Program

The fuzzy satisfaction gap program is developed by MATLAB software, with fuzzy logic methodology for satisfaction gap analysis. The program is mainly used to obtain the change of satisfaction gap with different situations and different values for each satisfaction factor. A beta value (satisfaction coefficient) is assigned for each satisfaction factor, and this beta value will change by the different roles of the core-companies and partners. These values are obtained from the satisfaction gap measurement and represent the importance level for different factors.

This program needs to connect with the ERP system, thus, the updating situation and data can help to analyze the real-time satisfaction gap. This means that the satisfaction coefficient is modified, then the satisfaction gap will also change (narrower or wider). Therefore, companies can use this program to estimate how to narrow the gap with their partners, through satisfaction improvement strategies.

The platform of the satisfaction gap program shows a graphic result of the economic gap index and the social gap index. It can accumulate the satisfaction gap result in a graphic format. The core-company and its partners can monitor the satisfaction gap and their improving progress regard to the figure frame work. Thus, this program offers a body-check function for partnership development. The partnerships can search for relationship problems by this objective and scientific method. Meanwhile, the numerical result of the economic satisfaction gap, social satisfaction gap, and total satisfaction gap can guide the analyst adopt an appropriate satisfaction enhancement strategy for decision making.

The definition of the satisfaction coefficient of the ***core-company*** is shown in the following part of the program:

Economic factors and their Beta values (β)
Marks of Profit = profit_C; Marks of Discount = discount_C; Marks of Quality = quality_C; Marks of Effective = effective_C; Marks of Selling & Marketing = Marketing_C Beta value of Profit = Bp_C; Beta value of Discount = Bd_C; Beta value of Quality = Bq_C; Beta value of Effective = Be_C; Beta value of Selling & Marketing = Bm_C;

Social factors and their Beta values (β)
Marks of Hostility = hostility_C; Marks of Criticism = criricism_C; Marks of Interaction = interaction_C; Marks of Apocalypse = apocalypse_C; Marks of Policy = policy_C Beta value of Hostility = Bh_C; Beta value of Criticism = Bc_C; Beta value of Interaction = Bi_C;

Beta value of Apocalypse = Ba_C; Beta value of Policy = Bpy_C; ***Where*** Hostility presents Loyalty factor; Criticism presents Concern factor

The definition of the satisfaction coefficient of the ***partner*** is shown as the following part of program:

	Economic factors and their Beta values (β)
■	Marks of Profit = profit_P; Marks of Discount = discount_P; Marks of Quality = quality_P; Marks of Effective = effective_P; Marks of Selling & Marketing = Marketing_P;
■	Beta value of Profit = Bp_P; Beta value of Discount = Bd_P; Beta value of Quality = Bq_P; Beta value of Effective = Be_P; Beta value of Selling & Marketing = Bm_P;

	Social factors and their Beta values (β)
■	Marks of Hostility = hostility_P; Marks of Criticism = criricism_P; Marks of Interaction = interaction_P; Marks of Apocalypse = apocalypse_P; Marks of Policy = policy_P
■	Beta value of Hostility = Bh_P; Beta value of Criticism = Bc_P; Beta value of Interaction = Bi_P; Beta value of Apocalypse = Ba_P; Beta value of Policy = Bpy_P

Satisfaction Indexes and Gap Indexes
Ec – Economic value of Core-company
Sc– Social value of Core-company
Ep– Economic value of Partner
Sp– Social value of Partner
Ge- Satisfaction gap for economic
Gs- Satisfaction gap for social
G- Gap Situation

The partial satisfaction gap program using the fuzzy logic methodology that was discussed in Section 4.3, Fuzzy Satisfaction Gap Programming Method, is shown as follows:

Calculation for Ec, Sc, Ep and Sp
■ Ec=profit_C*Bp_C+discount_C*Bd_C+quality_C*Bq_C+effective_C*Be_C+Marketing_C*Bm_C
■ Sc=hostility_C*Bh_C+criticism_C*Bc_C+interaction_C*Bi_C+apocalypse_C*Ba_C+policy_C*Bpy_ C
■ Ep=profit_P*Bp_P+discount_P*Bd_P+quality_P*Bq_P+effective_P*Be_P+Marketing_P*Bm_P
■ Sp=hostility_P*Bh_P+criticism_P*Bc_P+interaction_P*Bi_P+apocalypse_P*Ba_P+policy_P*Bpy_ P

Calculation for Ge ∈ [0, 1]
If Ec > Ep Ge = Ep/Ec; Ge<= 0.3 Show the value of Ge, “Ec is larger than Ep, small positive’ and ‘Ec > Ep, SP’ if (0.3< Ge) & (Ge<=0.7) Show the value of Ge, “Ec is larger than Ep, positive” and “Ec > Ep, P” if Ge > 0.7 Show the value of Ge, “Ec is larger than Ep, large positive” and “Ec > Ep, LP”
If Ec < Ep Ge = Ec/Ep; if Ge <= 0.3

Show the value of Ge, “Ep is larger than Ec, small negative” and “Ep > Ec, SN” if (0.3< Ge) & (Ge<=0.7) Show the value of Ge, “Ep is larger than Ec, negative” and “Ep > Ec, N” if Ge > 0.7 Show the value of Ge, “Ep is larger than Ec, large negative” and “Ep > Ec, LN”
If Ec = Ep Ge = 1; Show the value of Ge, “Ec is equal to Ep” and “Ep = Ec, Z”

Calculation for Gs $\in$ [0, 1]
If Sp < Sc Gs = Sp/Sc; if Gs <= 0.3 Show the value of Gs, “Sc is larger than Sp, small positive” and “Sc > Sp, SP” if (0.3< Gs) & (Gs<=0.7) Show the value of Gs, “Sc is larger than Sp, positive” and “Sc > Sp, P” if Gs > 0.7 Show the value of Gs, “Sc is larger than Sp, large positive” and “Sc > Sp, LP”
If Sc < Sp Gs = Sc/Sp; if Gs <= 0.3 Show the value of Gs, “Sp is larger than Sc, small negative” and “Sp > Sc, SN” if (0.3< Gs) & (Gs<=0.7) Show the value of Gs, “Sp is larger than Sc, negative” and “Sp > Sc, N”

if Gs > 0.7 Show the value of Gs, “Sp is larger than Sc, large negative” and “Sp > Sc, LN”
If Sc=Sp Gs = 1; Show the value of Gs, “Sc is equal to Sp” and “Sp = Sc, Z”

The total satisfaction gap is calculated in accordance with the Sugeno fuzzy model with nine cases of Satisfaction Gap Adjustment, and the defuzzification of the Satisfaction Gap Adjustment (g) by centre of gravity (COG) using satisfaction gap adjustment index table.

The case study of the Macau Telecommunication Company can help to understand the application of this satisfaction gap program. The results of the questionnaire survey of satisfaction factors are inputted in the program in two parts. The first part is the Core-company data. The second part is the Partner data.

In the first step, ten blanks are needed to input the marks of the ten different satisfaction factors for each role. There are totally twenty blanks for the Core-company and the Partner. Moreover, it is requested to input their satisfaction coefficients to the program.

The Economic (Ec) and Social (Sc) value can be calculated for the Core-company and Partner after clicking the two “Run” push-buttons. Then, the opinions for Economic and Social satisfaction can be obtained for the Core-company and Partner. The function of the “cal” push-button that is located on the top right hand side is to calculate the economic (Ge) satisfaction gap, the social (Gs) satisfaction gap and total satisfaction gap (G) situation. The situation between the partnerships can be analyzed by these values.

The figure frame for the fuzzy satisfaction gap can be found when applying the “Plot Ge” and “Plot Gs” functions. The output graph shows the result of the values and the levels (Small, Average and Large) of the “Degree of the Membership” for Ge and Gs. The economic (Ge) and social (Gs) gaps can be compared with regard to the Degree of the Membership. If these two values are near to 1, it means the economic satisfaction gap is too small between the Core-company and the Partner. If that value is not near to 1, there will be an opposite meaning.

Finally, the “Satisfaction Gap” function push-button can get the value of the total satisfaction gap that is calculated. In case that the value is 1, it implies the most satisfaction. Otherwise, the value is zero means the least satisfaction between the Core-company and the Partner. This value is also a main purpose of this research. After the satisfaction gap is calculated, the Core-company and Partner can use this value to improve their relationship. They can follow satisfaction improvement strategies to adjust the relevant factors that have low marks on the program. The feedback values calculated with the feedback analysis program will show and support further cooperation for keeping a healthy partnership development.

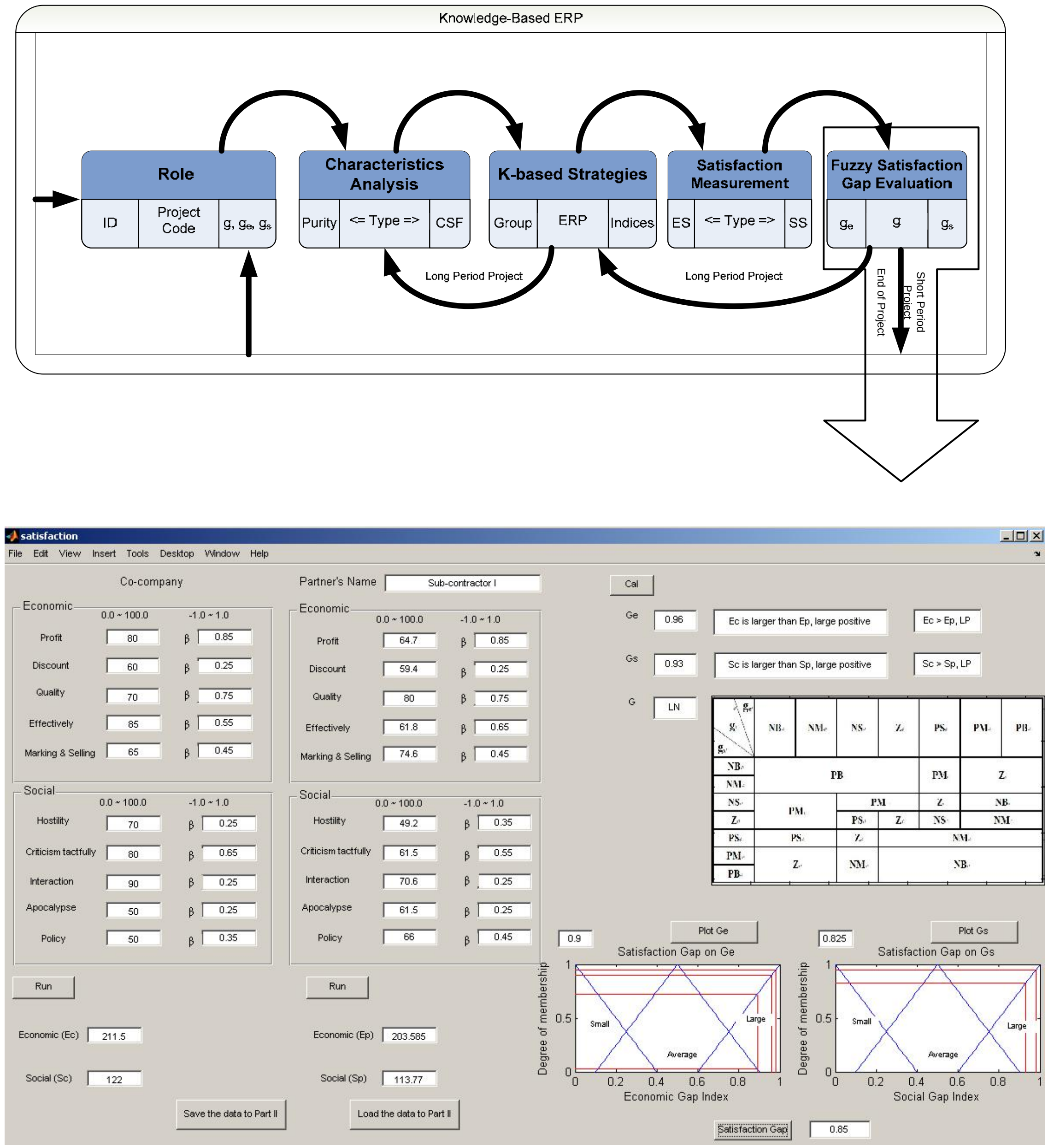


Figure 6.5 Fuzzy Satisfaction Gap Program

A case of satisfaction measurement results for the Macau Telecommunication Company and its partners is shown in Table 6.5 and Table 6.6.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.719	3.456		-.497	.620
	Profitability	.125	.064	.830	1.958	.053
	Discounts	.085	.065	.545	1.303	.195
	Quality	.106	.064	.677	1.668	.099
	Effectiveness	.116	.065	.715	1.804	.074
	Selling and Marketing	.072	.064	.470	1.130	.261
	Loyalty	.091	.063	.648	1.456	.149
	Concern	.116	.066	.945	1.775	.079
	Interactions	.106	.064	.740	1.659	.100
	Apocalypse	.100	.061	.555	1.649	.102
	Policies	.071	.067	.466	1.049	.297

Table 6.5 Results of Satisfaction Factor for Macau Telecommunication Company

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.858	3.185		.897	.376
	Profitability	.039	.075	.209	.515	.610
	Discounts	-.033	.060	-.230	-.551	.585
	Quality	.019	.057	.116	.339	.737
	Effectiveness	-.038	.065	-.191	-.584	.563
	Selling and Marketing	.006	.062	.031	.104	.918
	Loyalty	.038	.057	.247	.670	.508
	Concern	.080	.065	.496	1.222	.231
	Interactions	.011	.056	.072	.199	.844
	Apocalypse	.018	.070	.070	.257	.799
	Policies	.043	.063	.208	.691	.495

Table 6.6 Results of Satisfaction Factor for Macau Telecommunication Company's Partners

The satisfaction coefficients of each factor are inputted to the fuzzy satisfaction gap program. The values of Ec, Sc, Ep, Sp, Ge, Gs, G and Satisfaction Gap were found. Regarding to results, the satisfaction gap is 0.1, which means there is a very large satisfaction gap between this core-company and its partners. They need satisfaction improvement strategies to narrow their gaps. The Beta

Discount and Effective values are negative, so they need to be concerned and search for strategies with the knowledge-based ERP.

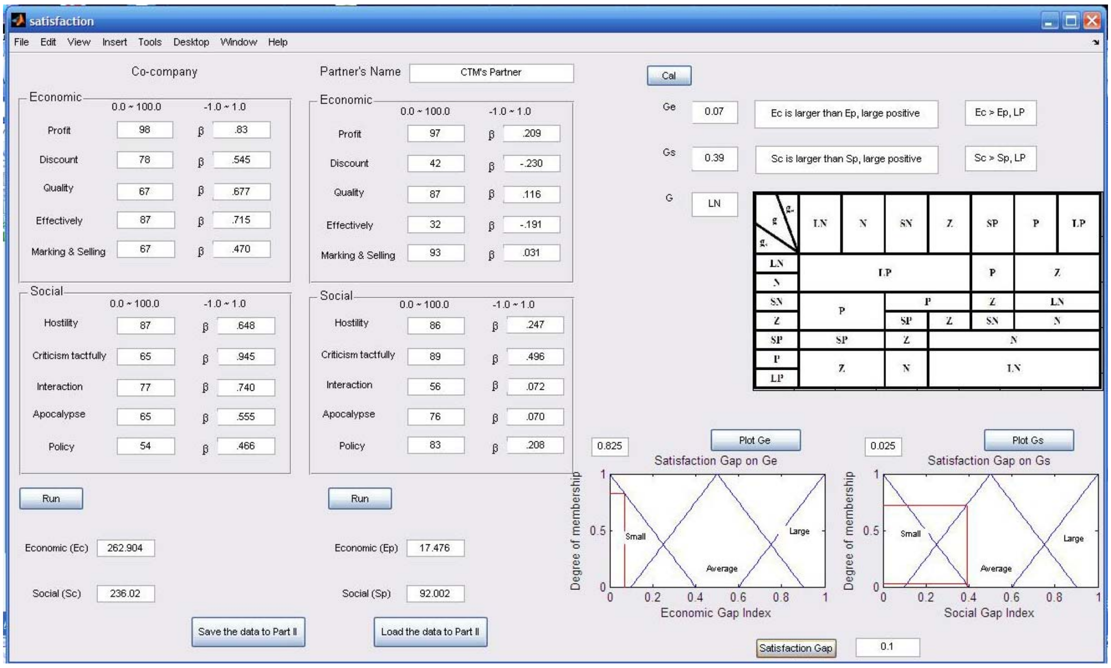


Figure 6.6 Fuzzy Satisfaction Gap Program Result for Macau Telecommunication Company

The feedback satisfaction gap analysis program (refer to figure 6.7) contributes to strategic guidelines. The analyzer can load records that include ten satisfaction factors, g_e, and g_s to evaluate their relationship. It will request the analyzer to adjust their communication, performance, partnership, and decision strategies to evaluate the satisfaction value. The pivotal fusion indexes are separated into four groups as follows:

Group of Pivotal Fusion Indexes	
Communication:	*Partnership:*
No. of jobs (C1) Contract & Bid Cost (C2) Capacity index (C3) Total investment (C4) Special problems (C5)	Honor index (PS1) Budget control index (PS2) Intelligence index (PS3) Knowledge-share level (PS4) Flexibility index (PS5)
Performance:	*Decision:*
Time control index (P1) Quality index (P2) Efficiency index (P3) Joint Solution index (P4)	Satisfaction index (D1) Weakness (disappointed) index (D2) Negotiation index (D3) Experience index (D4)

Table 6.7 Group of Pivotal Fusion Indexes

The core-company and its subcontractors can apply the data from their ERP system or extra-database outside the ERP system to increase or decrease their pivotal fusion indexes to narrow the satisfaction gap. Access to the evaluation methods of the pivotal fusion indexes are recommended in two ways that are tangible and intangible. The tangible evaluation method is suitable for application in the number of jobs, contract and bid cost, capacity index, total investment, time control index, quality index, efficiency index, and budget control index. The intangible evaluation method is suitable for application in the in joint solution index, honor index, intelligence index, knowledge-share level, flexibility index, satisfaction index, weakness index, negotiation index and experience index.

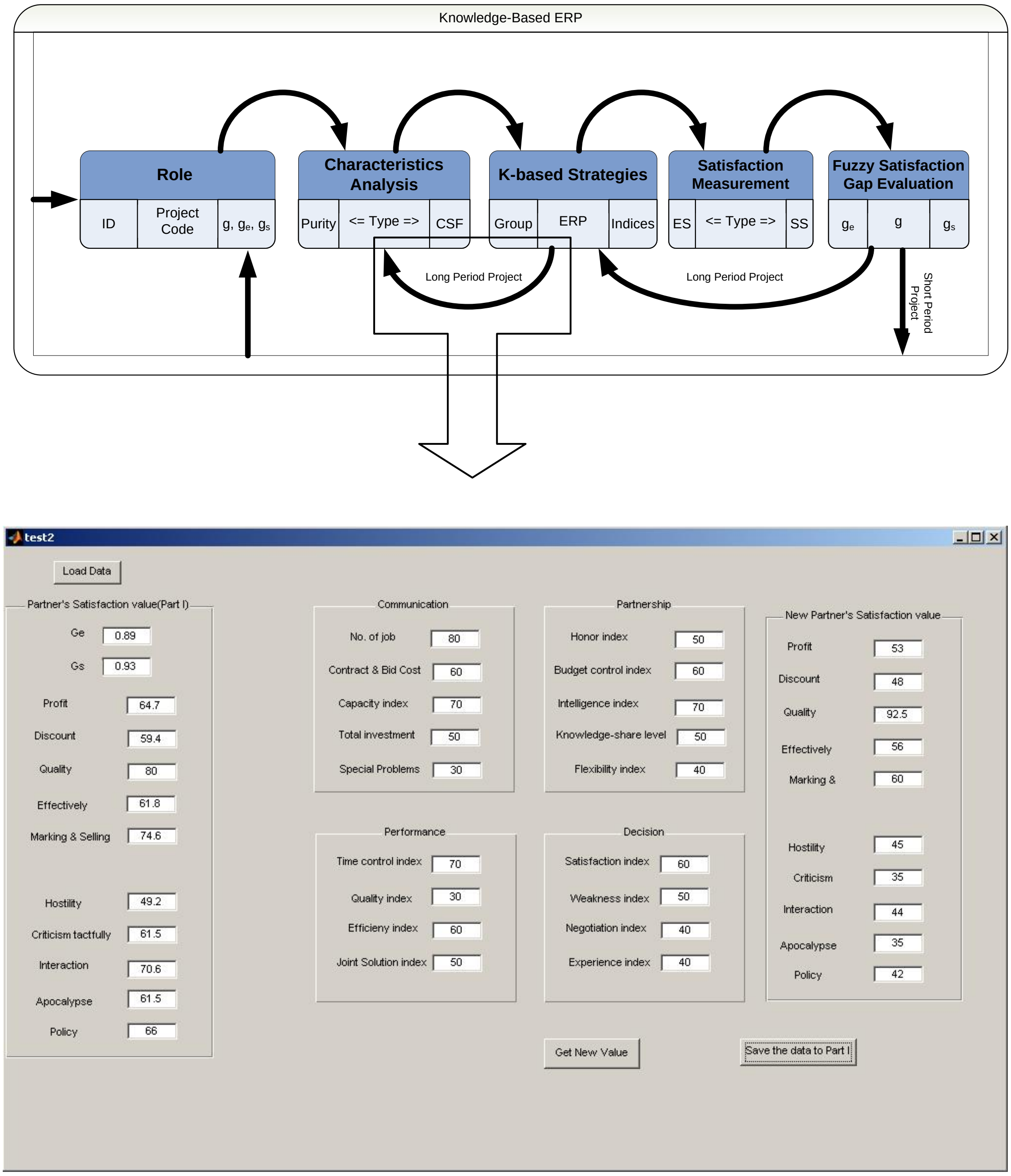


Figure 6.7 Feedback Analysis for Satisfaction Gap

The feedback logic is based on the impact factors of the pivotal fusion indexes (PFI), that cluster seven indexes in the social group and eleven indexes in the economic group to assign the adjustable priority (AP). Moreover, this adjustable priority will also be affected according to its investments in enterprise capacity, level of partnership and adjustable limitation. This AP value works with g_s or g_e

values to calculate the adjustable level of each PFI. The updated satisfaction gap can be measured under the new PFI with the new cooperative project. It can validate its contributions through the simulated result by the fuzzy feedback analysis.

