A STUDY OF HOW INFORMATION SYSTEMS FACILITATE FOOTBALL CLUBS

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Abstract

The study analyzes that how information systems facilitate football clubs. To fulfill these purposes this study adopts a design strategy which contains theoretical and empirical parts. It gives a way how to operate and improve works to solve and avoid problems in various sectors in order to facilitate football clubs. This study chooses a suitable information system development methodology and designs a general football club information system model. In the empirical study a questionnaire survey is made to check and complete a general football club information system model. This study proves that information systems can facilitate football clubs in business processes and operations, internal communication and decision-making; furthermore, it supports football club business strategies and helps establish a powerful human resource management project.

Keywords: information system, football club, information system model, information system development methodology

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1 Introduction

1.1 Background

From the appearance of human language until the universal application of computer, mankind never stopped improving information technology. From the middle of last century people started associating information technology with computers. Nowadays, computers, data centres, servers, database management systems and specialized software applications are managed by information technology departments, systems and databases administrators. Information technology supports modern businesses and becomes an important part of life (Alliance, 2011).

An information system is regarded as a combination of information technology and human activities. It supports people in many fields such as operation, management and decision making. Usually information systems are categorized in three parts: Management Information System, Decision Support System and Executive Information System (James, 2000). Following the evolution of information technology, various information systems, such as data warehouses, enterprise resource planning and enterprise systems, expert systems, geographic information systems, global information systems and office automations have been emerged in the business world. Bill Gates (1999) said information system is the "digital nervous system" of business. This means information system has an important role in modern business. As Bill Gates mentioned, business information system is a discipline with its mission to study the use of information system for business purposes. The research and application of business information system have become a meaningful issue, which involved many industries such as Manufacturing, Building, Transportation, Storage, Post, Finance, Wholesale and retail trade, Real estate, Accommodation and Catering, Services, Education, Health, social security and social welfare, Culture, Sports and Entertainment.

Football, as the most famous sport in the world and a new emerging industry, has an immeasurable impact on human life. For example, the World Cup 2006 in Germany captivated 3,359,439 spectators, who watched matches in 12 magnificent stadiums. Furthermore, an estimated worldwide audience were more than 3 billion. 32 teams from all over the world brought 64 matches and a 147-goal show (FIFA[1], 2006). Meanwhile, World Cup 2006 influenced a hotel, retail and general consumption, which significantly increased during the championship. During and after this event, trillions of information and data were collected, stored, retrieved, distributed, compared and analyzed such as schedule planning, choosing a place for 64 matches, a composite 12 stadiums arranging, tickets selling to 3,359,439 spectators, hotels pointing for teams from 32 countries, TV agreements signing, matches results recording, players data counting, referees choosing, bonus setting, sponsors activities, etc.

[1] FIFA is the abbreviation of Fédération Internationale de Football Association.

Even though Football World Cup has great influence, it is held only once in each four years. Actually, professional football players are mainly playing and working for football clubs but not for the national teams. Football matches between different football clubs have dramatic influence. The origin of modern football – England football was restructured in 1992. Following the formation of the Premier League, the deal signing between the television and the Sky Satellite Company has announced that a modern football industry in England was established (Szymanski, et al., 1997).

There are 326,527 football clubs officially registered all over the world in FIFA (FIFA, 2011). Two hundred and sixty-five million male and female players in addition to five million referees and officials make a grand total of two hundred seventy million people are actively involved in the game of football. The amount of people is a four percent of the world's population (FIFA, 2011).

Generally, football clubs contain several teams and are responsible for their management. In England top clubs have at least three teams to attend various leagues at different levels: first team mainly plays in Premier league, The Football Association Challenge cup, Community Shield competition, European league; reserve team attends Barclays Premier Reserve League; youth team plays in Academy league and Youth cup. In Spain first teams of each football club attend Spanish league, Spanish cup and European league; B teams play in B-level league; youth teams also play in Youth cup. In Italy football clubs have more youth competitions than clubs from the other two countries.