This closed-loop satisfaction modification is thus discriminative in the general discussion of partnership development. It can respond more effectively to the satisfaction gap in the knowledge-based ERP database and address the problems in partnership development.

Although this concept needs to be developed together with the extra-knowledgebase in the ERP system, the return of its tangible and intangible benefits can enrich the competitive advantages of both parties in facing globalization. The partners can determine effective g_s and g_e values to adjust their influence strategies. This kind of knowledge will enhance their self-improvement senses, oriented to both parties.

6.4 Objective Relationship Model Implementation

Traditional approach of satisfaction measurement for partnership development only conducts the one-side satisfaction measurement of economic and social aspects (Lai, 2007; Rodríguez et al., 2006; Geyskens and Steenkamp, 2000). When they meet the problems in partnership development, they will define and determinate the strategies such as Hard Coercive strategies, Promise strategies, Request strategies, and Perception Altered strategies based on their own satisfaction measurement result Nevertheless, the cooperation of core-company and its partner are required for these strategies. If they have the satisfaction gap in the strategies, it will affect the health growth of their relationship.

A promotion for a shared understanding (meaning a smaller satisfaction gap) of the cooperative relationship between the electronic components suppliers and the aerospace suppliers was suggested by Forker (2000) for the improvement of their competitive relationship Nevertheless, in this study, only T-Tests were used for the analysis of the customers and suppliers for their different point of views on the quality management practices and cooperative development practices, with the lack of the further inquires on how to improve the strategies of satisfaction gap in order to narrow down the differences of the gap.

The methodology of this research is proposed to conduct the satisfaction measurement that targets to classify the characteristics of both parties. Their characteristics are defined by their economic satisfaction gap, social satisfaction gap and total gap. The gap value is calculated through the satisfaction measurement results and artificial intelligence program which is designed by using fuzzy logic methodology in this research. Their total satisfaction gap index can be gained by the fuzzy satisfaction gap program with economic satisfaction gap and social satisfaction gap. Therefore, this objective relationship model is named as ***minimizing satisfaction gap model***. Two main layers of their characteristics are Pure E&S Satisfaction Gap and CSF. The attributes of each company, including the core-company and its partners, are identified and saved in the knowledge-based ERP system.

Their attributes are updated with regard to the feedback of satisfaction improvement strategies of each project. The fuzzy satisfaction gap program supports the adjustment of their attributes. Therefore, the strategy offer and characteristics definition are accessed by objective monitoring system. This is different from traditional satisfaction measurement or balance scorecard that will take the subjective actions after reviewing the measurement results.

The advantage of applied ERP system in this knowledge-based model is to reduce the workload of data collection and manpower investment in the implementation. Section 4.2 Fuzzy Sets in Satisfaction Harmony through Bi-indexes Analysis discussed about the data support of ERP.

This satisfaction gap analysis can be supported by the information flows of IDEF1X of the Working Performance (A2) (refer to figure 3.8). The knowledge records of the ERP system, including Communication, Performance, Partnership, and Decision, are clustered into a Social group and an Economic group.

The Social group including:

- *Special problems (C5) **
- *Honor index (PS1) **
- *Knowledge-share level (PS4) **
- *Flexibility index (PS5) **
- *Satisfaction index (D1) **
- *Weakness (disappointed) index (D2) **
- *Experience index (D4) **

The Economic group including:

- *No. of jobs (C1)*
- *Contract & Bid Cost (C2)*
- *Capacity index (C3)*
- *Total investment (C4)*
- *Time control index (P1)*
- *Quality index (P2)*
- *Efficiency index (P3) **

- *Joint Solution index (P4) **
- *Budget control index (PS2)*
- *Intelligence index (PS3) **
- *Negotiation index (D3) **

This kind of data is defined with Pivotal Fusion Indexes. It can be fully captured from the ERP database in the ideal case. However, the enterprise generally deals with the common economic data in an ERP system. Most of the data for the social satisfaction index and special satisfaction index for the economic aspect, that are remark by a star (*) are necessary for building up an extra-database outside the ERP system to support the fuzzy analysis.

In case the companies can gain the data from their ERP system, they can reduce their workload that arranges the manpower to collect the data for supporting the analysis of pivotal fusion indexes. It can enhance the feasibility of the knowledge-based model for the application on the enterprises. The ERP modules can support the relevant data to the pivotal fusion indexes as follows:

- Project management module: no. of jobs (C1), contract & bid cost (C2), capacity index (C3), time control index (P1), efficiency index (P3);
- Financial control module: contract & bid cost (C2), total investment (C4), budget control index (PS2);
- Quality management module: time control index (P1), quality index (P2), efficiency index (P3);
- Customer relationship management module: satisfaction index (D1).

However, the satisfaction index and efficiency index are necessary for the further analysis after the relevant data are captured from the ERP modules. Although SMEs are hard to afford the international level of ERP systems such as SAP, Oracle and Infor, they can generally use the national level of ERP systems such as Kingdee, UFIDA, DCMS, NEWGRAND, BOKE, HJsoft, Neusoft, RIAMB Software and Genersoft (refer to China ERP Market Annual Report 2006). Therefore, applied ERP system in supporting this knowledge-based model design of partnership development with core-company and their partners (SMEs) is reasonable and feasible.

Nevertheless, there is disadvantage in this model development for the use of the ERP data because different ERP systems are being used in different industries, thus different data formant is the bottleneck in the implementation of this concept. Fortunately, the contemporary researches are discussed with integrating multiple ERP systems to comply with the Sarbanes-Oxley Act (SOA) in an Enterprise Application Integration (EAI) environment (Maurizio et al., 2007). It is suggested to use “Open Hub” method to integrate multiple ERP systems. Therefore, the communication problems of multiple ERP systems can be solved.

The roadmap for the implementation of knowledge-based ERP system of partnership development is recommended to generate five rounds (refer to figure 6.8). The core-company and its partners are necessary to establish the mechanism of satisfaction gap measurement in the first round. This mechanism conducts both parties to have the structure to monitor their economic satisfaction and social satisfaction with regard to the fixed period of their cooperation. This is an important start point in this system development. Moreover, both parties need to establish a department of data communication for partnership development in the first round, because they need to handle the multiple sources of data in the initial phase.

The major efforts of data communication department in the second round are to contribute in managing available economic and social satisfaction data with individual ERP system. It also needs to organize the working team for building up extra-database of partnership development. Some available and valuable data from ERP system that is discussed in section 4.2 can suitably support the knowledge-based partnership development. Core-company and its partners are necessary to take the following actions for ERP system:

- Identify the characteristics of relevant data for knowledge-based partnership development (Preparation phase of knowledge-based system);
- Establish the updating and monitoring mechanism of the relevant data;
- Homogenizing data for both parties in case using different ERP systems (Preparation phase of Open Hub method for integrating multi-ERP system).

The main task of the working team for extra-database in second round is concentrated on:

- Identify the characteristics of target data:
  - Social satisfaction aspect
  - Partial economic satisfaction aspect
- Search and identify the data source.

As the mechanism of satisfaction gap measurement is established for both parties, the attributes of the core-company and its partners can be analyzed in accordance with pure E&S satisfaction gap and CSF. This is an important milestone of the second round, because the satisfaction improvement strategies can be objectively assigned to both parties regarding their scientific attributes.

The third round of KBERP system enters the main structure of the system. The companies need to consider the plug-compatible ERP problems. The open hub method is recommended to solve this problem with EAI and SOA for integrating multi-ERP systems. The companies can test the homogenizing data for both parties. Moreover, they need to collect the target data in accordance with the data source that is searched by second round. Knowledge-based indexes can be calculated and obtained according to the data analysis of satisfaction measurement. The satisfaction improvement strategies (SIS) can be defined by the factor analysis of satisfaction gap measurement. This blueprint can objectively enhance the satisfaction level for both parties.

The fourth round of KBERP system is the final testing phase. Fine-tuning the open hub method on the application of the extra-database is required by the companies. Moreover, they can test the performance of SIS with regard to the case studies. The knowledge-based system is built up by the knowledge-based indexes. It can work with the case studies of SIS to validate the precision level. Nevertheless, the companies may meet the barriers to develop the knowledge base special of SMEs. Riege (2005) discussed three-dozen knowledge-sharing barriers in accordance with three dimensions:

- Potential individual barriers;
- Potential organizational barriers;
- Potential technology barriers.

Therefore, the feasible guideline is recommended and divided into three sections. The first section in the conceptual framework with the basic concepts likes tangible resources (data of economic satisfaction) and intangible resources (data of social satisfaction) which can be defined by SECI model (Nonaka and Konno, 1998). McGinnis (2007) also recommended for the application with SECI model in incorporating KM into ERP continuous improvement. This is an effective model to help the SMEs to convert their tacit knowledge into explicit knowledge. There are four possible conversion paths between these two types of knowledge: Socialization (S), Externalization (E), Combination (C), and Internalization (I). In an organization, knowledge can be retained at three levels:

individual (i), group (g), and organization (o). Once their tacit knowledge has been created, it can be formalized and standardized in order to be communicated in groups, which leads to explicit knowledge. Once explicit knowledge is created, it can be combined with other explicit knowledge and expressed in a format that can be retained at the organizational level. The application of explicit knowledge can support the development of the knowledge-based system.

The second section concentrates on solving the potential technology barriers. SMEs lack integration of IT systems and processes. Moreover, they lack training regarding the employee familiarization of the new IT systems and processes. The workload of developing knowledge-based system in the field of technical support consideration may downgrade the cooperative motivation for the partnership development. Therefore, this is recommended that the core-company can select the potential partner to cooperatively build up the benchmark for other partners. The core-company can offer the technical support to this potential partner. They can base on the fuzzy satisfaction gap program that is developed by this research to custom-made their own knowledge-based system, and then they can transfer this technical model to other business partners. Thus, SMEs can reduce their workload and technology barriers in the development of knowledge-based system. Actually, this prototype of fuzzy satisfaction gap is one of the main contributions in this research. Since the contemporary researches in the field of objective partnership development are lacking in prototype to support the concept development of scientific satisfaction gap measurement for the enterprises, this research can show the template to the core-company and its partners.

The final section of the guidelines suggests that both parties have a data communication mechanism. They need to standardize their data format for the application of the knowledge-based system. Moreover, they need to make sure that the data are updating. The data and knowledge sharing level can be classified by the knowledge-based system.

Finally, the final (fifth) round of KBERP roadmap is the inspection phase. The core-company and its partners need to fine tune the multi-ERP system communication and knowledge-based ERP system for better communication. The main task in the system test is to debug the Pivotal Fusion Indexes in different ERP system. Since these indexes are necessary to support the fuzzy analysis of economic satisfaction, social satisfaction and total satisfaction, the testing process will work with the knowledge-based system. The performance measurement of SIS will calibrate with satisfaction level. This round can inspect the total performance of KBERP system of objective partnership development.

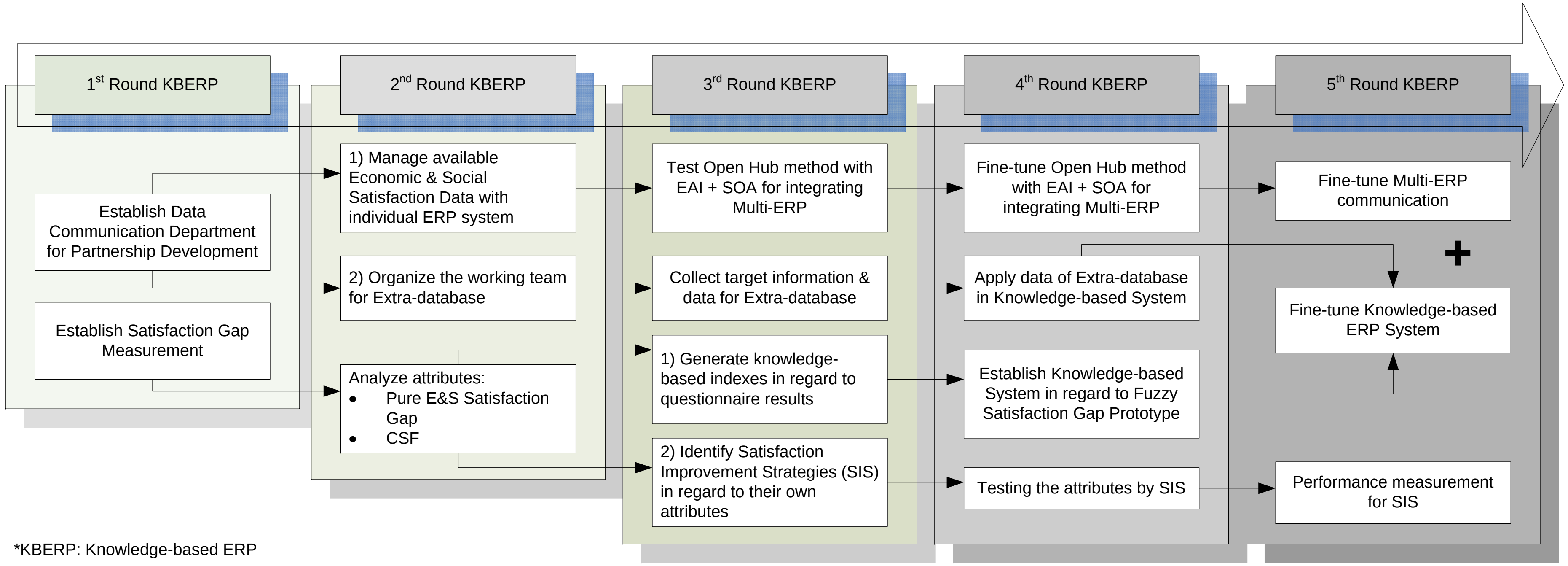


Figure 6.8 Roadmap for Knowledge-based ERP System of Partnership Development

6.5 Validation of the Model

The minimizing satisfaction gap model is focused at a compromise approach of partnership development between the core-company and its partners which adopts open tender but still retain the closely knitted relationship that allows the continuous flow of information to ensure quality. Therefore, the investigation of its feasibility in the service industries is very important for the model validation. This validation method is that the minimizing satisfaction gap model was introduced to the six relevant service industries such as Macau Power Station, Macau Telecommunication Company and their partners. Their senior staffs such as superior, manager and director were invited to attend the workshop.

The setting and background of the research project were introduced in the workshop. The participants understood that this research has done in a very unique environment of the former Portuguese enclave of Macau which now has become a Special Administrative Region of China. Macau has experienced exponential growth but still retained her ways of doing business in a small closely knitted society. Moreover, the objectives of this research were highlighted on the use of a more open and transparent method to narrow down the gaps between different perspectives of good partnership development through harmonizing satisfaction. As the minimizing satisfaction gap model is explained to profound theories in simple language by the case study in the workshop, the participants are thus attracted by this research project.

As a further validation for the feasibility of this model is required, so we worked together with the participants for the investigation on the major factors having influence on the application and implementation of the minimizing satisfaction gap model in this workshop. Whereas the minimizing satisfaction gap model should be more effective in improving the partnership development, therefore, the efficiency factor should be included in the questionnaire survey. Moreover, the partnership development is more transparent when applying this model, such that the motive for partnership to continuation will be higher. Meanwhile, core-company and partner can objectively find out their satisfaction gap with regard to the analysis results of the model.

Their relationship is looking forward to enhancing in accordance with the scientific satisfaction improvement strategies and full-scale analysis. The sustainability of the partnership is thus increased based on the results of this model through an objective angle. Nevertheless, the core-company and its partner can systematically find out their cooperation problems and figure out how the technical level and the feasibility of this model are acceptable and reasonable in this research project. Therefore, ten major factors based on the above considerations are discussed in the questionnaire survey (refer to Appendix A2) as follows:

- Efficiency
- Transparence
- Objectivity
- Relationship Enhancement
- Overall Consideration
- Sustainability
- Scientific Modification

- Systematic Contribution
- Technical Consideration
- Feasibility

The data collected used in the questionnaire is presented in Tables 6.8 and 6.9. Table 6.8 shows the contribution level of each critical factor of the minimizing satisfaction gap model. Perception was assessed on a five-point rating scale with 5 being “strongly agree” and 1 being “strongly disagree”. Therefore, an average score of 3 or above can be taken as indicating perceived contribution of the model. The average scores of all factors are greater than 3. It shows that they agree with the contributions of this model in improving partnership development. As can be seen from table 6.8, “Objectivity” had the highest mean score of 4.1667. The result indicates that the objectivity factor is the main contribution, which the representatives of the relevant industries concern in this model. Moreover, it is shown in the result that “Overall Consideration” and “Scientific Modification” factors are of the same importance for improving partnership development.

In fact, the factors of efficiency, transparence and systematic contribution do help to advance the relationship improvement in partnership development, and hence enhancing their competitive advantages. In addition, the sustainability of the partnership is increased that based on the results of this model. Thus, the survey results show the positive comments to the model. Mr. Raymond Tam who is the senior manager of the building service company comments that their company is looking forward to applying this useful model to improve the cooperation relationship. Mr. Scott Ma who is the senior manager of Macau Telecommunication

Company comments that this model is suitable to be applied in their company. Moreover, they expect the real system of this model can provide the systematic satisfaction improvement strategies. Their expectation is a perfect match to the further study of this model.

	Mean	Std. Deviation
Efficiency	3.8333	0.57735
Transparence	3.8333	0.83485
Objectivity	4.1667	0.57735
Relationship Enhancement	3.4167	0.51493
Overall Consideration	4.0000	0.85280
Sustainability	3.7500	0.62158
Scientific Modification	4.0000	0.85280
Systematic Contribution	3.8333	0.71774
Technical Consideration	3.6667	0.65134
Feasibility	3.3333	0.65134

Table 6.8 Critical Factor Analysis for Minimizing Satisfaction Gap Model

Table 6.9 shows the further analysis of the relationship of the critical factors. Nine factors that are efficiency, transparence, objectivity, relationship enhancement, overall consideration, sustainability, scientific modification, systematic contribution and technical consideration are analyzed with dependant variable ‘Feasibility’ by multiple regression analysis method. The results enable us to see which among the nine independent variables is the most important in explaining the feasibility of the model.

Eight factors including efficiency, transparence, objectivity, relationship enhancement, overall consideration, scientific modification, systematic contribution and technical consideration are significant at the 0.05 level. Moreover, the beta weight of efficiency and objectivity factors are greater than 0.89. It shows the model can succeed in applying to the industry because both the efficiency and objectivity factors are having good contributions to the partnership development. Meanwhile, overall and technical consideration can satisfy the needs of the industries because of around 0.5 beta weighting in the results. The companies are thus willing to try using this model in their relationship improvement. Respondents were generally in agreement with regard to systematic contribution and relationship enhancement as being the key considerations of the feasibility for the model. Therefore, the following key findings are revealed from the empirical analyses: this model was generally accepted by the industries and this model could be used for improving efficiency and objectivity in partnership development.

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-7.779	0.493		-15.773	0.004
	Efficiency	1.011	0.059	0.896	17.149	0.003
	Transparence	-0.189	0.038	-0.242	-4.997	0.038
	Objectivity	1.005	0.101	0.891	9.919	0.010
	Relationship Enhancement	0.437	0.059	0.345	7.409	0.018
	Overall Consideration	0.428	0.044	0.560	9.798	0.010
	Sustainability	-0.197	0.062	-0.188	-3.191	0.086
	Scientific Modification	-0.537	0.043	-0.703	-12.405	0.006
	Systematic Contribution	0.424	0.051	0.467	8.339	0.014
	Technical Consideration	0.499	0.051	0.499	9.838	0.010

[a] Dependent Variable: Feasibility

Table 6.9 Multiple Regression Analysis Results for Feasibility Evaluation

6.6 Summary

In this chapter, advanced fuzzy analysis is recommended to be applied in the adjustment of the satisfaction gap, with the knowledge-base ERP system. This fuzzy satisfaction gap algorithm can help the core-company to find out the problems existing between its partners and itself. The values of g, g_e, and g_s can effectively guide the management of the core-company to cover one or more critical bottlenecks to develop or enhance the satisfaction level. These strategic indexes can helpfully support the enterprise to develop a healthy partnership.

The knowledge-based ERP can provide the characteristic IDs to the partnerships, and this valuable data will help to indicate the satisfaction improvement strategies with regard to the fuzzy analysis of the satisfaction gap indexes. Confusing satisfaction factors (CSF) strategies are recommended when the satisfaction gap is too large. Class I of the CSF strategies are recommended to be used when the partnerships are more concerned with policy factors. Class II of the CSF strategies are recommended to be used when the partnerships are more concerned with loyalty factors.

The strategies have two main directions, except in the cases of the largest total satisfaction gap, namely economic satisfaction and social satisfaction. The core-company has the clear-cut groups that are purely profit driven, quality driven, policy driven and loyalty driven types. Nevertheless, the characteristics of the partners are more confusing, although they can search for the types in accordance with their profitability and effectiveness trends for economic satisfaction. The feedback analysis for satisfaction gap can respond more effectively to the satisfaction gap in the knowledge-based ERP database and address the problems in partnership development. Moreover, the model has been introduced to the relevant industries for validation and is generally accepted by the industries.

CHAPTER 7 CONCLUSION

Partnership development of a service provider is facing many challenges in the dynamic global market environment. It can be affected by its expectations, communication behavior and appraisal processes, while outcomes are satisfaction, commitment, and value creation processes. The impact of the satisfaction level in partnership development has been investigated widely in the contemporary researches. However, they are mainly focused in one way measurement (core-company side or partner side), and ignored the impact of the satisfaction gap in partnership development. Partnership development is the same as marriage, in that it cannot fully develop when only one side is satisfied.

This research addresses the disadvantages of simple fuzzy analysis with regard to the satisfaction gap in partnership development. Advanced fuzzy analysis is recommended for application in the adjustment of the satisfaction gap, with the knowledge-base ERP system. Nine aspects of the satisfaction gap between the core-company and partners are classified. A bi-indexes algorithm is developed and is driven by the fuzzy satisfaction gap programming method.

This fuzzy satisfaction gap algorithm can help the core-company to determine the problems between its partners and itself. The values of g, g_e, and g_s can effectively guide the management of the core-company to choose one or more critical bottlenecks to develop or enhance the satisfaction level. These strategic indexes can helpfully support the enterprise to develop a healthy partnership.

The extra-database development of the ERP system is the bottleneck of this concept, because the generic ERP database tends to handle the economic data aspect. The enterprise may be requested to invest in the cost of human resources to build-in this extra-database for the social aspect and some special economic aspects when they want to fully develop this new partnership development model.

Satisfaction measurement is often done in isolation from one single side of the partnership, often from the side of the core company. Although this approach may be adequate to achieve social and economic results in the case of a small circle with close relationship, it is unable to be competitive in a dynamic world where new partnerships have to be developed from time to time. Therefore, satisfaction gap measurement is recommended in this research.

The results of the satisfaction gap measurement questionnaire survey have shown that the main expectations of profitability include profit (economic consideration), profit (social consideration) and total investment, are the same. Thus, Hypothesis 1 has been supported. When the cooperation meets obstacles that are relevant to profitability in partnership development, the suggestion is to take actions with regard to these three factors. Otherwise, strategies are necessary concerning the different expectations of the core-company and partner in the Win-Win situation and in Contract & Bid Cost factors.

Moreover, the Core-company and Partner have the same opinion on discount factors. Nevertheless, the discount factor cannot contribute to long-term relationship development in a dynamic partnership environment, because further discussion in factor analysis for the economic satisfaction of partners has shown that the discount is a single group by itself and its coefficient is -0.565. It means that the partners don't prefer "discount" to contribute to partnership development. Thus, Hypothesis 2 has not been supported.

Although the core-company and partner appreciate the contribution of the quality factor, Hypothesis 3 has not been supported. Meanwhile, the core-company is focused more on Quality in its business. This is a valuable signal to determine the satisfaction improvement strategies, because the priority of satisfaction factors for the core-company and partner is at the same level, which belongs to second priority, with regard to the descriptive result of the ten satisfaction factors.

All factors' effectiveness means have no significant differences. Moreover, the values are very high in that "Efficiency", "Capacity", "Time control" and "Intelligence" are close to 4. These factors are quite sensitive in enhancing the satisfaction level of the core-company and partner. Therefore, Hypothesis 4 has been substantiated.

Although the reputation means of the core-company and partner are 3.9617 and 3.7500 respectively, the t-test results prove that they need the same level of selling and marketing support. Hence, Hypothesis 5 has been supported.

Nevertheless, the null Hypothesis 6 has not been supported. The roles of partnership and the choices of economic factors will be dependent. Thus, the choices of economic factors will be changed with regard to different roles. The design of economic strategies for partnership development needs to consider different expectations in economic factors for different roles.

According to the economic satisfaction factor analysis results for core-companies, it shows that the core-companies have two special styles, namely purely profit driven and quality driven. The purely profit driven style of core-companies only concentrates on the contribution of profitability factors in partnership development. The quality driven style of core-companies is double characteristics, because normally it only concerns “effectiveness”, “selling and marketing”, “quality” and “discount” to enrich satisfaction. This style of core-companies ignores the contribution of profitability factors that affect partnership development. However, in the case where the quality driven support is not working, the second strategy should be adopted. Quality-profit hybrid is another style for core-companies. They only consider “effectiveness” and “profitability” to enhance the satisfaction level of partnership development. Its characteristics are the same as those in the second class of the quality driven category, except “specialization”.

However, the characteristics of the partners have three classes of quality-profit hybrid with regard to the factor analysis results of the economic satisfaction for partners. The expectation of quality-profit hybrid will be decreasing from Class I to Class III. There is a type of partners that strongly dislike applying a discount to keep a healthy relation-ship, so care is needed in this situation.

The expectation of loyalty is the same for partnerships with regard to the null Hypothesis 7 being significant. Moreover, the responsibility mean is a top priority for consideration between both parties. It is thus most important for both parties in field of loyalty factors. Further discussion in factor analysis for CSF analysis that “loyalty” was used instead of “policy”, as the CSF analysis found that “selling ability” has a strong relationship with “reputation” and “responsibility”. Hence, the image of the core-company is quite important when the partners emphasize their partnership building with regard to “selling ability”.

The criticism and weakness means of the partner are greater than the core-company. Nevertheless, the trust means of the core-company and partner are the same. Therefore, Hypothesis 9 has been substantiated in that the partner appreciates the concern strategies more than the core-company.

Communication is the most important aspect for both the Core-company and the Partner. The communication and right decisions means are around 3.8. Moreover, different partnership roles have a consistent expectation in these two factors. Hence, the mutual interaction strategies are important in improving partnership development. Hypothesis 10 has been thus supported.

The opinions for special problems are similar for both parties. However, there are different expectations of “apocalypse” from the core-company and partner. Moreover, the needs of apocalypse are higher for the partner, although normally the apocalypse factor may be ignored in partnership development. Thus, Hypothesis 11 has not been supported.

Hypothesis 13 has not been substantiated. Hence, culture factor opinions are different between the core-company and partner. When the cooperation is affected by the culture background, the satisfaction improvement strategies are such that the partner is more concerned with the culture factor. Moreover, the policy and experience factors effectively support the policy strategies for partnership development.

The policy factor belongs to the sixth level of the core-company and the fifth level of the partner with regard to the descriptive result of impact factors of partnership development by different roles. Thus, the policy factor is important for both parties. Hypothesis 12 has been supported. Moreover, the core-company and partner are in a clear-cut group of pure social inferences that supports the policy factor when these are analyzed by the CSF analysis. On the other hand, the core-company can have a strong policy group or a weak policy group after the factor analysis for social satisfaction. The policy trend effectively supports the policy driven group and loyalty driven group too.

The choices of social factors are independent with regard to different roles. Thus, it is quite hard to handle social satisfaction problems according the subjective satisfaction approach, because contemporary satisfaction improvement strategies often lack of support from objective data.

Two main attributes of core-companies are policy driven and loyalty driven with regard to factor analysis of the social satisfaction for the core-company. Some partners are more concerned about contributions to policy enhancement. However, the loyalty driven is found in conventional partnership development. “Trust” is appreciated in building the relationship. Moreover, good policy support is effective in policy driven and loyalty driven.

Although partners cannot be separated in a group through factor analysis, taking the correlation coefficient and chain-reaction weight into consideration will be helpful to show a clean-cut. It is assumed that a greater chain-reaction weight can enrich the satisfaction level for partners according to “policy”, “loyalty” and “concern”. The contributions of “interaction” and “apocalypse” in narrowing the satisfaction gap are often mixed together and cannot be separately identified for this kind of partner.

Issues such as the cultural difference and individual factors will affect the measurement of satisfaction. The survey result proves that the core-companies and their partners acknowledge the contribution of economic profit in partnership development. At the same time they do not ignore other factors that can contribute to partnership development. The data analysis also shows that both parties are quite unclear with regard to satisfaction, so this research is valuable in clarifying the satisfaction gap.

Four satisfaction factors, including effectiveness, concern, selling and marketing, and policy, are fuzzy and are most important in partnership development, as a result of the analysis of the questionnaire. The effective groupings by factor analysis in full-scale analysis (anatomic characteristics) of economic satisfaction and social satisfaction further validate our findings in CSF. It does not only support the core-companies or partners to determine their characteristics in CSF, but also extend the findings to develop an objective relationship model. This objective relationship model can focus the solutions on the characteristics for recommending corrective actions to narrow the satisfaction gap. Moreover, the effective knowledge-based indexes derived from the effective grouping of the factor analysis can be used to further enrich the partnership development.

The social satisfaction gap of the partners is quite fuzzy with regard to partnership development. When the partners have problems in social satisfaction, the core-companies can take action, otherwise, the relationship will deteriorate or fall apart.

This research contributes to the general discussion on partnership development not only in traditional actions such as *Exit, Voice, Loyalty, and Neglect*. It also provides an objective and scientific method to maintain relationships and healthy growth. It is a challenge to do research on the area of engineering management because it is necessary to convert the tacit concept to an explicit model.

The partnerships can capture their characteristic IDs from the knowledge-based ERP. These valuable data will help to indicate their satisfaction improvement strategies needs with regard to fuzzy analysis of the satisfaction gap indexes. When the satisfaction gap is too large, they need to use the CSF strategies. There are Class I and Class II strategies to clear up the cloudiness in relationship development.

Class I and Class II of the CSF strategies are applied that cover the relationship development problems with regard to the partnership records in the knowledge-based ERP system. Class I of the CSF strategies are recommended to be used when the partnership is more concerned with policy factors. Class II of the CSF strategies are recommended to be used when the partnership is more concerned with loyalty factors.

The purity economic satisfaction factors strategies are suggested to solve the relationship development problems, except in the cases of the largest total satisfaction gaps. The strategies have two main directions, namely economic satisfaction and social satisfaction. The core-company can easily find out their problems, because they have the clarifying groups that are purely profit driven, quality driven, policy driven and loyalty driven types. However the situations of their partners are more complex. They have different expectations in economic satisfaction and social satisfaction in the CSF analysis except for those who can clearly sense their needs in social satisfaction concerning policy characteristics.

Updating satisfaction gap measurement is recommended for both long period project cooperation and short period project cooperation. Long period project cooperation is necessary to review the satisfaction level during the short fixed period. Otherwise, the relationship will be damaged after the problems are enlarged. On the other hand, short period project cooperation can review near the end of the project. This updated result will be stored in the knowledge-based ERP system for further improving the relationship.

The satisfaction improvement strategies will be modified according to the new data from the knowledge-based ERP system, for different partnerships. The core-company and partner can follow these objective and scientific data and knowledge to modify their partnership development concept by objective methodology. The new concept will change their attitude and behavior for improving the relationship. Thus, this research can be successful in developing an objective system for relationship development. Moreover, the model has been introduced to the relevant industries for validation and is generally accepted by the industries.

Limitations of this research are the tests for feedback analysis of the satisfaction gap measurement, because it is necessary to monitor two or more projects with same core-company and its partner, and review the improvement. Thus, this is a longitudinal study. It is expected to cooperate with Macau service industries, such as the Macau Power Station, to monitor their partnership development. The results of such future longitudinal studies can further validate the effectiveness of this objective system for relationship development.

REFERENCES

Adler, P., Goldoftas, B., Levine, D. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system, *Organization Science*, Vol. 10, pp. 43–68.

AI-Mashari, M. (2003). Enterprise resource planning (ERP) systems: a research agenda, *Industrial Management & Data Systems*, Vol. 103 No. 1, pp. 22-27.

Badiru, A. B. (1998). Expert Systems and Industrial Engineers: A Practical Guide to a Successful Partnership, *Computers & Industrial Engineering*, Vol. 14 No. 1, 1998, pp. 1-13.

Bantham, J. H. (1998). Toward a better understanding of the dynamics in buyer-supplier partnerships: an exploratory study of partnering dyads from multi-functional perspectives. *Unpublished Dissertation Syracuse University*.

Bantham, J. H., Celuch, K. G., Kasouf, C. J. (2003). A perspective of partnerships based on interdependence and dialectical theory, *Journal of Business Research*, Vol. 56, pp. 265-274.

Barry, J., Aparicio M. et al. (1998). NIIIP-SMART: An Investigation of Distributed Object Approaches to Support MES Development and Deployment in a Virtual Enterprise, *IEEE*.

Bedford, T., Cooke, R. (1999). A new generic model for applying MAUT, *European Journal of Operational Research*, Vol. 118 No. 3, pp. 589-604.

Benton, W. C., & Maloni, M. (2005). The influence of power driven buyer/seller relationships on supply chain satisfaction, *Journal of Operations Management*, Vol. 23, pp. 1-22.

Blumberg, D. F. (1998). Strategic assessment of outsourcing and downsizing in the service market, *Managing Service Quality*, Vol. 8, pp. 5-18.

Bonaccorsi, A., & Lipparini, A. (1994). Strategic partnerships in new product development: An Italian case study, *Journal of Product Innovation Management*, Vol. 11 No. 2, pp. 134-145.

Brax, S. (2005). A manufacturer becoming service provider – challenges and a paradox, *Managing Service Quality*, Vol. 15 No. 2, pp. 142-155.

Brown, A. D., Boyett, I., & Robinson, P. (1994). The Dynamics of Partnership Sourcing, *Leadership and Organization Development Journal*, Vol. 15 No. 7, pp. 15-18.

Brownell, J., Reynolds, D. (2002). Strengthening the F&B Purchaser-Supplier Partnership: Actions that Make a Difference, *The Cornell Hotel and Restaurant Administration Quarterly*, Vol. 43 No. 6, pp. 49-61.

Bryans, P. (1999). Partnership in practice: what can be learned?, *Industrial and Commercial Training*, Vol. 31 No. 7, pp. 272-276.

Buxmann, P., König, W. (2000). *Inter-organizational Cooperation with SAP Systems: Perspectives on Logistics and Service Management*, Springer.

Celuch, K. G., Bantham, J. H., & Kasouf, C. J. (2006). An extension of the marriage metaphor in buyer-seller relationships: An exploration of individual level process dynamics, *Journal of Business Research*, Vol. 59, pp. 573-581.

Chao, X., Liu, L., Zheng, S. (2003). Resource Allocation in Multisite Service Systems with Intersite Customer Flows, *Management Science*, Vol. 49 No. 12, pp. 1739-1752.

Chen, F. C. Y., Chen, C. (2003). The effects of strategic alliances and risk pooling on the load factors of international airline operations, *Transportation Research Part E: Logistics and Transportation Review*, Vol. 39 No. 1, pp. 19-34.

Chen, I. J. (2001). Planning for ERP systems: analysis and future trend, *Business Process Management Journal*, Vol. 7 No. 5, pp. 374-386.

Chen; S., Xu, D. (1994). KBMDL: a knowledge based model description language for decision support, *Tools with Artificial Intelligence, Proceedings, Sixth International Conference*, pp. 696-699.

China ERP Market Annual Report 2006, *Internet-based Business Information Provider* (http://www.analysys.com.cn/)

Choy, K. L., Lee, W. B. (2002). A generic tool for the selection and management of supplier relationships in an outsourced manufacturing environment: the application of case based reasoning, *Logistics Information Management*, Vol. 15 No. 4, pp. 235-253.

Darr, E. D., Kurtzberg, T. R. (2000). An Investigation of Partner Similarity Dimensions on Knowledge Transfer, *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 28-44.

Divate, V., Saengpongpaew, P. (2002). An online integrated operational decision support system with predefined knowledge base for semiconductor industry, *Engineering Management Conference (IEMC '02), IEEE International*, Vol. 1 , pp. 425 -430.

Dwyer, F. R., Schurr, P. H., Oh, S. (1987). Developing Buyer-Seller Relationships, *Journal of Marketing*, Vol. 51 (April), pp. 11-28.

Dye, R. A. (2004). Strategy Selection and Performance Measurement Choice When Profit Drivers Are Uncertain, *Management Science*, Vol. 50 No. 12, pp. 1624-1637.

Evans, D.J., Tay, L.P. (1995). Fast learning artificial neural networks for continuous input applications, *Kybernetes: The International Journal of Systems & Cybernetics*, Vol. 24 No. 3, pp. 11-23.

Forker, L. B., Stannack, P. (2000). Cooperation versus competition: do buyers and suppliers really see eye-to-eye? *European Journal of Purchasing & Supply Management*, Vol. 6, pp. 31-40.

Gaski, J. F., Nevin, J. R. (1985). The Differential Effects of Exercised and Unexercised Power Sources in a Marketing Channel, *Journal of Marketing Research*, Vol. 22 (May), pp. 130-142.

Gélinas, R., Drolet, R. J. (1996). Just-in-time purchasing and the partnership strategy, *European Journal of Purchasing & Supply Management*, Vol. 2 No. 1, pp. 39-45.

Geyskens, I., Steenkamp, J. E. M., Kumar, N. (1999, May). A meta-analysis of satisfaction in marketing channel relationship, *Journal of Marketing Research*, Vol. 36, pp. 223-238.

Geyskens, I., Steenkamp, J. E. M. (2000). Economic and social satisfaction: Measurement and relevance to marketing channel relationship. *Journal of Retailing*, Vol. 76 No. 1, pp. 11−32.

Gibson, B. J., Rutner, S. M., Keller, S. B. (2002). Shipper-carrier partnership issues, rankings and satisfaction, *International Journal of Physical Distribution & Logistics Management*, Vol. 32 No. 8, pp. 669-681.

Glover, S. M., Prawitt, D. F., Romney, M. B. (1999). Implementing ERP, *Internal Auditor*, Vol. 56, pp. 40–45.