Normally, one football season contains one national cup competition, one main international cup competition and many commercial exhibitions. Football club should organize around 80 games for the first team, including around 38 league games (for instance, 20 teams play in bi-circulating league), 10 international cup matches, around 10 national games, and countless commercial or friendly matches (at least 20). Besides, football clubs need to arrange many matches for reserve teams and youth competitions according to different age groups.

A football club is consisted by many organizations, which can be categorized in finance, marketing, public relations, service, medical, soccer, human resource, fans association sectors and so on. The targeted scope of each sector is large; their administration is more complex than other sports clubs. A profit of football club per year is incredible, for example, one of the richest worldwide football clubs from England - Manchester United’s revenue in 2010 reached 156 million pounds (Stretty, 2011). Undoubtedly, administrating of 156 million pounds every year is a complex task for the finance department. Most famous football clubs, as known, have a history of almost one century, much longer than the biggest company in the world– Wal-Mart, which was founded in 1962 (Anon., 2008). For example, Real Madrid, which was formed in 1897 in Madrid, has more than 450 million fans worldwide (Real Madrid Club, 2011). Real Madrid club obviously has to consider different payment patterns in each country according to various situations and relevant online payment policies for its official online shops. For football clubs, establishing an overseas fans association to get supports from clubs’ worldwide fans is a sensible choice to improve influence.

Football club singularity has been proven; football industry has confirmed its great influential position in human daily life. Information system application in football clubs should be regarded as an important subject of business information.

1.2 Problem Statement

Football clubs were chosen as the target area in this study because of their specifications and representation. Different from other clubs such as basketball, volleyball, and hockey clubs, football clubs have more supporters and influence, more players and staff, more levels of team management, more intensive competitions, larger organizational structures, etc. More importantly, football is the most spread and popular sport in all over the world. Its popularity as a challenging task is considered by two factors: number of fans, who follow this sport, and number of people, who regularly play football. Furthermore, football is on the top of team sports at professional level (Anon., 2010).

Voluntary sport clubs or other clubs which unite a lot of people with the same interests into one community; they are non-profit organizations and do not seek individual economic benefits; they work altruistically and very often do not have a paid staff (Ansgar and Jochen, 2008). Professional football clubs work according to different rules and their club' performance is commercialized. Members and fans of a football club are regarded customers. Therefore, football clubs can be considered as a business company and understood as an economic sector.

Moreover, in comparison with other simple structured sports clubs, football clubs provide not only sport activities but also have a duty to form a team, which participates in official competitions and represents a club. Football clubs not only promote and develop professional sports, but also fulfil expectations of members, fans and all the other actors that are involved in clubs' activity (Gomez, Marti and Opazo, 2008). So, a football club is more complex than other companies.

For example, supermarkets mainly collect information about the customers, such as customer's consuming habits, age, social group or favourite commodities combination, etc. Investment Companies monitor and analyze trends of stock market, future market, foreign exchange market and real estate market, etc. Special and targeted information systems also have been designed and improved for many years. In manufacturing, for instance, some more automated manufacturing systems, which have been merged with new information technologies, played a critical role: computer integrated manufacturing (CIM), flexible manufacturing systems (FMS), enterprise resource planning (ERP), Material Requirements Planning (MRP), Virtual organizations (VO) and Statistical process control (SPC) (Gunasekaran and McGaughey, 2002). A football club contains various departments, sectors, groups, people and activities. For example, a football club includes special groups such as a first team, reserve/youth teams, coach groups, football schools, junior camps, management sectors, personnel departments, technical support centres, marketing sectors, football fans

associations, etc. Football club operation model is far different from other traditional industries. For instance, football club human resource management is a huge project. In practice, football clubs demand for various types of information to maintain daily operations such as information about competitions, schedules, competitors' state, transfer market status, players' physical and technical state, opponents' tactical, sponsors' information, etc. Obviously, it is a complex project and a great challenge for football club to integrate, collect, store, update, retrieve and transform so much specific information.