Hajidimitriou, Y. A., Georgiou, A. C. (2002). A goal programming model for partner selection decisions in international joint ventures, *European Journal of Operational Research*, Vol. 138 No. 3, pp. 649-662.

Hall, R., & Andriani, P. (1999). Developing and managing strategic partnerships, *European Journal of Purchasing & Supply Management*, Vol. 5, pp. 53-65.

Hall, R., Andriani, P. (1999). Developing and managing strategic partnerships, *European Journal of Purchasing & Supply Management*, Vol. 5 No 1, pp. 53-65.

Hoffner, Y., Field, S., Grefen, P., Ludwig, H (2001). Contract-driven creation and operation of virtual enterprises, *Computer Networks*, Vol. 37 No. 2, pp. 111-136.

Houston, A., Youngs, G. (1996). Proactive outsourcing - a strategic partnership: Rank Xerox Technical Centre, *Facilities*, Vol. 14 No. 7, pp. 40-47.

http://orientaldaily.com.hk

http://www.alibaba.com

http://www.cem-macau.com

http://www.globalsources.com

http://www.meetworld-trade.com

http://www.pccw.com

Huang, C. C., Kuo, C. M. (2003). The transformation and search of semi-structured knowledge in organizations, *Journal of Knowledge Management*, Vol. 7 No. 4, pp. 106-123.

Huang, G. Q. , Mak, K. L. (2000). WeBid: A web-based framework to support early supplier involvement in new product development, *Robotics and Computer-Integrated Manufacturing*, Vol. 16 No. 2-3, pp. 169-179.

Huang, G. Q., Mak, K. L., & Humphreys, P. K. (2003). A new model of the customer–supplier partnership in new product development, *Journal of Materials Processing Technology*, Vol. 138 No. 1-3, pp. 301-305.

Huin, S. F. (2002). Knowledge Engineering in Resources Planning, *IEEE ICIT'02, Bangkok, THAILAND*, pp. 1037-1042.

Huin, S. F., Luong, L. H. S., Abhary, K. (2003). Knowledge-based tool for planning of enterprise resources in ASEAN SMEs, *Robotics and Computer-Integrated Manufacturing*, Vol. 19 No. 5, pp. 409-414.

Ip, W. H., Huang, M, Yung, K. L., & Wang, D. W. (2003). Genetic algorithm solution for a risk-based partner selection problem in a virtual enterprise, *Computers & Operations Research*, Vol. 30 No. 2, pp. 213-231.

Ip, W. H., Yung, K. L., & Wang, D. W. (2004). A branch and bound algorithm for sub-contractor selection in agile manufacturing environment, International *Journal of Production Economics*, Vol. 87, pp. 195-205.

Jang, J. S. R., Sun, C. T., Mizutani, E. (1997). *Neuro-Fuzzy And Soft Computing: A Computational Approach to Learning and Machine Intelligence (International ed.)*. Prentice Hall.

Kalaignanam, K., Shankar, V., Varadarajan, R. (2007). Asymmetric New Product Development Alliances: Win-Win or Win-Lose Partnerships?, *Management Science*, Vol. 53 No. 3, pp. 357-374.

Koch, C. (2001). Enterprise resource planning Information technology as a steamroller for management politics?, *Journal of Organizational Change Management*, Vol. 14 No. 1, pp. 64-78.

Kosel, T., Grabec, I., Kosel, F. (2003). Intelligent location of simultaneously active acoustic emission sources: Part I, *Aircraft Engineering and Aerospace Technology: An International Journal*, Vol 75 No. 1, pp. 11-17.

Kotzab, H., Teller, C. (2003). Value-adding partnerships and co-opetition models in the grocery industry, *International Journal of Physical Distribution & Logistics Management*, Vol. 33 No. 3, pp. 268-281.

Kujala, J., Ahola, T. (2005). The value of customer satisfaction surveys for project-based organizations: symbolic, technical, or none, *International Journal of Project Management*, Vol. 23, pp. 404–409.

Kur, E., Bunning, R. (2002). Assuring corporate leadership for the future, The *Journal of Management Development*, Vol. 21, No. 10, pp. 761-779.

Lai, C. S. (2007). The effects of influence strategies on dealer satisfaction and performance in Taiwan's motor industry, *Industrial Marketing Management*, Vol. 36, pp. 518-527.

Lau, H. C. W., Chin, K. S., Pun, K. F., Ning, A. (2000). Decision supporting functionality in a virtual enterprise network, *Expert Systems with Applications*, Vol. 19 No. 4, pp. 261-270.

Lau, H. C. W., Lee, W. B., & Lau, P. K. H. (2001). Development of an intelligent decision support system for benchmarking assessment of business partners, *Benchmarking: An International Journal*, Vol. 8 No. 5, pp. 376-395.

Lee, J. N., & Kim, Y. G. (1999, Spring). Effect of Partnership Quality on IS Outsourcing: Conceptual Framework and Empirical Validation, *Journal of Management Information Systems*, Vol. 15 No. 4, pp. 29-61.

Lee, Z., Lee, J. (2000). An ERP implementation case study from a knowledge transfer perspective, *Journal of Information Technology*, Vol. 15, pp. 281–288.

Lehtinen, U. (1996). Partnerships among Finnish Manufacturers, *European Journal of Purchasing & Supply Management*, Vol. 2 No. 4, pp. 161-167.

Lehtinen, U. (1999). Subcontractors in a partnership environment: A study on changing manufacturing strategy, *International Journal of Production Economics*, Vol. 60-61, pp. 165-170.

Leidner, D. E. (1999). Virtual partnerships in support of electronic commerce: the case of TCIS, *Journal of Strategic Information System*, Vol. 8, pp. 105-117.

Liao, S.H. (2003). Knowledge management technologies and applications – literature review from 1995 to 2002, *Expert Systems with Applications*, Vol. 25, pp. 155-164.

Lin, Z., Yang, H., Demirkan, I. (2007). The Performance Consequences of Ambidexterity in Strategic Alliance Formations: Empirical Investigation and Computational Theorizing, *Management Science,* Vol. 53 No. 10, pp. 1645-1658.

Liu, Z. G. (2002). ERP Guide for Small-to-Medium Enterprise, *New Economy Life Thoughts*.

Madu, C. N. (2000). Competing through maintenance strategies, *International Journal of Quality & Reliability Management*, Vol. 17 No. 9, pp. 937-948.

Man, A.P., Stienstra, M., Volberda, H. W. (2002). e-Partnering: Moving Bricks and Mortar Online, *European Management Journal*, Vol. 20 No. 4, pp. 329-339.

Martin, H. H. (1997). Contracting out maintenance and a plan for future research, *Journal of Quality in Maintenance Engineering*, Vol. 3 No. 2, pp. 81-90.

Mathieu, V. (2001). Service strategies within the manufacturing sector: benefits, costs and partnership, *International Journal of Service Industry Management*, Vol. 12 No. 5, pp. 451-475.

Maurizio, A., Girolami, L., Jones, P. (2007). EAI and SOA: factors and methods influencing the integration of multiple ERP systems (in as SAP environment) to comply with the Sarbanes-Oxley Act, *Journal of Enterprise Information Management*, Vol. 20 No. 1, pp. 14-31.

McElroy, M. W. (2002). *The New Knowledge Management: Complexity, Learning, and Sustainable Innovation*, Butterworth-Heinemann.

McGinnis, T. C., Huang, Z. (2007). Rethinking ERP success: A new perspective from knowledge management and continuous improvement, *Information & Management*, Vol. 44, pp. 626-634.

McKee, D., Wang, G. (2006). Economic versus social exchange in marketing places: An empirical study among manufacturing firms, *Journal of Business Research*, Vol. 59, pp. 397 – 406.

Mclvor, R. T., Humphreys, P. K. (1997). A strategic model for the formulation of an effective make or buy decision, *Management Decision*, Vol. 35 No. 2, pp. 169-178.

Meade, L., Sarkis, J. (2002). A conceptual model for selecting and evaluating third-party reverse logistics providers, *Supply Chain Management: An International Journal*, Vol. 7 No. 5, pp. 283-295.

Metaxiotis, K., Ergazakis, K., Samouilids, E., Psarras, J. (2003). Decision support through knowledge management: the role of the artificial intelligence, *Information Management & Computer Security*, Vol. 11 No. 5, pp. 216-221.

Mikhailov, L. (2002). Fuzzy analytical approach to partnership selection in formation of virtual enterprises, *The International Journal of Management Science*, Vol. 30 No. 5, pp. 393-401.

Milton, N., Shadbolt, N., Cottam, H., Hammersley, M. (1999). Towards a knowledge technology for knowledge management, *International Journal Human-Computer Studies,* Vol. 51, pp. 615-641.

Mirghani, M. A. (2001). A framework for costing planned maintenance, *Journal of Quality in Maintenance Engineering*, Vol. 7 No. 3, pp. 170-182.

Mitchell, D., Pavur, R. (2002). Using modular neural networks for business decisions, *Management Decision*, Vol. 40 No. 1, pp. 58-63.

Mockler, R. J., Dologite, D.G. (1991). Knowledge-based systems to support strategic planning decision making, *System Sciences, Proceedings of the Twenty-Fourth Annual Hawaii International Conference,* Vol. 3, pp. 173 -180.

Moutinho, L., Phillips, P. A. (2002). The impact of strategic planning on the competitiveness, performance and effectiveness of bank branches: a neural network analysis, *The International Journal of Bank Marketing*, Vol. 20 No. 3, pp. 102-110.

Murthy, D.N.P., Atrens, A., Eccleston, J.A. (2002). Strategic maintenance management, *Journal of Quality in Maintenance Engineering,* Vol. 8, No. 4, pp. 287-305.

Narazaki, H., & Turksen, I. B. (1993). A decision-making approach to a syllogistic reasoning problem with consistency maintenance in a knowledge base, *Fuzzy Systems, Second IEEE International Conference*, Vol. 1, pp. 76 -81.

Negnevitsky, M. (2005). *Artificial Intelligence: A Guide to Intelligent Systems (2nd ed.).* Pearson Education.

Newell, S., Huang, J. C., Galliers, R. D., Pan, S. L. (2003). Implementing enterprise resource planning and knowledge management systems in tandem: fostering efficiency and innovation complementarity, *Information and Organization*, Vol. 13, pp. 25-52.

Nijssen, E. J., Reekum, R. V., Hulshoff, H. E. (2001). Gathering and Using Information for the Selection of Technology Partners, *Technological Forecasting and Social Change*, Vol. 67 No. 2-3, pp. 221-237.

Nikolopoulos, K., Metaxiotis, K, Lekatis, N., Assimakopoulos, V. (2003). Integrating industrial maintenance strategy into ERP, *Industrial Management & Data Systems*, Vol. 103 No. 3, pp. 184-191.

Nonaka, W. E., Konno, N. (1998). The concept of “Ba”: building a foundation for knowledge creation, *California Management Review*, Vol. 40 No. 3, pp. 40-54.

O’Leary, D. E. (2002). Knowledge management across the enterprise resource planning systems life cycle, *International Journal of Accounting Information Systems*, Vol. 3, pp. 99-110.

Paul [Reference to Schönsleben] (2000). With agility and adequate partnership strategies towards effective logistics networks, *Computers in Industry*, Vol. 42 No. 1, pp. 33-42.

Pintelon, L., Preez, N. D., Puyvelde, F. V. (1999). Information technology: opportunities for maintenance management, *Journal of Quality in Maintenance Engineering*, Vol. 5 No. 1, pp. 9-24.

Quah, T. S., Teh, H. H., Tan, C. L. (1995). Emulating human decision making process using hybrid system, *Neural Networks, Proceedings, IEEE International Conference*, Vol. 4, pp. 1823 -1827.

Raju, K. S., Pillai, C. R. S. (1999). Multicriterion decision making in performance evaluation of an irrigation system, *European Journal of Operational Research*, Vol. 112 No. 3, pp. 479-488.

Ramaseshan, B., Yip, L. S.C., Pae, J. H. (2006). Power, satisfaction, and relationship commitment in Chinese store–tenant relationship and their impact on performance, *Journal of Retailing*, Vol. 82 No. 1, pp. 63–70.

Rebecca [Reference to Angeles], Ravinder [Reference to Nath] (2000). An empirical study of EDI trading partner selection criteria in customer-supplier relationships, *Information & Management*, Vol. 37 No. 5, pp. 241-255.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider, *Journal of Knowledge Management*, Vol. 9 No. 3, pp. 18-35.

Rolland, C., Prakash, N. (2000). Bridging the Gap Between Organizational Needs and ERP Functionality, *Requirements Engineering*, Vol. 5, pp. 180-193.

Rodríguez, I. R. B., Agudo, J. C., Gutiérrez, H. S. M. (2006). Determinants of economic and social satisfaction in manufacturer–distributor relationships, *Industrial Marketing Management*, Vol. 35, pp. 666 – 675.

Sampson, S. E. (2000). Customer-supplier duality and bidirectional supply chains in service organizations, *International Journal of Service Industry Management*, Vol. 11 No. 4, pp. 348-364.

Sarkis, J., Sundarraj, R. P. (2002). Evolution of brokering; paradigms in e-commerce enabled manufacturing, *International Journal of Production Economics*, Vol. 75, pp. 21-31.

Scheer, L. K., Stern, L. W. (1992). The Effect of Influence Type and Performance Outcomes on Attitude Toward the Influencer, *Journal of Marketing Research*, Vol. 29 (February), pp. 128-142.

Shanks, G., Seddon, P. (2000). Editorial. *Journal of Information Technology*, Vol. 15, pp. 243–244.

Shore, B., Venkatachalam, A.R. (2003). Evaluating the information sharing capabilities of supply chain partners: A fuzzy logic model, *International Journal of Physical Distribution & Logistics Management*, Vol. 33 No. 9, pp. 804-824.

Simpson, J. T., Wren, B. M. (1997). Buyer-seller relationships in the wood products industry, *Journal of Business Research*, Vol. 39 No. 1, pp. 45-51.

Snider, M. (2003). *Compatibility Breeds Success*. PRAEGER.

Sowunmi, A., Burstein, F. V., Smith, H. G. (1996). Knowledge acquisition for an organisational memory system, *System Sciences, Proceedings of the Twenty-Ninth Hawaii International Conference*, Vol. 3, pp. 168 -177.

Stijn, E. V., Wensley A. (2001). Organizational memory and he completeness of process modeling in ERP systems: Some concerns, methods and directions for future research, *Business Process Management Journal*, Vol. 7 No. 3, pp. 181-194.

Tsang, A. H. C. (2002). Strategic dimensions of maintenance management, *Journal of Quality in Maintenance Engineering*, Vol. 8 No. 1, pp. 7-39.

Turban, E., Aronson, J. E. (2001). *Decision Support Systems and Intelligent Systems*, Sixth Edition, Prentice Hall.

Umble, E. J., Haft, R. R., Umble, M. M. (2003). Enterprise resource planning: Implementation procedures and critical success factors, *European Journal of Operational Research*, Vol. 146, pp. 241–257.

Virolainen, V. M. (1998). A survey of procurement strategy development in industrial companies, *International Journal of Production Economics*, Vol. 56-57, pp. 677-688.

Walczak, S. (1998). Knowledge acquisition and knowledge representation with class: the object-oriented paradigm, *Expert Systems with Applications*, Vol. 15, pp. 235-244.

Wiertz, C., Ruyter, K., Keen, C., Streukens, S. (2004). Cooperating for service excellence in multichannel service systems – An empirical assessment, *Journal of Business Research*, Vol. 57, pp. 424-436.

Willcocks, L., & Choi, C. J. (1995). Co-operative partnership and total IT outsourcing: From contractual obligation to strategic alliance?, *European Management Journal*, Vol. 13 No. 1, pp. 67-78.

Williams, R. G., Lilley, M. M. (1993). Partner selection for joint-venture agreements, *International Journal of Project Management*, Vol. 11 No. 4, pp. 233-237.

Wray, B., Palmer, A., Bejou, D. (1994). Using Neural Network Analysis to Evaluate Buyer-Seller Relationships, *European Journal of Marketing*, Vol. 28 No. 10, pp. 32-48.

Yang, C. C. (2003). Establishment and applications of the integrated model of service quality measurement, *Managing Service Quality*, Vol. 13 No. 4, pp. 310-324.

Zhu, G., Gelders, L., Pintelon, L. (2002). Object/objective-oriented maintenance management, *Journal of Quality in Maintenance Engineering*, Vol. 8 No. 4, pp. 306-318.

APPENDIX A QUESTIONNAIRE

- Appendix A1 Questionnaire: Satisfaction on Partnership Development
- Appendix A2 Questionnaire: Satisfaction Gap Model in Partnership Development

Appendix A1 Questionnaire: Satisfaction on Partnership Development

Questionnaire---Satisfaction on Partnership Development

The purpose of this questionnaire is to collect information of how to 'Narrow the Satisfaction Gap in Partnership'.

I would like to have your opinion on the 'Partnership Development' in this questionnaire. All the information provided is for academic use only and will be kept confidential. Please take a few minutes to complete this questionnaire. Thank You.

Please put a tick (✓) on the appropriate answer according to how much you agree with the statement

①	②	③	④	⑤
Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree

Economic Satisfaction

Factor	Explanation	Degree of agreeableness				
Profitability						
(1) Win-win situation	If partners can achieve the win-win situation, it would be more effective in improving the partnership development.	①	②	③	④	⑤
(2) Profit (Economic)	When you get higher profits, the motive for partnership continuation will be higher.	①	②	③	④	⑤
(3) Profit (Social)	Increasing profits in the partnership is the main reason that helps you to gain a feeling of achievement.	①	②	③	④	⑤
(4) Contract & Bid Cost	Less Contract & Bid Cost between partners can make higher profits.	①	②	③	④	⑤
(5) Total investment	More investment of each partner will make it easier for running their businesses.	①	②	③	④	⑤
Discounts						
(6) Discount	Special discount for some permanent partners.	①	②	③	④	⑤
Quality Enhancement						
(7) Quality	If the partner's service has a high quality, you will maintain this partnership.	①	②	③	④	⑤
Effectiveness						
(8) Cooperation	Partners can cooperatively solve technical or non-technical problems.	①	②	③	④	⑤
(9) Specialization	To allow a firm to concentrate its resources on critical activities.	①	②	③	④	⑤
(10) Efficiency	Partnership between companies can work better if every task is done efficiently.	①	②	③	④	⑤
(11) Capacity	Higher capacity of the partner has higher satisfaction for the core-company.	①	②	③	④	⑤
(12) Time control	If the partner has better control of time, you will be more satisfied with the partner.	①	②	③	④	⑤
(13) Intelligence	More intelligence by each partner, better decisions will be made, and profit will be increased.	①	②	③	④	⑤
Selling and Marketing						
(14) Selling ability	If your partner can sell effectively, you will still do business together.	①	②	③	④	⑤
(15) Reputation	If one of the partners has a higher reputation, promoting products in the name of that partner will gain better response.	①	②	③	④	⑤

Social Satisfaction

Factor	Explanation	Degree of agreeableness				
Loyalty						
(16)Position in the market	The market position of each partner can be ensured through the high cooperative relationship between the partners.	①	②	③	④	⑤
(17) Respect	Any decisions (which are) made should be thoroughly discussed between the business partners in order to show respect and trust.	①	②	③	④	⑤
(18) Responsibility	If your partner has more responsibility, you will be more satisfied with the partner.	①	②	③	④	⑤

Concern			Degree of agreeableness				
(19) Trust	If sensitive information and technology can be safely shared between both partners, a stable relationship can be developed.		①	②	③	④	⑤
(20) Criticism	After you make constructive criticisms about your partner, they will do better next time.		①	②	③	④	⑤
(21) Weakness	Weaknesses of partners can be solved through effective communication between organizations.		①	②	③	④	⑤
Mutual Interactions							
(22) Communication	You will be satisfied if you know what your partners are doing, through sufficient communication.		①	②	③	④	⑤
(23) Right decisions	If partners can solve problems with joint solutions, the tendency of making the right decisions will be higher.		①	②	③	④	⑤
Apocalypse							
(24) Apocalypse	If partners can stimulate apocalypse in your policies, this would strengthen the cooperation in the partnership.		①	②	③	④	⑤
(25) Special problems	If the business partners can effectively solve any unexpected problems, the satisfaction between them will be better.		①	②	③	④	⑤
Policies							
(26) Policy	Better operational management within a firm can make the partnership last longer.		①	②	③	④	⑤
(27) Experience	You will be more satisfied if the partner has more experience.		①	②	③	④	⑤
(28) Negotiation	Higher negotiation skill of the partner means higher satisfaction for you.		①	②	③	④	⑤
(29) Culture	You will be more satisfied to do business with a partner of the same cultural background.		①	②	③	④	⑤
(30) No. of partners	Sharing of work with more partners, you will be more satisfied.		①	②	③	④	⑤
(31)Jobs	More jobs in each company will give more fulfillment.		①	②	③	④	⑤

(32) Which of the following is a more important factor which can make you feel more satisfied with your partner? (Choose one)

☐ Economic Satisfaction ☐ Social Satisfaction

(33) Which of the following is the most important factor which can make you feel more satisfied with your partner? (Choose one)

☐ Profitability ☐ Discounts ☐ Quality ☐ Effectiveness ☐ Marketing & selling support

(34) Which of the following is the most important factor which can make you feel more satisfied with your partner? (Choose one)

☐ Loyalty ☐ Concern ☐ Interactions ☐ Apocalypse ☐ Policies

(35) Please arrange the partnership development variables below accords to the order of importance

(1 is the most important factor 10 is the least important factor)

☐ Profitability ☐ Discounts ☐ Quality ☐ Effectiveness ☐Marketing & selling support

☐ Loyalty ☐ Concern ☐ Interactions ☐ Apocalypse ☐ Policies

Personal information

Role: ☐ Core-company ☐ Partner

Gender: ☐ Male ☐ Female

Nationality: ☐ Chinese ☐ Portuguese ☐ Other: ____________________

Age: ☐ 18~25 ☐ 26~30 ☐ 31~40 ☐ 41~50 ☐ above 50

Department: ☐ Purchasing ☐ Sales & Marketing ☐ Human Resources ☐ Engineering ☐ Finance

☐ Executive Office ☐ Information Technology ☐ Rear-service ☐ other: ____________________

Position: ☐ General Staff ☐ Superior ☐ Assistant manager ☐ Manager ☐ Director

Working Time (year): ☐ below 2 years ☐ 3~6 years ☐ 7~10 years ☐ Above 10 years

---

Appendix A2 Questionnaire: Satisfaction Gap Model in Partnership Development

Questionnaire---Satisfaction Gap Model in Partnership Development

The purpose of this questionnaire is to collect information of how to 'Narrow the Satisfaction Gap in Partnership'.