In fact, the research and application of information system in football clubs and the whole football industry are rare can be considered laggard. On one hand, almost no general and integral football club-targeted information systems were developed; even not any detailed information system models for football clubs were designed. Because of the lack of basic information system models, it is even more impossible to start designing a suitable system. On the other hand, without effective information system's support, it is obviously a challenge for managers to operate clubs. According to The European Club Footballing Landscape[2] by UEFA[3], most football clubs have serious financial problems. In 2009, top division football club total revenues reached € 11.7 billion; however, the whole net losses rose incredibly to € 1.17 billion. More than 58% of European top football clubs reported losses, 28% of clubs has losses which cover more than 20% income, which means spending € 12 for each € 10 income. In an investigation, more than one in eight football club auditors cannot stop doubting whether those clubs should keep on going (UEFA, 2009).

So, this study could be interesting and useful in order to check information systems' support and benefit in such a complex organization as a football club, which is a good area to test information systems' abilities in different departments, such as sports, finance and so on. It would give a way to football club managers how to operate and improve their work in pursuance to solve or avoid some problems in various sectors.

1.3 Purpose of the study

This study is meant to help football club managers realize possible influence and significance brought by information systems; this study would be useful as a reference for football club managers and software developers when they try to establish or improve football club information system.

1.4 Research questions

The main question of this study is: How could information system facilitate football clubs?

To answer this main question, several sub-questions will be analyzed:

[2] The European Club Footballing Landscape is a 100 pages report, which is published in four languages by EUFA. This report is focused on financial problems which influenced European club's development.
[3] UEFA is the abbreviation of Union of European Football Associations.

1. Which areas in football clubs may information systems facilitate?

2. Which methodology is suitable for football club information system development?

3. How should a general football club information system model be?

1.5 Target group

This study will be a supplement for business information system theory and information system application in a special industry. Researchers in information system applications area will be the main target group of this study from theoretical aspect. For scholars, who focus on information system model construction, this study would be valuable as well.

In practice, it would help football clubs to establish or enhance their information systems. So, football club managers will be the main target group in practical area. Football club information system developers would be the second target group.

1.6 Delimitations

This study analyzes information systems' impact on football clubs; this study chooses a suitable information system development methodology; this study designs a general football club information system model. It can be regarded as the beginning of information reform in football industry.

> Business information system consists of various parts: people, hardware, software, data and network (James, 2000).

How to design sub-systems, how to integrate them efficiently, and how to design relevant software will be long-term and arduous tasks. These will be left for following researches.

1.7 Expected outcome

This study will analyze and search areas of football clubs that information systems could facilitate; this study will choose a suitable methodology for football club information system development; a general football club information system model will be designed; at the end, this study will show how information systems facilitate football clubs.

1.8 The author's own experience and background

At the stage of bachelor, my field of study was information system and information management. I studied foreign trade companies' information systems and got a chance to work in a relevant company. Even though the experience was nice and unforgettable; still some doubts about information system were troubling me. In University of Boras, I got more knowledge about information systems. This knowledge enabled me to make my own research about information system in another special area of business.

Once I read an article about Milan Lab - a famous worldwide high interdisciplinary scientific research centre, which is designed to collect football players' body data and provide systematic approach to manage players' individual health (AC Milan, 2011). The output data will be shared with players, physical therapists, staff, coaches and managers. Milan Lab inspired me to detect the influence of information systems inside football clubs.

1.9 Structure of the thesis play

The problem statements, the purpose of the thesis and research questions are described in first chapter. Second chapter explains the thesis in a qualitative perspective. A design study is chosen as the research strategy; a documents analysis is the main data collection method; a comparative analysis is chosen to be the analysis method; accuracy, credibility and validity have been chosen to validate findings. Third chapter is about the theoretical study of information systems' influence to football club and system development methodologies. Fourth chapter is about a football club information system model and a relevant questionnaire design. Fifth chapter analyzes research results from both theoretical and empirical perspectives. Sixth chapter consists of conclusion, result evaluation, result validation and research outlook.

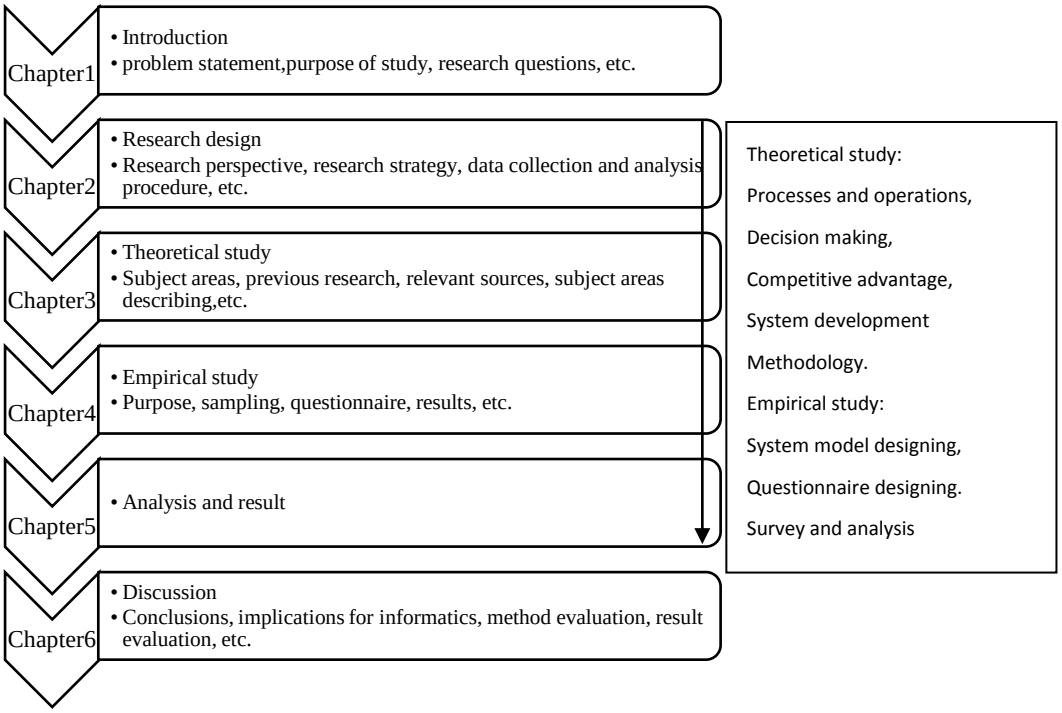


Figure 1.1: Structure of the thesis

Figure 1.1 visually illustrates the relation between different content such as the contextual research, theoretical findings, model designing, investigation and validation.

2 Research design

2.1 Research perspective

In sociology there are different kinds of methods to develop a special knowledge to refine a human social welfare. These methods are based on various perspectives from different social structure levels. Popular perspectives contain positivism, anti-positivism, structural functionalism, mathematical doctrine, criticism and hermeneutics (Sheeja, 2010).

Positivism is regarded as the most popular sociology perspective, which recommends scientific method as the best method to uncover the essence of social activities. According to positivism, "authentic knowledge" is based on experience, sense and positive verification. In contemporary sociology, positivism usually avoids too many debates on clarity, reliability and validity; it carries no explicit theoretical or philosophical commitments; it is generally equated to "quantitative research". Typical positivism research methods are experiments and statistical surveys (David and John, 2008).

Anti-positivism induces researchers to reject empiricism and scientific methods in a process of sociology. In modern practice anti-positivism usually is equated with qualitative research methods. Generally, anti-positivism contains research methods such as non-structural interview or participant observation (Wicks, 1998).

Structural functionalism regards society as a whole system which namely consists of norms, customs, institutions and traditions. This perspective emphasizes "effort", which imputes each feature, custom or practice on the functioning of cohesive system (Alexander, 1970).