I would like to have your opinion on the 'Evaluation of Satisfaction Gap Model' in this questionnaire. All the information provided is for academic use only and will be kept confidential. Please take a few minutes to complete this questionnaire. Thank You.

Please put a tick (✓) on the appropriate answer according to how much you agree with the statement

①	②	③	④	⑤
Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree

Factor	Explanation	Degree of agreeableness				
(1) Efficiency	The model can more effectively improve the partnership development.	①	②	③	④	⑤
(2) Transparence	The partnership development is more transparent when applying this model, such that the motive for partnership to continuation will be higher.	①	②	③	④	⑤
(3) Objectivity	Core-company and partner can objectively find out their satisfaction gap.	①	②	③	④	⑤
(4) Relationship Enhancement	Their relationship will be enhanced in accordance with the scientific satisfaction improvement strategies.	①	②	③	④	⑤
(5) Overall Consideration	The relationship development can be improved through full-scale analysis.	①	②	③	④	⑤
(6) Sustainability	The sustainability of the partnership is increased that based on the results of this model.	①	②	③	④	⑤
(7) Scientific Modification	The model can narrow the satisfaction gap through an objective angle.	①	②	③	④	⑤
(8) Systematic Contribution	Core-company and partner can systematically find out their cooperation problems.	①	②	③	④	⑤
(9) Technical Consideration	The technical level of this model is acceptable.	①	②	③	④	⑤
(10) Feasibility	The feasibility of this model is reasonable.	①	②	③	④	⑤

Other comments:

____

____

____

Personal information

Gender: ☐ Male ☐ Female

Age: ☐ 18~25 ☐ 26~30 ☐ 31~40 ☐ 41~50 ☐ above 50

Department: ☐ Purchasing ☐ Sales & Marketing ☐ Human Resources ☐ Engineering ☐ Finance ☐ Executive Office ☐ Information Technology ☐ Rear-service ☐ other: ____________________

Position: ☐ General Staff ☐ Superior ☐ Assistant manager ☐ Manager ☐ Director ☐ other: ____________________

Working Time (year): ☐ below 2 years ☐ 3~6 years ☐ 7~10 years ☐ Above 10 years

APPENDIX B DATA TABLES

Win Win

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	2.5	2.5	2.5
	Neither disagree nor agree	44	15.8	15.8	18.3
	Agree	125	44.8	44.8	63.1
	Strongly Agree	103	36.9	36.9	100.0
	Total	279	100.0	100.0	

Table B.1 Descriptive Result for Question 1

Profit (Economic)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	10	3.6	3.6	3.6
	Neither disagree nor agree	62	22.2	22.2	25.8
	Agree	135	48.4	48.4	74.2
	Strongly Agree	72	25.8	25.8	100.0
	Total	279	100.0	100.0	

Table B.2 Descriptive Result for Question 2

Profit (Social)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	5.0	5.0	5.0
	Neither disagree nor agree	74	26.5	26.5	31.5
	Agree	145	52.0	52.0	83.5
	Strongly Agree	46	16.5	16.5	100.0
	Total	279	100.0	100.0	

Table B.3 Descriptive Result for Question 3

Contract & Bid Cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	1.4	1.4	1.4
	Disagree	15	5.4	5.4	6.8
	Neither disagree nor agree	120	43.0	43.0	49.8
	Agree	116	41.6	41.6	91.4
	Strongly Agree	24	8.6	8.6	100.0
	Total	279	100.0	100.0	

Table B.4 Descriptive Result for Question 4

Total Investment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	28	10.0	10.0	10.0
	Neither disagree nor agree	109	39.1	39.1	49.1
	Agree	116	41.6	41.6	90.7
	Strongly Agree	26	9.3	9.3	100.0
	Total	279	100.0	100.0	

Table B.5 Descriptive Result for Question 5

Discount

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	14	5.0	5.0	5.4
	Neither disagree nor agree	60	21.5	21.5	26.9
	Agree	155	55.6	55.6	82.4
	Strongly Agree	49	17.6	17.6	100.0
	Total	279	100.0	100.0	

Table B.6 Descriptive Result for Question 6

Quality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	2.2	2.2	2.2
	Neither disagree nor agree	53	19.0	19.0	21.1
	Agree	147	52.7	52.7	73.8
	Strongly Agree	73	26.2	26.2	100.0
	Total	279	100.0	100.0	

Table B.7 Descriptive Result for Question 7

Cooperation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	13	4.7	4.7	5.0
	Neither disagree nor agree	87	31.2	31.2	36.2
	Agree	146	52.3	52.3	88.5
	Strongly Agree	32	11.5	11.5	100.0
	Total	279	100.0	100.0	

Table B.8 Descriptive Result for Question 8

Specialization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	15	5.4	5.4	5.7
	Neither disagree nor agree	97	34.8	34.8	40.5
	Agree	128	45.9	45.9	86.4
	Strongly Agree	38	13.6	13.6	100.0
	Total	279	100.0	100.0	

Table B.9 Descriptive Result for Question 9

Efficiency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	4	1.4	1.4	1.8
	Neither disagree nor agree	63	22.6	22.6	24.4
	Agree	155	55.6	55.6	79.9
	Strongly Agree	56	20.1	20.1	100.0
	Total	279	100.0	100.0	

Table B.10 Descriptive Result for Question 10

Capacity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	2.5	2.5	2.5
	Neither disagree nor agree	58	20.8	20.8	23.3
	Agree	171	61.3	61.3	84.6
	Strongly Agree	43	15.4	15.4	100.0
	Total	279	100.0	100.0	

Table B.11 Descriptive Result for Question 11

Time control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	9	3.2	3.2	3.2
	Neither disagree nor agree	46	16.5	16.5	19.7
	Agree	180	64.5	64.5	84.2
	Strongly Agree	44	15.8	15.8	100.0
	Total	279	100.0	100.0	

Table B.12 Descriptive Result for Question 12

Intelligence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	4.7	4.7	4.7
	Neither disagree nor agree	63	22.6	22.6	27.2
	Agree	140	50.2	50.2	77.4
	Strongly Agree	63	22.6	22.6	100.0
	Total	279	100.0	100.0	

Table B.13 Descriptive Result for Question 13

Selling ability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	2.2	2.2	2.2
	Neither disagree nor agree	69	24.7	24.7	26.9
	Agree	147	52.7	52.7	79.6
	Strongly Agree	57	20.4	20.4	100.0
	Total	279	100.0	100.0	

Table B.14 Descriptive Result for Question 14

Reputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	1.8	1.8	1.8
	Neither disagree nor agree	59	21.1	21.1	22.9
	Agree	166	59.5	59.5	82.4
	Strongly Agree	49	17.6	17.6	100.0
	Total	279	100.0	100.0	

Table B.15 Descriptive Result for Question 15

Position in market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.7	.7	.7
	Disagree	10	3.6	3.6	4.3
	Neither disagree nor agree	90	32.3	32.3	36.6
	Agree	150	53.8	53.8	90.3
	Strongly Agree	27	9.7	9.7	100.0
	Total	279	100.0	100.0	

Table B.16 Descriptive Result for Question 16

Respect

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	14	5.0	5.0	5.4
	Neither disagree nor agree	81	29.0	29.0	34.4
	Agree	141	50.5	50.5	84.9
	Strongly Agree	42	15.1	15.1	100.0
	Total	279	100.0	100.0	

Table B.17 Descriptive Result for Question 17

Responsibility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	3.9	3.9	3.9
	Neither disagree nor agree	44	15.8	15.8	19.7
	Agree	155	55.6	55.6	75.3
	Strongly Agree	69	24.7	24.7	100.0
	Total	279	100.0	100.0	

Table B.18 Descriptive Result for Question 18

Trust

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	.7	.7	.7
	Disagree	17	6.1	6.1	6.8
	Neither disagree nor agree	88	31.5	31.5	38.4
	Agree	152	54.5	54.5	92.8
	Strongly Agree	20	7.2	7.2	100.0
	Total	279	100.0	100.0	

Table B.19 Descriptive Result for Question 19

Criticism

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	16	5.7	5.7	5.7
	Neither disagree nor agree	106	38.0	38.0	43.7
	Agree	132	47.3	47.3	91.0
	Strongly Agree	25	9.0	9.0	100.0
	Total	279	100.0	100.0	

Table B.20 Descriptive Result for Question 20

Weakness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	20	7.2	7.2	7.5
	Neither disagree nor agree	104	37.3	37.3	44.8
	Agree	135	48.4	48.4	93.2
	Strongly Agree	19	6.8	6.8	100.0
	Total	279	100.0	100.0	

Table B.21 Descriptive Result for Question 21

Communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	12	4.3	4.3	4.3
	Neither disagree nor agree	63	22.6	22.6	26.9
	Agree	157	56.3	56.3	83.2
	Strongly Agree	47	16.8	16.8	100.0
	Total	279	100.0	100.0	

Table B.22 Descriptive Result for Question 22

Right decisions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	2.5	2.5	2.5
	Neither disagree nor agree	74	26.5	26.5	29.0
	Agree	162	58.1	58.1	87.1
	Strongly Agree	36	12.9	12.9	100.0
	Total	279	100.0	100.0	

Table B.23 Descriptive Result for Question 23

Apocalypse

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	9	3.2	3.2	3.2
	Neither disagree nor agree	83	29.7	29.7	33.0
	Agree	152	54.5	54.5	87.5
	Strongly Agree	35	12.5	12.5	100.0
	Total	279	100.0	100.0	

Table B.24 Descriptive Result for Question 24

Special problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	1.8	1.8	1.8
	Neither disagree nor agree	65	23.3	23.3	25.1
	Agree	168	60.2	60.2	85.3
	Strongly Agree	41	14.7	14.7	100.0
	Total	279	100.0	100.0	

Table B.25 Descriptive Result for Question 25

Policy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	4.7	4.7	4.7
	Neither disagree nor agree	60	21.5	21.5	26.2
	Agree	160	57.3	57.3	83.5
	Strongly Agree	46	16.5	16.5	100.0
	Total	279	100.0	100.0	

Table B.26 Descriptive Result for Question 26

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	2.2	2.2	2.2
	Neither disagree nor agree	64	22.9	22.9	25.1
	Agree	173	62.0	62.0	87.1
	Strongly Agree	36	12.9	12.9	100.0
	Total	279	100.0	100.0	

Table B.27 Descriptive Result for Question 27

Negotiation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	7	2.5	2.5	2.9
	Neither disagree nor agree	106	38.0	38.0	40.9
	Agree	138	49.5	49.5	90.3
	Strongly Agree	27	9.7	9.7	100.0
	Total	279	100.0	100.0	

Table B.28 Descriptive Result for Question 28

Culture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.4	.4	.4
	Disagree	21	7.5	7.5	7.9
	Neither disagree nor agree	112	40.1	40.1	48.0
	Agree	119	42.7	42.7	90.7
	Strongly Agree	26	9.3	9.3	100.0
	Total	279	100.0	100.0	

Table B.29 Descriptive Result for Question 29

Number of partners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	1.4	1.4	1.4
	Disagree	39	14.0	14.0	15.4
	Neither disagree nor agree	135	48.4	48.4	63.8
	Agree	84	30.1	30.1	93.9
	Strongly Agree	17	6.1	6.1	100.0
	Total	279	100.0	100.0	

Table B.30 Descriptive Result for Question 30

Jobs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	22	7.9	7.9	7.9
	Neither disagree nor agree	108	38.7	38.7	46.6
	Agree	127	45.5	45.5	92.1
	Strongly Agree	22	7.9	7.9	100.0
	Total	279	100.0	100.0	

Table B.31 Descriptive Result for Question 31

Economic vs. Social factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Economic Satisfaction	91	32.6	32.6	32.6
	Social Satisfaction	188	67.4	67.4	100.0
	Total	279	100.0	100.0	

Table B.32 Descriptive Result for Question 32

Economic Factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Profitability	116	41.6	41.6	41.6
	Discounts	12	4.3	4.3	45.9
	Quality	75	26.9	26.9	72.8
	Effectiveness	49	17.6	17.6	90.3
	Selling & Marketingsupport	27	9.7	9.7	100.0
	Total	279	100.0	100.0	

Table B.33 Descriptive Result for Question 33

Social Factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Loyalty	50	17.9	17.9	17.9
	Concern	117	41.9	41.9	59.9
	Interactions	51	18.3	18.3	78.1
	Apocalypse	6	2.2	2.2	80.3
	Policies	55	19.7	19.7	100.0
	Total	279	100.0	100.0	

Table B.34 Descriptive Result for Question 34

Statistics

		Profit	Discounts	Quality2	Effective	Selling & Marketing	Hostility	Criticism2	Interaction	Apocalypse2	Policies
N	Valid	279	279	279	279	279	279	279	279	279	279
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		3.1004	7.4839	3.7634	4.4731	5.1147	6.0538	4.9427	6.3405	8.3763	5.3584
Median		2.0000	8.0000	3.0000	4.0000	5.0000	6.0000	5.0000	7.0000	9.0000	6.0000
Mode		1.00	10.00	2.00	4.00	6.00	7.00	1.00	8.00	10.00	7.00
Std. Deviation		2.40143	2.44042	2.28255	2.16873	2.35541	2.54753	2.87828	2.52374	2.02989	2.56720
Sum		865.00	2088.00	1050.00	1248.00	1427.00	1689.00	1379.00	1769.00	2337.00	1495.00

Table B.35 Descriptive Result for Question 35

Role

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Core-company	235	84.2	84.2	84.2
	Partner	44	15.8	15.8	100.0
	Total	279	100.0	100.0	

Table B.36 Descriptive Result for Role

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	162	58.1	58.1	58.1
	Female	117	41.9	41.9	100.0
	Total	279	100.0	100.0	

Table B.37 Descriptive Result for Gender

Nationality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Chinese	219	78.5	78.5	78.5
	Portuguese	57	20.4	20.4	98.9
	Other	3	1.1	1.1	100.0
	Total	279	100.0	100.0	

Table B.38 Descriptive Result for Nationality

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18~25	98	35.1	35.1	35.1
	16~30	72	25.8	25.8	60.9
	31~40	75	26.9	26.9	87.8
	41~50	28	10.0	10.0	97.8
	About 50	6	2.2	2.2	100.0
	Total	279	100.0	100.0	

Table B.39 Descriptive Result for Age

Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Purchasing	9	3.2	3.2	3.2
	Sales & Marketing	72	25.8	25.8	29.0
	Human Resources	12	4.3	4.3	33.3
	Engineering	67	24.0	24.0	57.3
	Finance	16	5.7	5.7	63.1
	Executive Office	13	4.7	4.7	67.7
	Information Technology	17	6.1	6.1	73.8
	Rear-service	48	17.2	17.2	91.0
	Other	25	9.0	9.0	100.0
	Total	279	100.0	100.0	

Table B.40 Descriptive Result for Department

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General Staff	177	63.4	63.4	63.4
	Superior	58	20.8	20.8	84.2
	Assistant manager	17	6.1	6.1	90.3
	Manager	16	5.7	5.7	96.1
	Director	11	3.9	3.9	100.0
	Total	279	100.0	100.0	

Table B.41 Descriptive Result for Position

Working Time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 2 years	109	39.1	39.1	39.1
	3~6 years	92	33.0	33.0	72.0
	7~10 years	21	7.5	7.5	79.6
	About 10 years	57	20.4	20.4	100.0
	Total	279	100.0	100.0	

Table B.42 Descriptive Result for Working Time

APPENDIX C FUZZY SATISFACTION GAP PROGRAM

function varargout = satisfaction(varargin)

% SATISFACTION M-file for satisfaction.fig

% SATISFACTION, by itself, creates a new SATISFACTION or raises the existing

% singleton*.

%

% H = SATISFACTION returns the handle to a new SATISFACTION or the handle to

% the existing singleton*.

%

% SATISFACTION('CALLBACK',hObject,eventData,handles,...) calls the local

% function named CALLBACK in SATISFACTION.M with the given input arguments.

%

% SATISFACTION('Property','Value',...) creates a new SATISFACTION or raises the

% existing singleton*. Starting from the left, property value pairs are

% applied to the GUI before satisfaction_OpeningFunction gets called. An

% unrecognized property name or invalid value makes property application

% stop. All inputs are passed to satisfaction_OpeningFcn via varargin.

%

% *See GUI Options on GUIDE's Tools menu. Choose "GUI allows only one

% instance to run (singleton)".