Mathematical doctrine sets out mathematics as a study social phenomenon. Sociological theory is based on an intuitive content, but it is weak on its form and express method. However, this approach uses mathematics to derive implications of theory, which could be reached by other intuitive methods. Mathematical models are always constructed in order to explain some social phenomenon and provide an empirical interpretation for ideas with a relevant empirical data. Mathematical models usually help sociologists predict possible future situation in broader scope (John, 2000).

Criticism is a sociological research method which criticizes and attempts to change a society as a whole, instead of trying to understand or explain some phenomenon. The source and foundation of the perspective usually come from basic rules of a social domination (Norm, 2008).

Hermeneutics refers to explain and comprehend a social phenomenon by analyzing culture, meanings and human activities. Its core principle is that researchers should relate it with the whole context or analyze it from a worldwide perspective to understand the true meaning of a

phenomenon. In a research area of marketing, hermeneutics usually represents a qualitative study based on interviews with a small group of participants, who are seriously analyzed and interpreted (Willis and Jost, 2007).

This study will analyze which areas information system could influence football clubs; it will choose a suitable information system development methodology for football club information projects; it will design a general football club information system model.

According to the content of this study, this investigation starts from a qualitative perspective, which combines both anti-positivism and hermeneutics. The aim of this research is to do a deep analysis about football clubs' business process, speciality and the distinction of football club information system. So, the research will be more qualitative rather than quantitative.

2.2 Research strategy

The main purpose of this study is to help football club managers realize possible influence or significance which brought by information systems and to give football club managers and software developers a useful reference when they try to establish or improve a football club information system.

To fulfil these purposes, this study adopts a design study strategy, which contains mainly two parts: theoretical and empirical design studies. The theoretical part resolves two research questions and empirical part resolves one question.

Research questions will be transformed into testing projects in the design study. Designs usually depend on research questions and consist of such parts: questions of research, relevant data, data collection, result analysis. Generally, there are two types of research designs: quantitative and qualitative. Qualitative designs do not need to be fixed before the main stage of data collection starts. It allows more flexible changes and freedom during the data collection stage (Adèr, Mellenbergh and Hand, 2008).

The theoretical analysis will be based on combination of typical information system application and football club business processes. Information system application examples from football clubs and other industries will be analyzed. Then, various development methodologies will be analyzed to choose a suitable one according to the characteristics from both methodologies and football clubs. So, in the theoretical part, grounded theory study is adopted to make a relevant knowledge analysis and to explain first two questions.

The empirical study will design a targeted information system model and a questionnaire. Through the questionnaire survey, a comparatively complete and effective football club information system model will be established. The model helps analyze how information systems facilitate football clubs. So, a model design study and investigation will be combined.

The theoretical study could provide empirical study limited reference, especially when a football club information system model is designed. However, definitely there is some practical information that should be collected from other materials in the model designing process. Empirical study could verify some assumptions and obtain some knowledge beside of theoretical area.

2.3 Data collection procedures

Data collection procedures in this study consist of three main methods: observation method, document review and questionnaire.

An observation method means that researchers observe what people actually do. The aim is for researchers to gain a closer insight into the targeted practices and motivations (Denzin and Lincoln, 2005). Football clubs' organizational and operational information can be observed by many ways such as official website, internet media and TV channels.

A document review is a data collection procedure to review existing sources such as documents, reports, articles and data files with the intention of collecting independently verifiable data and information (WBI, 2007). Sources about information business application and information system development methodologies have more priority; information system applications in other business areas are also valuable as a reference. Information system development methodology which suits football clubs' characteristics more will be the final selection. Then, analysis of documents and materials will be the main data collection method in this part.

A questionnaire is a research instrument consisting of a series of questions and selections for the purpose of gathering information from respondents (Mellenbergh, 2008). Football clubs' daily business processes and football club managers' opinions can be collected by questionnaires.

2.4 Data analysis procedures

Data analysis is used to support conclusion and decision making by transforming and modeling data. It has many methods with different technologies, such as data mining, descriptive statistics, exploratory data analysis, confirmatory data analysis, business intelligence, constant comparison, predictive analytics and root cause analysis (Adèr, Mellenbergh and Hand, 2008).

According to characteristics of this study, a comparative analysis is chosen to be this study's analysis method. A comparative analysis helps find similarities and differences of both theoretical and empirical part, and then analyze reasons. There are mainly several processes in comparative analysis: classify different categories, compare results, and analyze facilitation.

The first step of analysis is to classify all knowledge from both theoretical and empirical parts into different categories. Found areas and designed information system model will be divided into details.

The second step of analysis is to compare results according to categories what were divided on last step. The cooperation will investigate new phenomenon and prepare for final analysis.

The last step is analysis facilitation. This step investigates final conclusion according to arguments from last two steps.

2.5 Strategies for validating findings

Generally, there are some validation methods to measure accuracy, credibility and validity such as prolonged engagement, interviewer-corroboration, peer-debriefing, negative case analysis, confirming ability, bracketing, audit ability and member check (Lincoln and Guba, 1985).

In this research, design study is chosen as main method to verify how information systems facilitate football clubs. So, it is necessary to validate whether results meet this study's intended purpose; whether results are reliable; whether results are effective. Accuracy, credibility and validity should be considered carefully to evaluate results of this study.

2.6 Evaluation criteria

There are totally three evaluation criteria what have been chosen: accuracy, credibility and validity.

Accuracy means how much results meet original purpose. It usually starts with the analysis of research purpose; and then it analyzes how study is carrying out; finally it will be a comparison between them.

Credibility means how much results can be trusted. It usually starts with analysis of the research method such as resource-choosing and knowledge-choosing.

Validity means the effectiveness of results. How effective are results depends on the influence to some areas such as relevant research areas, practical business and so on.

2.7 Result presentation method

The results will be shown in a form which contains text and diagram. The study will analyze new changes brought by information system to football clubs, and then show the diversity and benefits.

3 Theoretical study

3.1 Key concepts

This study is designed to show how information systems facilitate football clubs. Since the main research questions are: Which areas may information systems facilitate football clubs? Which Information system development methodology is suitable to develop football club information system? How should a general football club information system model be? So, there are some main concepts: information, information system, football club, information system development methodology, and information system model.

1. Information can be understood in many different ways. In technical sense, information can be regarded as an ordered sequence of signals or symbols to record a message. It has different forms, such as signs, signals, numbers, words, etc. Furthermore, information as concept has various meanings: a sensory input, an influence to transformation, a physical property or records (Floridi, 2010).

2. The most critical concept of this study is information system. Information system is a system of communication between people (Paul, 2009). It can be regarded as a special system which contains gathering, processing, retrieving, distributing and producing of information. The effective and correct output of an information system is used to facilitate or support decision-making by a group of people, such as a business target.

3. Football club is an institution which organizes one or more teams to participate in matches at different levels, and works according to the same rules made by a specific football association (FIFA, 2011). However, in this study, the research range is locked on those football clubs which have integral organizations and departments. These clubs usually exist as limited liability companies. These clubs are famous in a certain range, and can be national or worldwide; they belong to top leagues of those countries, which have improved football governing association and a mature football circumstance.

4. This study is trying to design an information system, which is oriented to a football club, with a mature methodology. Information system development methodology is a recommended collection of philosophies, phases, procedures, rules, techniques, tools, documentation, management and training for developers of information systems (Maddision, 1983). Generally, Information system development methodology refers to series of methods to develop an information system.

5. Information system model is one part of information system research, which consists of a set of underlying construction to express information flows and relations among different sub-systems.

3.2 Subject areas relevant for the research

The first research question is “Which areas may information systems facilitate football clubs?”

James (2000) argues there are three aspects that information systems could influence an industry: supporting business processes and operations, supporting decision making by managers and employees, and supporting business strategies for competitive advantages.

So, the first subject area is information systems’ influence on football club business processes and operations. The second subject area is information systems’ influence on football club decision-making. The last subject area is information systems’ influence on football club business strategies for competitive advantages.