%

% See also: GUIDE, GUIDATA, GUIHANDLES

% Copyright 2002-2003 The MathWorks, Inc.

```
% Edit the above text to modify the response to help satisfaction

% Last Modified by GUIDE v2.5 08-May-2007 17:02:42

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @satisfaction_OpeningFcn, ...
                   'gui_OutputFcn',  @satisfaction_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
   gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
   [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
   gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% --- Executes just before satisfaction is made visible.
function satisfaction_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to satisfaction (see VARARGIN)
```

```
% Choose default command line output for satisfaction
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes satisfaction wait for user response (see UIRESUME)
% uiwait(handles.figure1);
im=imread('level.jpg');
axes(handles.image);
axis off;
set(handles.image,'UserData',image(im));

% --- Outputs from this function are returned to the command line.
function varargout = satisfaction_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

function profit_a_Callback(hObject, eventdata, handles)
% hObject    handle to profit_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of profit_a as text
%        str2double(get(hObject,'String')) returns contents of profit_a as a double
```

```
% --- Executes during object creation, after setting all properties.
function profit_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to profit_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function effectively_a_Callback(hObject, eventdata, handles)
% hObject    handle to effectively_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of effectively_a as text
%        str2double(get(hObject,'String')) returns contents of effectively_a as a double

% --- Executes during object creation, after setting all properties.
function effectively_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to effectively_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function quality_a_Callback(hObject, eventdata, handles)
% hObject    handle to quality_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of quality_a as text
%        str2double(get(hObject,'String')) returns contents of quality_a as a double

% --- Executes during object creation, after setting all properties.
function quality_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to quality_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit4_Callback(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit4 as text
%        str2double(get(hObject,'String')) returns contents of edit4 as a double

% --- Executes during object creation, after setting all properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function marking_a_Callback(hObject, eventdata, handles)
% hObject    handle to marking_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of marking_a as text
%        str2double(get(hObject,'String')) returns contents of marking_a as a double

% --- Executes during object creation, after setting all properties.
function marking_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to marking_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit6_Callback(hObject, eventdata, handles)
% hObject    handle to edit6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit6 as text
%        str2double(get(hObject,'String')) returns contents of edit6 as a double

% --- Executes during object creation, after setting all properties.
function edit6_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function edit7_Callback(hObject, eventdata, handles)
% hObject    handle to edit7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit7 as text
%        str2double(get(hObject,'String')) returns contents of edit7 as a double

% --- Executes during object creation, after setting all properties.
function edit7_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit8_Callback(hObject, eventdata, handles)
% hObject    handle to edit8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit8 as text
%        str2double(get(hObject,'String')) returns contents of edit8 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit8_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit9_Callback(hObject, eventdata, handles)
% hObject    handle to edit9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit9 as text
%        str2double(get(hObject,'String')) returns contents of edit9 as a double

% --- Executes during object creation, after setting all properties.
function edit9_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit10_Callback(hObject, eventdata, handles)
% hObject    handle to edit10 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit10 as text
%        str2double(get(hObject,'String')) returns contents of edit10 as a double

% --- Executes during object creation, after setting all properties.
function edit10_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit10 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit11_Callback(hObject, eventdata, handles)
% hObject    handle to edit11 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit11 as text
%        str2double(get(hObject,'String')) returns contents of edit11 as a double


% --- Executes during object creation, after setting all properties.
function edit11_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit11 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit12_Callback(hObject, eventdata, handles)
% hObject    handle to edit12 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit12 as text
%        str2double(get(hObject,'String')) returns contents of edit12 as a double

% --- Executes during object creation, after setting all properties.
function edit12_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit12 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit13_Callback(hObject, eventdata, handles)
% hObject    handle to edit13 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit13 as text
%        str2double(get(hObject,'String')) returns contents of edit13 as a double

% --- Executes during object creation, after setting all properties.
function edit13_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit13 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
```

```
end

function edit14_Callback(hObject, eventdata, handles)
% hObject    handle to edit14 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit14 as text
%        str2double(get(hObject,'String')) returns contents of edit14 as a double

% --- Executes during object creation, after setting all properties.
function edit14_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit14 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit15_Callback(hObject, eventdata, handles)
% hObject    handle to edit15 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit15 as text
%        str2double(get(hObject,'String')) returns contents of edit15 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit15_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit15 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_h_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_h_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_h_a as text
%        str2double(get(hObject,'String')) returns contents of b_h_a as a double

% --- Executes during object creation, after setting all properties.
function b_h_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_h_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_a_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_a_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_a_a as text
%        str2double(get(hObject,'String')) returns contents of b_a_a as a double

% --- Executes during object creation, after setting all properties.
function b_a_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_a_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_i_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_i_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_i_a as text
%        str2double(get(hObject,'String')) returns contents of b_i_a as a double

% --- Executes during object creation, after setting all properties.
function b_i_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_i_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_c_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_c_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_c_a as text
%        str2double(get(hObject,'String')) returns contents of b_c_a as a double

% --- Executes during object creation, after setting all properties.
function b_c_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_c_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_py_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_py_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_py_a as text
%        str2double(get(hObject,'String')) returns contents of b_py_a as a double

% --- Executes during object creation, after setting all properties.
function b_py_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_py_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function b_p_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_p_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_p_a as text
%        str2double(get(hObject,'String')) returns contents of b_p_a as a double

% --- Executes during object creation, after setting all properties.
function b_p_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_p_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_e_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_e_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_e_a as text
%        str2double(get(hObject,'String')) returns contents of b_e_a as a double
```

```
% --- Executes during object creation, after setting all properties.
function b_e_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_e_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_q_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_q_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_q_a as text
%        str2double(get(hObject,'String')) returns contents of b_q_a as a double

% --- Executes during object creation, after setting all properties.
function b_q_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_q_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_d_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_d_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_d_a as text
%        str2double(get(hObject,'String')) returns contents of b_d_a as a double

% --- Executes during object creation, after setting all properties.
function b_d_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_d_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_m_a_Callback(hObject, eventdata, handles)
% hObject    handle to b_m_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_m_a as text
%        str2double(get(hObject,'String')) returns contents of b_m_a as a double

% --- Executes during object creation, after setting all properties.
function b_m_a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_m_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function profit_b_Callback(hObject, eventdata, handles)
% hObject    handle to profit_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of profit_b as text
%        str2double(get(hObject,'String')) returns contents of profit_b as a double

% --- Executes during object creation, after setting all properties.
function profit_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to profit_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function effectively_b_Callback(hObject, eventdata, handles)
% hObject    handle to effectively_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of effectively_b as text
%        str2double(get(hObject,'String')) returns contents of effectively_b as a double

% --- Executes during object creation, after setting all properties.
function effectively_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to effectively_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function quality_b_Callback(hObject, eventdata, handles)
% hObject    handle to quality_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of quality_b as text
%        str2double(get(hObject,'String')) returns contents of quality_b as a double

% --- Executes during object creation, after setting all properties.
function quality_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to quality_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function discount_b_Callback(hObject, eventdata, handles)
% hObject    handle to discount_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of discount_b as text
%        str2double(get(hObject,'String')) returns contents of discount_b as a double
```

```
% --- Executes during object creation, after setting all properties.
function discount_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to discount_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit90_Callback(hObject, eventdata, handles)
% hObject    handle to edit90 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit90 as text
%        str2double(get(hObject,'String')) returns contents of edit90 as a double

% --- Executes during object creation, after setting all properties.
function edit90_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit90 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function hostility_b_Callback(hObject, eventdata, handles)
% hObject    handle to hostility_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of hostility_b as text
%        str2double(get(hObject,'String')) returns contents of hostility_b as a double

% --- Executes during object creation, after setting all properties.
function hostility_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to hostility_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function apocalypse_b_Callback(hObject, eventdata, handles)
% hObject    handle to apocalypse_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of apocalypse_b as text
%        str2double(get(hObject,'String')) returns contents of apocalypse_b as a double

% --- Executes during object creation, after setting all properties.
function apocalypse_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to apocalypse_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function Interaction_b_Callback(hObject, eventdata, handles)
% hObject    handle to Interaction_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of Interaction_b as text
%        str2double(get(hObject,'String')) returns contents of Interaction_b as a double

% --- Executes during object creation, after setting all properties.
function Interaction_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to Interaction_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function criticism_b_Callback(hObject, eventdata, handles)
% hObject    handle to criticism_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of criticism_b as text
%        str2double(get(hObject,'String')) returns contents of criticism_b as a double

% --- Executes during object creation, after setting all properties.
function criticism_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to criticism_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function policy_b_Callback(hObject, eventdata, handles)
% hObject    handle to policy_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of policy_b as text
%        str2double(get(hObject,'String')) returns contents of policy_b as a double

% --- Executes during object creation, after setting all properties.
function policy_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to policy_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_p_b_Callback(hObject, eventdata, handles)
% hObject    handle to b_p_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_p_b as text
%        str2double(get(hObject,'String')) returns contents of b_p_b as a double
```

```
% --- Executes during object creation, after setting all properties.
function b_p_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_p_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_e_b_Callback(hObject, eventdata, handles)
% hObject    handle to b_e_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_e_b as text
%        str2double(get(hObject,'String')) returns contents of b_e_b as a double

% --- Executes during object creation, after setting all properties.
function b_e_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_e_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit98_Callback(hObject, eventdata, handles)
% hObject    handle to edit98 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit98 as text
%        str2double(get(hObject,'String')) returns contents of edit98 as a double

% --- Executes during object creation, after setting all properties.
function edit98_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit98 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_d_b_Callback(hObject, eventdata, handles)
% hObject    handle to b_d_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_d_b as text
%        str2double(get(hObject,'String')) returns contents of b_d_b as a double

% --- Executes during object creation, after setting all properties.
function b_d_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_d_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_m_b_Callback(hObject, eventdata, handles)
% hObject    handle to b_m_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_m_b as text
%        str2double(get(hObject,'String')) returns contents of b_m_b as a double

% --- Executes during object creation, after setting all properties.
function b_m_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_m_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit101_Callback(hObject, eventdata, handles)
% hObject    handle to edit101 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit101 as text
%        str2double(get(hObject,'String')) returns contents of edit101 as a double

% --- Executes during object creation, after setting all properties.
function edit101_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit101 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function edit102_Callback(hObject, eventdata, handles)
% hObject    handle to edit102 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit102 as text
%        str2double(get(hObject,'String')) returns contents of edit102 as a double

% --- Executes during object creation, after setting all properties.
function edit102_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit102 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit103_Callback(hObject, eventdata, handles)
% hObject    handle to edit103 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit103 as text
%        str2double(get(hObject,'String')) returns contents of edit103 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit103_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit103 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit104_Callback(hObject, eventdata, handles)
% hObject    handle to edit104 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit104 as text
%        str2double(get(hObject,'String')) returns contents of edit104 as a double

% --- Executes during object creation, after setting all properties.
function edit104_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit104 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
```

```
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function b_py_b_Callback(hObject, eventdata, handles)
% hObject    handle to b_py_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of b_py_b as text
%        str2double(get(hObject,'String')) returns contents of b_py_b as a double

% --- Executes during object creation, after setting all properties.
function b_py_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to b_py_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in run1.
function run1_Callback(hObject, eventdata, handles)
% hObject    handle to run1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)
global profit_a;
global discount_a;
global quality_a;
global effectively_a;
global marking_a;

global b_p_a;
global b_d_a;
global b_q_a;
global b_e_a;
global b_m_a;

global hostility_a;
global criticism_a;
global interaction_a;
global apocalypse_a;
global policy_a;

global b_h_a;
global b_c_a;
global b_i_a;
global b_a_a;
global b_py_a;

profit_a=str2double(get(handles.profit_a,'string'));
discount_a=str2double(get(handles.discount_a,'string'));
quality_a=str2double(get(handles.quality_a,'string'));
effectively_a=str2double(get(handles.effectively_a,'string'));
marking_a=str2double(get(handles.marking_a,'string'));
```

```
b_p_a=str2double(get(handles.b_p_a,'string'));
b_d_a=str2double(get(handles.b_d_a,'string'));
b_q_a=str2double(get(handles.b_q_a,'string'));
b_e_a=str2double(get(handles.b_e_a,'string'));
b_m_a=str2double(get(handles.b_m_a,'string'));

hostility_a=str2double(get(handles.hostility_a,'string'));
criticism_a=str2double(get(handles.criticism_a,'string'));
interaction_a=str2double(get(handles.interaction_a,'string'));
apocalypse_a=str2double(get(handles.apocalypse_a,'string'));
policy_a=str2double(get(handles.policy_a,'string'));

b_h_a=str2double(get(handles.b_h_a,'string'));
b_c_a=str2double(get(handles.b_c_a,'string'));
b_i_a=str2double(get(handles.b_i_a,'string'));
b_a_a=str2double(get(handles.b_a_a,'string'));
b_py_a=str2double(get(handles.b_py_a,'string'));

Ec=profit_a*b_p_a+discount_a*b_d_a+quality_a*b_q_a+effectively_a*b_e_a+mar
king_a*b_m_a;
Sc=hostility_a*b_h_a+criticism_a*b_c_a+interaction_a*b_i_a+apocalypse_a*b_a_a
+policy_a*b_py_a;

set(handles.E_c,'String',Ec);
Ec = get(handles.E_c,'String');

set(handles.S_c,'String',Sc);
Sc = get(handles.S_c,'String');

%Ec = get(handles.E_c,'String');
%abc =eval(Ec);
```

```
%set(handles.E_c,'String',Ec)

% --- Executes on button press in run2.
function run2_Callback(hObject, eventdata, handles)
% hObject    handle to run2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global profit_b;
global discount_b;
global quality_b;
global effectively_b;
global marking_b;

global b_p_b;
global b_d_b;
global b_q_b;
global b_e_b;
global b_m_b;

global hostility_b;
global criticism_b;
global interaction_b;
global apocalypse_b;
global policy_b;

global b_h_b;
global b_c_b;
global b_i_b;
global b_a_b;
global b_py_b;
```

```
profit_b=str2double(get(handles.profit_b,'string'));
discount_b=str2double(get(handles.discount_b,'string'));
quality_b=str2double(get(handles.quality_b,'string'));
effectively_b=str2double(get(handles.effectively_b,'string'));
marking_b=str2double(get(handles.marking_b,'string'));

b_p_b=str2double(get(handles.b_p_b,'string'));
b_d_b=str2double(get(handles.b_d_b,'string'));
b_q_b=str2double(get(handles.b_q_b,'string'));
b_e_b=str2double(get(handles.b_e_b,'string'));
b_m_b=str2double(get(handles.b_m_b,'string'));

hostility_b=str2double(get(handles.hostility_b,'string'));
criticism_b=str2double(get(handles.criticism_b,'string'));
interaction_b=str2double(get(handles.interaction_b,'string'));
apocalypse_b=str2double(get(handles.apocalypse_b,'string'));
policy_b=str2double(get(handles.policy_b,'string'));

b_h_b=str2double(get(handles.b_h_b,'string'));
b_c_b=str2double(get(handles.b_c_b,'string'));
b_i_b=str2double(get(handles.b_i_b,'string'));
b_a_b=str2double(get(handles.b_a_b,'string'));
b_py_b=str2double(get(handles.b_py_b,'string'));

Ep = profit_b*b_p_b + discount_b*b_d_b + quality_b*b_q_b + effectively_b*b_e_b
+ marking_b*b_m_b;
Sp = hostility_b*b_h_b + criticism_b*b_c_b + interaction_b*b_i_b +
apocalypse_b*b_a_b + policy_b*b_py_b;

set(handles.E_p,'String',Ep);
Ep = get(handles.E_p,'String');
```

```
set(handles.S_p,'String',Sp);
Sp = get(handles.S_p,'String');

function E_c_Callback(hObject, eventdata, handles)

% hObject    handle to E_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of E_c as text
%        str2double(get(hObject,'String')) returns contents of E_c as a double

% --- Executes during object creation, after setting all properties.

function interaction_b_Callback(hObject, eventdata, handles)
% hObject    handle to interaction_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of interaction_b as text
%        str2double(get(hObject,'String')) returns contents of interaction_b as a double

% --- Executes during object creation, after setting all properties.
function interaction_b_CreateFcn(hObject, eventdata, handles)
% hObject    handle to interaction_b (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in run_1.

% --- Executes during object creation, after setting all properties.
function E_c_CreateFcn(hObject, eventdata, handles)
% hObject    handle to E_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function S_c_Callback(hObject, eventdata, handles)
% hObject    handle to S_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of S_c as text
%        str2double(get(hObject,'String')) returns contents of S_c as a double

% --- Executes during object creation, after setting all properties.
```

```
function S_c_CreateFcn(hObject, eventdata, handles)
% hObject    handle to S_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function E_p_Callback(hObject, eventdata, handles)
% hObject    handle to E_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of E_p as text
%        str2double(get(hObject,'String')) returns contents of E_p as a double

% --- Executes during object creation, after setting all properties.
function E_p_CreateFcn(hObject, eventdata, handles)
% hObject    handle to E_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
```

```
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function S_p_Callback(hObject, eventdata, handles)
% hObject    handle to S_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of S_p as text
%        str2double(get(hObject,'String')) returns contents of S_p as a double

% --- Executes during object creation, after setting all properties.
function S_p_CreateFcn(hObject, eventdata, handles)
% hObject    handle to S_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in Cal.
function Cal_Callback(hObject, eventdata, handles)
% hObject    handle to Cal (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
global  S_p;
global  S_c;
global  E_c;
global  E_p;
global  g_e;
global  g_s;

S_p=str2double(get(handles.S_p,'string'));
E_p=str2double(get(handles.E_p,'string'));
S_c=str2double(get(handles.S_c,'string'));
E_c=str2double(get(handles.E_c,'string'));
g_e=str2double(get(handles.g_e,'string'));
g_s=str2double(get(handles.g_s,'string'));

if S_p < S_c
    gss = S_p/S_c;

            gs=sprintf('%0.2f',gss);

    if gs <= 0.3
                        gs=sprintf('%0.2f',gss);
            set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sc is larger than Sp, small positive');
set(handles.gs_short,'String','Sc > Sp, SP');

    elseif (0.3< gs) & (gs<=0.7)
            set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sc is larger than Sp, positive');
    set(handles.gs_short,'String','Sc > Sp, P');
```

```
    elseif gs > 0.7
        set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sc is larger than Sp, large positive');
    set(handles.gs_short,'String','Sc > Sp, LP');

    end

elseif S_c < S_p
    gss = S_c/S_p;

        gs=sprintf('%0.2f',gss);

      if gs <= 0.3
          set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sp is larger than Sc, small negative');
    set(handles.gs_short,'String','Sp > Sc, SN');

      elseif (0.3< gs) & (gs<=0.7)
          set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sp is larger than Sc, negative');
    set(handles.gs_short,'String','Sp > Sc, N');

    elseif gs > 0.7
        set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
    set(handles.gs_text,'String','Sp is larger than Sc, large negative');
    set(handles.gs_short,'String','Sp > Sc, LN');
```

```
        end

else
   gs = 1;
   set(handles.g_s,'String',gs);
    gs = get(handles.g_s,'String');
     set(handles.gs_text,'String','Sc is equal to Sp');
         set(handles.gs_short,'String','Sp = Sc, Z');
end

if E_c > E_p
    gee = E_p/E_c;

            ge=sprintf('%0.2f',gee);

    if ge <= 0.3
             set(handles.g_e,'String',ge);
     ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ec is larger than Ep, small positive');
        set(handles.ge_short,'String','Ec > Ep, SP');

    elseif (0.3< ge) & (ge<=0.7)
             set(handles.g_e,'String',ge);
     ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ec is larger than Ep, positive');
        set(handles.ge_short,'String','Ec > Ep, P');

    elseif ge > 0.7
             set(handles.g_e,'String',ge);
     ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ec is larger than Ep, large positive');
```

```
        set(handles.ge_short,'String','Ec > Ep, LP');

    end

elseif E_c < E_p
    gee = E_c/E_p;

                    ge=sprintf('%0.2f',gee);

    if ge <= 0.3

    set(handles.g_e,'String',ge);
    ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ep is larger than Ec, small negative');
        set(handles.ge_short,'String','Ep > Ec, SN');

    elseif (0.3< ge) & (ge<=0.7)
    set(handles.g_e,'String',ge);
    ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ep is larger than Ec, negative');
        set(handles.ge_short,'String','Ep > Ec, N');
    elseif ge > 0.7

    set(handles.g_e,'String',ge);
    ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ep is larger than Ec, large negative');
        set(handles.ge_short,'String','Ep > Ec, LN');
    end

else
    ge = 1;
```

```
    set(handles.g_e,'String',ge);
    ge = get(handles.g_e,'String');
    set(handles.ge_text,'String','Ec is equal to Ep');
    set(handles.ge_short,'String','Ep = Ec, Z');
end

%1
if (E_c < E_p) & (S_p>S_c) & (g_s > 0.3)

    set(handles.g_text,'String','LP');
%2
elseif (E_c < E_p) & (S_p>S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','P');
%3
elseif (E_c < E_p) & (g_s == 1) & (g_e > 0.3)
        set(handles.g_text,'String','P');
%4
elseif (g_e == 1) & (S_p>S_c) & (g_s > 0.3)
        set(handles.g_text,'String','LP');
%5
elseif (g_e == 1) & (S_p>S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','P');
%6
elseif (E_c < E_p) & (g_e <= 0.3) & (g_s == 1)
        set(handles.g_text,'String','SP');
%7
elseif (g_e == 1) & (g_s == 1)
        set(handles.g_text,'String','Z');

%8
elseif (E_c < E_p) & (g_e >0.3) & (S_p<S_c) & (g_s<=0.3)
```

```
        set(handles.g_text,'String','SP');

%9
elseif (E_c < E_p) & (g_e >0.3) & (S_p<S_c) & (g_s > 0.3)
        set(handles.g_text,'String','Z');

 %10
elseif (E_c < E_p) & (g_e <=0.3) & (S_p<S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','Z');

%11
elseif (E_c < E_p) & (g_e <=0.3) & (S_p<S_c) & (g_s > 0.3)
        set(handles.g_text,'String','N');

%12
elseif (g_e == 1) & (S_p<S_c) & (g_s > 0.3)
        set(handles.g_text,'String','LN');
 %13
elseif (g_e == 1) & (S_p<S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','N');

%14
elseif (E_c > E_p) & (S_p<S_c) & (g_s > 0.3)
        set(handles.g_text,'String','LN');

 %15
elseif (E_c > E_p) & (S_p<S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','N');

 %16
elseif (E_c > E_p) & (g_e <= 0.3) & (g_s == 1)
```

```
        set(handles.g_text,'String','SN');

  %17
elseif (E_c > E_p) & (g_e > 0.3) & (g_s == 1)
        set(handles.g_text,'String','N');

      %18
elseif (E_c > E_p) & (g_e <= 0.3) & (S_p>S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','L');

      %19
elseif (E_c > E_p) & (g_e > 0.3) & (S_p>S_c) & (g_s <= 0.3)
        set(handles.g_text,'String','LN');

        %20
elseif (E_c > E_p) & (g_e <= 0.3) & (S_p>S_c) & (g_s > 0.3)
        set(handles.g_text,'String','P');

        %21
elseif (E_c > E_p) & (g_e > 0.3) & (S_p>S_c) & (g_s > 0.3)
        set(handles.g_text,'String','Z');

    end

function g_s_Callback(hObject, eventdata, handles)
% hObject    handle to g_s (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_s as text
%        str2double(get(hObject,'String')) returns contents of g_s as a double
```

```
% --- Executes during object creation, after setting all properties.
function g_s_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_s (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function g_e_Callback(hObject, eventdata, handles)
% hObject    handle to g_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_e as text
%        str2double(get(hObject,'String')) returns contents of g_e as a double

% --- Executes during object creation, after setting all properties.
function g_e_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
```

```
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function g_box_Callback(hObject, eventdata, handles)
% hObject    handle to g_box (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_box as text
%        str2double(get(hObject,'String')) returns contents of g_box as a double

% --- Executes during object creation, after setting all properties.
function g_box_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_box (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function g_text_Callback(hObject, eventdata, handles)
% hObject    handle to g_text (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_text as text
%        str2double(get(hObject,'String')) returns contents of g_text as a double

% --- Executes during object creation, after setting all properties.
function g_text_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_text (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in plot_ge.
function plot_ge_Callback(hObject, eventdata, handles)
% hObject    handle to plot_ge (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global  g_e;
g_e=str2double(get(handles.g_e,'string'));

global  degree_ge;
degree_ge=str2double(get(handles.degree_ge,'string'));

a=g_e;
```

```
p(1)=handles.axes1;
    axes(p(1));
x = linspace(0,1,100);

y1=(-x+0.4)/0.4;
y2=(x-0.1)/0.4;
y3=(-x+0.9)/0.4;
y4=(x-0.6)/0.4;

title('Satisfaction Gap on Ge');
xlabel('Economic Gap Index');
ylabel('Degree of membership');

%% Create textbox

% part 1
if a<=0.1

yy=(a/(-0.4))+1;
vx=[a a];
vy=[0 yy];
hx=[0 a];
hy=[yy yy];

    set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');

  plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b', vx,vy,'r',hx,hy,'r');
   %plot2 = plotyy(vx,vy,hx,hy,'Color',[0 0 1]);
    axis([0 1 0 1]);
    hold on
```

```
% part 2
elseif (0.1 < a) & (a <= 0.25)
   yy=(a/(-0.4))+1;
  yyy=(a-0.1)/0.4;

    vx=[a a];
    vy=[0 yy];
    hx=[0 a];
    hy=[yy yy];
    hxx=[0 a];
    hyy=[yyy yyy];

    set(handles.degree_ge,'String',yyy);
    yyy = get(handles.degree_ge,'String');

   plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
    hold on
% part 3
elseif (0.25 < a) & (a <= 0.4)
   yy=(a/(-0.4))+1;
  yyy=(a-0.1)/0.4;

    vx=[a a];
    vy=[0 yyy];
    hx=[0 a];
    hy=[yy yy];
    hxx=[0 a];
    hyy=[yyy yyy];
            set(handles.degree_ge,'String',yy);
```

```
    yy = get(handles.degree_ge,'String');

 plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
hold on
    % part 4
elseif (0.4 < a) & (a <= 0.5)
   yy=(a-0.1)/0.4;

vx=[a a];
vy=[0 yy];
hx=[0 a];
hy=[yy yy];
    set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');
plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
   hold on

    % part 5
elseif  (0.5 < a) & (a <= 0.6)
   yy=(-a+0.9)/0.4;

vx=[a a];
vy=[0 yy];
hx=[0 a];
hy=[yy yy];
    set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');
plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
```

```
  hold on
    % part 6
elseif (0.6 < a) & (a <= 0.75)
yyy=(-a+0.9)/0.4;
yy=(a-0.6)/0.4;

    vx=[a a];
    vy=[0 yyy];
    hx=[0 a];
    hy=[yy yy];
    hxx=[0 a];
    hyy=[yyy yyy];
            set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');

plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
    hold on
        % part 7
elseif (0.75 < a) & (a <= 0.9)
yy=(-a+0.9)/0.4;
yyy=(a-0.6)/0.4;

    vx=[a a];
    vy=[0 yyy];
    hx=[0 a];
    hy=[yy yy];
    hxx=[0 a];
    hyy=[yyy yyy];
            set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');
```

```
plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
hold on
    % part 8
elseif (0.9 < a) & (a <= 1)
   yy=(a-0.6)/0.4;

vx=[a a];
vy=[0 yy];
hx=[0 a];
hy=[yy yy];
    set(handles.degree_ge,'String',yy);
    yy = get(handles.degree_ge,'String');

 plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
hold on

else

  plot(x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
axis([0 1 0 1]);
hold on
end

% --- Executes on button press in plot_gs.

function plot_gs_Callback(hObject, eventdata, handles)

% hObject    handle to plot_gs (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global  g_s;
g_s=str2double(get(handles.g_s,'string'));
global  degree_gs;
degree_gs=str2double(get(handles.degree_gs,'string'));

b=g_s;
p(2)=handles.axes2;
    axes(p(2));
x = linspace(0,1,100);
y1=(-x+0.4)/0.4;
y2=(x-0.1)/0.4;
y3=(-x+0.9)/0.4;
y4=(x-0.6)/0.4;

title('Satisfaction Gap on Gs');
xlabel('Social Gap Index');
ylabel('Degree of membership');

%% Create textbox

% part 1
if b<=0.1

yy=(b/(-0.4))+1;
vx=[b b];
vy=[0 yy];
hx=[0 b];
hy=[yy yy];
```

```
    set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

  plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b', vx,vy,'r',hx,hy,'r');
   %plot2 = plotyy(vx,vy,hx,hy,'Color',[0 0 1]);
    axis([0 1 0 1]);
    hold on

% part 2
elseif (0.1 < b) & (b <= 0.25)
   yy=(b/(-0.4))+1;
  yyy=(b-0.1)/0.4;

    vx=[b b];
    vy=[0 yy];
    hx=[0 b];
    hy=[yy yy];
    hxx=[0 b];
    hyy=[yyy yyy];

            set(handles.degree_gs,'String',yyy);
    yyy = get(handles.degree_gs,'String');
   plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
    hold on
% part 3
elseif (0.25 < b) & (b <= 0.4)
   yy=(b/(-0.4))+1;
  yyy=(b-0.1)/0.4;
```

```
    vx=[b b];
    vy=[0 yyy];
    hx=[0 b];
    hy=[yy yy];
    hxx=[0 b];
    hyy=[yyy yyy];
                        set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

  plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
hold on
    % part 4
elseif (0.4 < b) & (b <= 0.5)
   yy=(b-0.1)/0.4;

vx=[b b];
vy=[0 yy];
hx=[0 b];
hy=[yy yy];
    set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');
plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
   hold on

    % part 5
elseif  (0.5 < b) & (b <= 0.6)
   yy=(-b+0.9)/0.4;

vx=[b b];
```

```
vy=[0 yy];
hx=[0 b];
hy=[yy yy];
    set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
  hold on
    % part 6
elseif (0.6 < b) & (b <= 0.75)
yyy=(-b+0.9)/0.4;
yy=(b-0.6)/0.4;

    vx=[b b];
    vy=[0 yyy];
    hx=[0 b];
    hy=[yy yy];
    hxx=[0 b];
    hyy=[yyy yyy];
                        set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

   plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
    hold on
        % part 7
elseif (0.75 < b) & (b <= 0.9)
yy=(-b+0.9)/0.4;
yyy=(b-0.6)/0.4;
```

```
    vx=[b b];
    vy=[0 yyy];
    hx=[0 b];
    hy=[yy yy];
    hxx=[0 b];
    hyy=[yyy yyy];
                        set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

  plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r',hxx,hyy,'r');
    axis([0 1 0 1]);
hold on
    % part 8
elseif (0.9 < b) & (b <= 1)
   yy=(b-0.6)/0.4;

vx=[b b];
vy=[0 yy];
hx=[0 b];
hy=[yy yy];
    set(handles.degree_gs,'String',yy);
    yy = get(handles.degree_gs,'String');

   plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
    axis([0 1 0 1]);
hold on

    else
  plot(handles.axes2,x,y1,'b',x,y2,'b',x,y3,'b',x,y4,'b',vx,vy,'r',hx,hy,'r');
axis([0 1 0 1]);
hold on
```

```
end

function ge_short_Callback(hObject, eventdata, handles)
% hObject    handle to ge_short (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of ge_short as text
%        str2double(get(hObject,'String')) returns contents of ge_short as a double

% --- Executes during object creation, after setting all properties.
function ge_short_CreateFcn(hObject, eventdata, handles)
% hObject    handle to ge_short (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function gs_short_Callback(hObject, eventdata, handles)
% hObject    handle to gs_short (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of gs_short as text
%        str2double(get(hObject,'String')) returns contents of gs_short as a double
```

```
% --- Executes during object creation, after setting all properties.
function gs_short_CreateFcn(hObject, eventdata, handles)
% hObject    handle to gs_short (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on key press over profit_a with no controls selected.
function profit_a_KeyPressFcn(hObject, eventdata, handles)
% hObject    handle to profit_a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)

global  g_e;
g_e=str2double(get(handles.g_e,'string'));
global  g_s;
g_s=str2double(get(handles.g_s,'string'));

global profit_b;
global discount_b;
```

```
global quality_b;
global effectively_b;
global marking_b;
global hostility_b;
global criticism_b;
global interaction_b;
global apocalypse_b;
global policy_b;

profit_b=str2double(get(handles.profit_b,'string'));
discount_b=str2double(get(handles.discount_b,'string'));
quality_b=str2double(get(handles.quality_b,'string'));
effectively_b=str2double(get(handles.effectively_b,'string'));
marking_b=str2double(get(handles.marking_b,'string'));
hostility_b=str2double(get(handles.hostility_b,'string'));

criticism_b=str2double(get(handles.criticism_b,'string'));
interaction_b=str2double(get(handles.interaction_b,'string'));
apocalypse_b=str2double(get(handles.apocalypse_b,'string'));
policy_b=str2double(get(handles.policy_b,'string'));

ge2=g_e;
gs2=g_s;
profit=profit_b;
discount=discount_b;
quality=quality_b;
effectively=effectively_b;
marking=marking_b;
hostility=hostility_b;
criticism=criticism_b;
interaction=interaction_b;
```

```
apocalypse=apocalypse_b;
policy=policy_b;

save satisfaction ge2 gs2 profit discount quality effectively marking hostility criticism interaction apocalypse policy

%open('C:\MATLAB7\work\test2.fig')

%save ('satisfaction', 'gs', 'ge')
%guidata(object_handle, g_e)
%g_e = guidata(object_handle)

%save('satisfaction', 'gs', 'ge');

%global  S_p;
%global  S_c;
%global  E_c;
%global  E_p;
%global  g_e;
%global  g_s;

%S_p=str2double(get(handles.S_p,'string'));
%E_p=str2double(get(handles.E_p,'string'));
%S_c=str2double(get(handles.S_c,'string'));
%E_c=str2double(get(handles.E_c,'string'));

%g_e=str2double(get(handles.g_e,'string'));
%g_s=str2double(get(handles.g_s,'string'));

% --- Executes on slider movement.
function slider2_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to slider2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'Value') returns position of slider
%        get(hObject,'Min') and get(hObject,'Max') to determine range of slider


% --- Executes during object creation, after setting all properties.
function slider2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to slider2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: slider controls usually have a light gray background, change
%       'usewhitebg' to 0 to use default.  See ISPC and COMPUTER.
usewhitebg = 1;
if usewhitebg
    set(hObject,'BackgroundColor',[.9 .9 .9]);
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on selection change in slider3.
function slider3_Callback(hObject, eventdata, handles)
% hObject    handle to slider3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = get(hObject,'String') returns slider3 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from slider3
```

```
% --- Executes during object creation, after setting all properties.
function slider3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to slider3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: popupmenu controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- If Enable == 'on', executes on mouse press in 5 pixel border.
% --- Otherwise, executes on mouse press in 5 pixel border or over slider3.
function slider3_ButtonDownFcn(hObject, eventdata, handles)
% hObject    handle to slider3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes during object deletion, before destroying properties.

% hObject    handle to slider3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes when figure1 is resized.
function figure1_ResizeFcn(hObject, eventdata, handles)
% hObject    handle to figure1 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes on button press in pushbutton8.
function pushbutton8_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

load test2

set(handles.profit_b,'String',new_p2);
new_p2 = get(handles.profit_b,'String');

set(handles.discount_b,'String',new_d2);
new_d2 = get(handles.discount_b,'String');

set(handles.quality_b,'String',new_q2);
new_q2 = get(handles.quality_b,'String');

set(handles.effectively_b,'String',new_e2);
new_e2 = get(handles.effectively_b,'String');

set(handles.marking_b,'String',new_m2);
new_m2 = get(handles.marking_b,'String');

set(handles.hostility_b,'String',new_h2);
new_h2 = get(handles.hostility_b,'String');

set(handles.criticism_b,'String',new_c2);
new_c2 = get(handles.criticism_b,'String');
```

```
set(handles.interaction_b,'String',new_i2);
new_i2 = get(handles.interaction_b,'String');

set(handles.apocalypse_b,'String',new_a2);
new_a2 = get(handles.apocalypse_b,'String');

set(handles.policy_b,'String',new_py2);
new_py2 = get(handles.policy_b,'String');

% --- Executes on button press in pushbutton9.
function pushbutton9_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

function gap_text_Callback(hObject, eventdata, handles)
% hObject    handle to gap_text (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of gap_text as text
%        str2double(get(hObject,'String')) returns contents of gap_text as a double

% --- Executes during object creation, after setting all properties.
function gap_text_CreateFcn(hObject, eventdata, handles)
% hObject    handle to gap_text (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
```

```
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in gap.
function gap_Callback(hObject, eventdata, handles)

global g_e;
g_e=str2double(get(handles.g_e,'string'));
global g_s;
g_s=str2double(get(handles.g_s,'string'));
global degree_gs;
degree_gs=str2double(get(handles.degree_gs,'string'));
global degree_ge;
degree_ge=str2double(get(handles.degree_ge,'string'));

if g_e < 0.1;
            ge1 = degree_ge*0.3;
            ge2 = degree_ge*3;
    elseif (0.1<=g_e) & (g_e<=0.25)
            ge1 = degree_ge*1.8;
            ge2 = degree_ge*4;
    elseif (g_e>0.25) & (g_e<0.4)
            ge1 = degree_ge*0.3;
            ge2 = degree_ge*3;
            elseif (g_e>=0.4) & (g_e<0.6)
            ge1 = degree_ge*1.8;
            ge2 = degree_ge*4;
```

```
        elseif (g_e>=0.6) & (g_e<=0.75)
        ge1 = degree_ge*3.4;
        ge2 = degree_ge*4;
        elseif (g_e>0.75) & (g_e<0.9)
        ge1 = degree_ge*1.8;
        ge2 = degree_ge*4;
        elseif (g_e>=0.9) & (g_e<=1)
        ge1 = degree_ge*3.4;
        ge2 = degree_ge*4;
end

if g_s < 0.1;
        gs1 = degree_gs*0.3;
        gs2 = degree_gs*3;
  elseif (0.1<=g_s) & (g_s<=0.25)
        gs1 = degree_gs*1.8;
        gs2 = degree_gs*4;
  elseif (g_s>0.25) & (g_s<0.4)
        gs1 = degree_gs*0.3;
        gs2 = degree_gs*3;
        elseif (g_s>=0.4) & (g_s<0.6)
        gs1 = degree_gs*1.8;
        gs2 = degree_gs*4;
        elseif (g_s>=0.6) & (g_s<=0.75)
        gs1 = degree_gs*3.4;
        gs2 = degree_gs*4;
        elseif (g_s>0.75) & (g_s<0.9)
        gs1 = degree_gs*1.8;
        gs2 = degree_gs*4;
        elseif (g_s>=0.9) & (g_s<=1)
        gs1 = degree_gs*3.4;
```

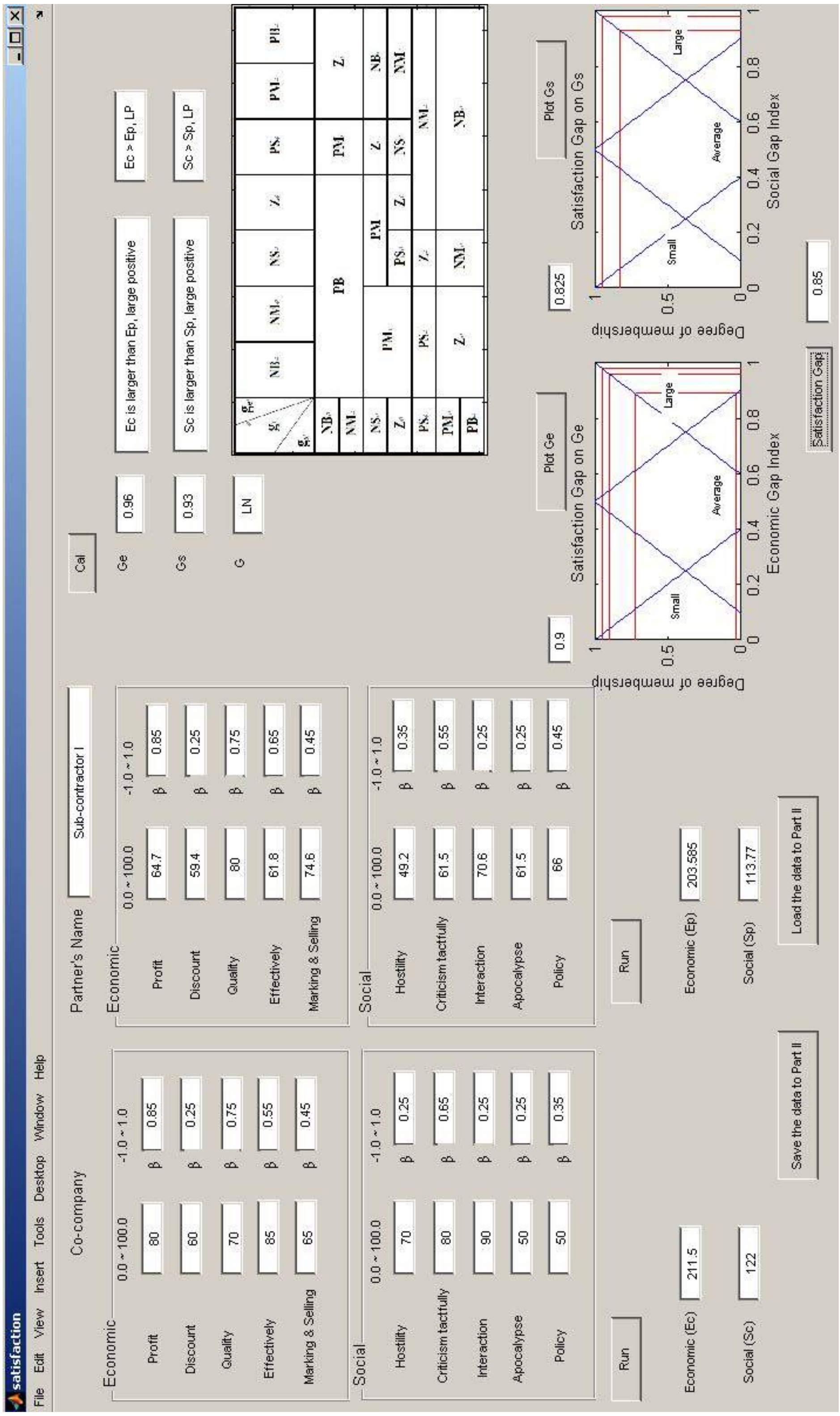
```
    gs2 = degree_gs*4;
end

total_gap= (gs1+ge1)/(gs2+ge2)
set(handles.gap_text,'String',total_gap);
total_gap = get(handles.gap_text,'String');
% hObject    handle to gap (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global profit_b;
global discount_b;
global quality_b;
global effectively_b;
global marking_b;
global hostility_b;
global criticism_b;
global interaction_b;
global apocalypse_b;
global policy_b;
global gap_text;
global E_p;
global S_p;

profit_b=str2double(get(handles.profit_b,'string'));
discount_b=str2double(get(handles.discount_b,'string'));
quality_b=str2double(get(handles.quality_b,'string'));
effectively_b=str2double(get(handles.effectively_b,'string'));
marking_b=str2double(get(handles.marking_b,'string'));
hostility_b=str2double(get(handles.hostility_b,'string'));
criticism_b=str2double(get(handles.criticism_b,'string'));
```

```
interaction_b=str2double(get(handles.interaction_b,'string'));
apocalypse_b=str2double(get(handles.apocalypse_b,'string'));
policy_b=str2double(get(handles.policy_b,'string'));
gap_text=str2double(get(handles.gap_text,'string'));
E_p=str2double(get(handles.E_p,'string'));
S_p=str2double(get(handles.S_p,'string'));

a=[profit_b, discount_b, quality_b, effectively_b, marking_b, hostility_b, criticism_b, interaction_b, apocalypse_b, policy_b, E_p, S_p, gap_text];
save ('satisfaction.txt', '-ascii','a');

function degree_ge_Callback(hObject, eventdata, handles)
% hObject    handle to degree_ge (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of degree_ge as text
%        str2double(get(hObject,'String')) returns contents of degree_ge as a double

% --- Executes during object creation, after setting all properties.
function degree_ge_CreateFcn(hObject, eventdata, handles)
% hObject    handle to degree_ge (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
```

```
end

function degree_gs_Callback(hObject, eventdata, handles)
% hObject    handle to degree_gs (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of degree_gs as text
%        str2double(get(hObject,'String')) returns contents of degree_gs as a double

% --- Executes during object creation, after setting all properties.
function degree_gs_CreateFcn(hObject, eventdata, handles)
% hObject    handle to degree_gs (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function P_name_Callback(hObject, eventdata, handles)
% hObject    handle to P_name (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of P_name as text
%        str2double(get(hObject,'String')) returns contents of P_name as a double
```

```
% --- Executes during object creation, after setting all properties.
function P_name_CreateFcn(hObject, eventdata, handles)
% hObject    handle to P_name (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

__Outlook of Fuzzy Satisfaction Gap Program__



Feedback Analysis Programme for Satisfaction Gap

```
function varargout = test2(varargin)
% TEST2 M-file for test2.fig
%      TEST2, by itself, creates a new TEST2 or raises the existing
%      singleton*.
%
%      H = TEST2 returns the handle to a new TEST2 or the handle to
%      the existing singleton*.
%
%      TEST2('CALLBACK',hObject,eventData,handles,...) calls the local
%      function named CALLBACK in TEST2.M with the given input arguments.
%
%      TEST2('Property','Value',...) creates a new TEST2 or raises the
%      existing singleton*.  Starting from the left, property value pairs are
%      applied to the GUI before test2_OpeningFunction gets called.  An
%      unrecognized property name or invalid value makes property application
%      stop.  All inputs are passed to test2_OpeningFcn via varargin.
%
%      *See GUI Options on GUIDE's Tools menu.  Choose "GUI allows only one
%      instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Copyright 2002-2003 The MathWorks, Inc.

% Edit the above text to modify the response to help test2

% Last Modified by GUIDE v2.5 16-Apr-2007 17:15:51

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @test2_OpeningFcn, ...
                   'gui_OutputFcn',  @test2_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
```

```
end
% End initialization code - DO NOT EDIT

% --- Executes just before test2 is made visible.
function test2_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to test2 (see VARARGIN)

% Choose default command line output for test2
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes test2 wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command line.
function varargout = test2_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

load satisfaction

set(handles.g_e,'String',ge2);
ge2 = get(handles.g_e,'String');

set(handles.g_s,'String',gs2);
gs2 = get(handles.g_s,'String');

set(handles.p,'String',profit);
profit = get(handles.p,'String');
```

```
set(handles.d,'String',discount);
discount = get(handles.d,'String');

set(handles.q,'String',quality);
quality = get(handles.q,'String');

set(handles.e,'String',effectively);
effectively = get(handles.e,'String');

set(handles.m,'String',marking);
marking = get(handles.m,'String');

set(handles.h,'String',hostility);
hostility = get(handles.h,'String');

set(handles.c,'String',criticism);
criticism = get(handles.c,'String');

set(handles.i,'String',interaction);
interaction = get(handles.i,'String');

set(handles.a,'String',apocalypse);
apocalypse = get(handles.a,'String');

set(handles.py,'String',policy);
policy = get(handles.py,'String');

function g_e_Callback(hObject, eventdata, handles)
% hObject    handle to g_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_e as text
%        str2double(get(hObject,'String')) returns contents of g_e as a double

% --- Executes during object creation, after setting all properties.
function g_e_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
```

```
else
   set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function g_s_Callback(hObject, eventdata, handles)
% hObject    handle to g_s (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of g_s as text
%        str2double(get(hObject,'String')) returns contents of g_s as a double

% --- Executes during object creation, after setting all properties.
function g_s_CreateFcn(hObject, eventdata, handles)
% hObject    handle to g_s (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
   set(hObject,'BackgroundColor','white');
else
   set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in c_push.
function c_push_Callback(hObject, eventdata, handles)
% hObject    handle to c_push (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes on button press in d_push.
function d_push_Callback(hObject, eventdata, handles)
% hObject    handle to d_push (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes during object deletion, before destroying properties.

% hObject    handle to c_push (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% --- Executes during object deletion, before destroying properties.
```

```
% hObject    handle to d_push (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

function p_Callback(hObject, eventdata, handles)
% hObject    handle to p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of p as text
%        str2double(get(hObject,'String')) returns contents of p as a double

% --- Executes during object creation, after setting all properties.
function p_CreateFcn(hObject, eventdata, handles)
% hObject    handle to p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function d_Callback(hObject, eventdata, handles)
% hObject    handle to d (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of d as text
%        str2double(get(hObject,'String')) returns contents of d as a double

% --- Executes during object creation, after setting all properties.
function d_CreateFcn(hObject, eventdata, handles)
% hObject    handle to d (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
```

```
end

function q_Callback(hObject, eventdata, handles)
% hObject    handle to q (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of q as text
%        str2double(get(hObject,'String')) returns contents of q as a double

% --- Executes during object creation, after setting all properties.
function q_CreateFcn(hObject, eventdata, handles)
% hObject    handle to q (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function e_Callback(hObject, eventdata, handles)
% hObject    handle to e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of e as text
%        str2double(get(hObject,'String')) returns contents of e as a double

% --- Executes during object creation, after setting all properties.
function e_CreateFcn(hObject, eventdata, handles)
% hObject    handle to e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function m_Callback(hObject, eventdata, handles)
% hObject    handle to m (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of m as text
%        str2double(get(hObject,'String')) returns contents of m as a double

% --- Executes during object creation, after setting all properties.
function m_CreateFcn(hObject, eventdata, handles)
% hObject    handle to m (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function h_Callback(hObject, eventdata, handles)
% hObject    handle to h (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of h as text
%        str2double(get(hObject,'String')) returns contents of h as a double

% --- Executes during object creation, after setting all properties.
function h_CreateFcn(hObject, eventdata, handles)
% hObject    handle to h (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function c_Callback(hObject, eventdata, handles)
% hObject    handle to c (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of c as text
%        str2double(get(hObject,'String')) returns contents of c as a double

% --- Executes during object creation, after setting all properties.
function c_CreateFcn(hObject, eventdata, handles)
% hObject    handle to c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function i_Callback(hObject, eventdata, handles)
% hObject    handle to i (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of i as text
%        str2double(get(hObject,'String')) returns contents of i as a double

% --- Executes during object creation, after setting all properties.
function i_CreateFcn(hObject, eventdata, handles)
% hObject    handle to i (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function a_Callback(hObject, eventdata, handles)
% hObject    handle to a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of a as text
%        str2double(get(hObject,'String')) returns contents of a as a double

% --- Executes during object creation, after setting all properties.
function a_CreateFcn(hObject, eventdata, handles)
% hObject    handle to a (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function py_Callback(hObject, eventdata, handles)
% hObject    handle to py (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of py as text
%        str2double(get(hObject,'String')) returns contents of py as a double

% --- Executes during object creation, after setting all properties.
function py_CreateFcn(hObject, eventdata, handles)
% hObject    handle to py (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function ps4_Callback(hObject, eventdata, handles)
% hObject    handle to ps4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of ps4 as text
```

```
%       str2double(get(hObject,'String')) returns contents of ps4 as a double

% --- Executes during object creation, after setting all properties.
function ps4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to ps4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function ps5_Callback(hObject, eventdata, handles)
% hObject    handle to ps5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of ps5 as text
%       str2double(get(hObject,'String')) returns contents of ps5 as a double

% --- Executes during object creation, after setting all properties.
function ps5_CreateFcn(hObject, eventdata, handles)
% hObject    handle to ps5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function ps3_Callback(hObject, eventdata, handles)
% hObject    handle to ps3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of ps3 as text
%       str2double(get(hObject,'String')) returns contents of ps3 as a double
```

```
% --- Executes during object creation, after setting all properties.
function ps3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to ps3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit55_Callback(hObject, eventdata, handles)
% hObject    handle to edit55 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit55 as text
%        str2double(get(hObject,'String')) returns contents of edit55 as a double


% --- Executes during object creation, after setting all properties.
function edit55_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit55 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function ps1_Callback(hObject, eventdata, handles)
% hObject    handle to ps1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of ps1 as text
%        str2double(get(hObject,'String')) returns contents of ps1 as a double

% --- Executes during object creation, after setting all properties.
```

```
function ps1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to ps1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function p1_Callback(hObject, eventdata, handles)
% hObject    handle to p1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of p1 as text
%        str2double(get(hObject,'String')) returns contents of p1 as a double

% --- Executes during object creation, after setting all properties.
function p1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to p1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function p2_Callback(hObject, eventdata, handles)
% hObject    handle to p2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of p2 as text
%        str2double(get(hObject,'String')) returns contents of p2 as a double

% --- Executes during object creation, after setting all properties.
function p2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to p2 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function p3_Callback(hObject, eventdata, handles)
% hObject    handle to p3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of p3 as text
%        str2double(get(hObject,'String')) returns contents of p3 as a double

% --- Executes during object creation, after setting all properties.
function p3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to p3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function p4_Callback(hObject, eventdata, handles)
% hObject    handle to p4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of p4 as text
%        str2double(get(hObject,'String')) returns contents of p4 as a double

% --- Executes during object creation, after setting all properties.
function p4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to p4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function d1_Callback(hObject, eventdata, handles)
% hObject    handle to d1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of d1 as text
%        str2double(get(hObject,'String')) returns contents of d1 as a double

% --- Executes during object creation, after setting all properties.
function d1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to d1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function d2_Callback(hObject, eventdata, handles)
% hObject    handle to d2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of d2 as text
%        str2double(get(hObject,'String')) returns contents of d2 as a double

% --- Executes during object creation, after setting all properties.
function d2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to d2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
```

```
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function d3_Callback(hObject, eventdata, handles)
% hObject    handle to d3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of d3 as text
%        str2double(get(hObject,'String')) returns contents of d3 as a double

% --- Executes during object creation, after setting all properties.
function d3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to d3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function d4_Callback(hObject, eventdata, handles)
% hObject    handle to d4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of d4 as text
%        str2double(get(hObject,'String')) returns contents of d4 as a double

% --- Executes during object creation, after setting all properties.
function d4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to d4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
```

```
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function c1_Callback(hObject, eventdata, handles)
% hObject    handle to c1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of c1 as text
%        str2double(get(hObject,'String')) returns contents of c1 as a double

% --- Executes during object creation, after setting all properties.
function c1_CreateFcn(hObject, eventdata, handles)
% hObject    handle to c1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit50_Callback(hObject, eventdata, handles)
% hObject    handle to edit50 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit50 as text
%        str2double(get(hObject,'String')) returns contents of edit50 as a double

% --- Executes during object creation, after setting all properties.
function edit50_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit50 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
```

```
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function c3_Callback(hObject, eventdata, handles)
% hObject    handle to c3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of c3 as text
%        str2double(get(hObject,'String')) returns contents of c3 as a double

% --- Executes during object creation, after setting all properties.
function c3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to c3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function c4_Callback(hObject, eventdata, handles)
% hObject    handle to c4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of c4 as text
%        str2double(get(hObject,'String')) returns contents of c4 as a double

% --- Executes during object creation, after setting all properties.
function c4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to c4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end
```

```
function c5_Callback(hObject, eventdata, handles)
% hObject    handle to c5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of c5 as text
%        str2double(get(hObject,'String')) returns contents of c5 as a double

% --- Executes during object creation, after setting all properties.
function c5_CreateFcn(hObject, eventdata, handles)
% hObject    handle to c5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_i_Callback(hObject, eventdata, handles)
% hObject    handle to new_i (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_i as text
%        str2double(get(hObject,'String')) returns contents of new_i as a double

% --- Executes during object creation, after setting all properties.
function new_i_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_i (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function edit78_Callback(hObject, eventdata, handles)
```

```
% hObject    handle to edit78 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit78 as text
%        str2double(get(hObject,'String')) returns contents of edit78 as a double

% --- Executes during object creation, after setting all properties.
function edit78_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit78 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_py_Callback(hObject, eventdata, handles)
% hObject    handle to new_py (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_py as text
%        str2double(get(hObject,'String')) returns contents of new_py as a double

% --- Executes during object creation, after setting all properties.
function new_py_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_py (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_c_Callback(hObject, eventdata, handles)
% hObject    handle to new_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_c as text
%        str2double(get(hObject,'String')) returns contents of new_c as a double

% --- Executes during object creation, after setting all properties.
function new_c_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_c (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_p_Callback(hObject, eventdata, handles)
% hObject    handle to new_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_p as text
%        str2double(get(hObject,'String')) returns contents of new_p as a double

% --- Executes during object creation, after setting all properties.
function new_p_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_p (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_d_Callback(hObject, eventdata, handles)
% hObject    handle to new_d (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of new_d as text
%        str2double(get(hObject,'String')) returns contents of new_d as a double

% --- Executes during object creation, after setting all properties.
function new_d_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_d (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_q_Callback(hObject, eventdata, handles)
% hObject    handle to new_q (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_q as text
%        str2double(get(hObject,'String')) returns contents of new_q as a double

% --- Executes during object creation, after setting all properties.
function new_q_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_q (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_e_Callback(hObject, eventdata, handles)
% hObject    handle to new_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_e as text
%        str2double(get(hObject,'String')) returns contents of new_e as a double
```

```
% --- Executes during object creation, after setting all properties.
function new_e_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_e (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_m_Callback(hObject, eventdata, handles)
% hObject    handle to new_m (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_m as text
%        str2double(get(hObject,'String')) returns contents of new_m as a double

% --- Executes during object creation, after setting all properties.
function new_m_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_m (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

function new_h_Callback(hObject, eventdata, handles)
% hObject    handle to new_h (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of new_h as text
%        str2double(get(hObject,'String')) returns contents of new_h as a double

% --- Executes during object creation, after setting all properties.
```

```
function new_h_CreateFcn(hObject, eventdata, handles)
% hObject    handle to new_h (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc
    set(hObject,'BackgroundColor','white');
else
    set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
end

% --- Executes on button press in pushbutton12.
function pushbutton12_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton12 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global c1;
global c2;
global c3;
global c4;
global c5;

global p1;
global p2;
global p3;
global p4;

global ps1;
global ps2;
global ps3;
global ps4;
global ps5;

global d1;
global d2;
global d3;
global d4;

c1=str2double(get(handles.c1,'string'));
c2=str2double(get(handles.c2,'string'));
c3=str2double(get(handles.c3,'string'));
c4=str2double(get(handles.c4,'string'));
c5=str2double(get(handles.c5,'string'));
```

```
p1=str2double(get(handles.p1,'string'));
p2=str2double(get(handles.p2,'string'));
p3=str2double(get(handles.p3,'string'));
p4=str2double(get(handles.p4,'string'));

ps1=str2double(get(handles.ps1,'string'));
ps2=str2double(get(handles.ps2,'string'));
ps3=str2double(get(handles.ps3,'string'));
ps4=str2double(get(handles.ps4,'string'));
ps5=str2double(get(handles.ps5,'string'));

d1=str2double(get(handles.d1,'string'));
d2=str2double(get(handles.d2,'string'));
d3=str2double(get(handles.d3,'string'));
d4=str2double(get(handles.d4,'string'));

newp=c1*0.1+c2*0.1+c3*0.1+c4*0.1+p1*0.1+p2*0.1+p3*0.1+ps2*0.1+ps4*0.1;
newd=c2*0.3+ps2*0.3+d3*0.3;
newq=c4*0.25+p1*0.25+p2+p3*0.25+ps3*0.25;
newe=p1*0.2+p2*0.2+p3*0.2+p4*0.2+ps3*0.2;
newm=c3*0.2+c4*0.2+p3*0.2+p4*0.2+ps3*0.2;

newh=ps1*0.3+ps4*0.3+d2*0.3;
newc=c5*0.5+d4*0.5;
newi=c5*0.2+ps4*0.2+ps5*0.2+d1*0.2+d4*0.2;
newa=c5*0.5+d4*0.5;
newpy=ps5*0.3+d1*0.3+d4*0.3;

set(handles.new_p,'String',newp);
newp = get(handles.new_p,'String');

set(handles.new_d,'String',newd);
newd = get(handles.new_d,'String');

set(handles.new_q,'String',newq);
newq = get(handles.new_q,'String');

set(handles.new_e,'String',newe);
newe = get(handles.new_e,'String');

set(handles.new_m,'String',newm);
newm = get(handles.new_m,'String');

set(handles.new_h,'String',newh);
newh = get(handles.new_h,'String');
```

```
set(handles.new_c,'String',newc);
newc = get(handles.new_c,'String');

set(handles.new_i,'String',newi);
newi = get(handles.new_i,'String');

set(handles.new_a,'String',newa);
newa = get(handles.new_a,'String');

set(handles.new_py,'String',newpy);
newpy = get(handles.new_py,'String');

% --- Executes on button press in pushbutton13.
function pushbutton13_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton13 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global new_p;
global new_d;
global new_q;
global new_e;
global new_m;

global new_h;
global new_c;
global new_i;
global new_a;
global new_py;

new_p=str2double(get(handles.new_p,'string'));
new_d=str2double(get(handles.new_d,'string'));
new_q=str2double(get(handles.new_q,'string'));
new_e=str2double(get(handles.new_e,'string'));
new_m=str2double(get(handles.new_m,'string'));
new_h=str2double(get(handles.new_h,'string'));
new_c=str2double(get(handles.new_c,'string'));
new_i=str2double(get(handles.new_i,'string'));
new_a=str2double(get(handles.new_a,'string'));
new_py=str2double(get(handles.new_py,'string'));

new_p2=new_p;
new_d2=new_d;
new_q2=new_q;
new_e2=new_e;
new_m2=new_m;
```

```
new_h2=new_h;
new_c2=new_c;
new_i2=new_i;
new_a2=new_a;
new_py2=new_py;

save test2 new_p2 new_d2 new_q2 new_e2 new_m2 new_h2 new_c2 new_i2
new_a2 new_py2
```

__Outlook of Feedback Analysis Program for Satisfaction Gap__