Figure 3.1 shows the relation between three subject areas of the first research question:

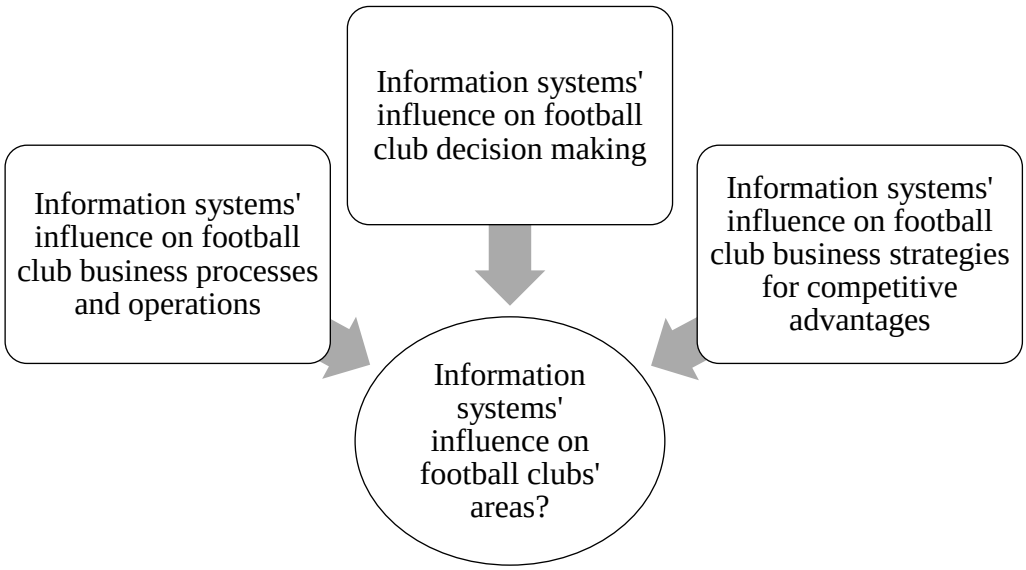


Figure 3.1: Relations of three subject areas

In this part, in order to testify areas that information system facilitates in football industry, three sub-areas need to be analyzed and investigated. An information system has been used and proved successfully in some specific industries, such as manufacturing, retail and consulting industry. Researches about information system application in football industry are most related to this study. In addition, researches about information system application in sports or other similar industries are also contained in the subject area.

The second theoretical research question is “Which methodology is suitable for football club information system development?” Obviously, football information system development methodology is the relevant research subject area.

3.3 Previous research

There are a few direct studies about information systems' influence on football club business processes and operations.

Dario (2002) analyzes diverse information technologies that are used to provide players with relevant feedback in his research "Advances in the application of information technology to sport performance". He takes some technology-based feedback application samples from various sports and makes assumption that feedback would actually enhance players' skills, performance and evaluations from couches; then he discusses those selected systems from different perspectives such as vision, audition and proprioception.

In "Designing database for a football league: A case study of Thai football league", Trisuwannawat (2010) argues the importance of database when developers design an information system for a football league. This research is based on Thai football league for a case study with classified and represented data in categories. Each category is important in a specific area and stored into beneficial information by analysis tools. They are divided into three main categories: player and staff profile information, health and physical information of players, and information of club, association and competition. Moreover, this research uses entity relation diagram to represent relation between different sub-databases.

However, there are some studies of information systems' influence on other industries' business processes and operations.

Paul (2009) deems that information systems help different business enterprises to collect transactional data about their own operations, co-operators and competitors' behaviour and even business plans.

In a manufacturing industry, Omar and Ramírez (2005) describe the designing and implementation of a Manufacturing Information System as a solution to share and exchange manufacturing data.

In a retail industry, Ken (1998) introduces human centeredness to information systems. He argues against modern rationalism; he also emphasizes an interactive concept of interaction between human and technology of a postmodern paradigm.

Gedam (2011) argues that the function of human resource information systems and its role as a business tool to allow the standardization in gathering information for users. A human resource information system can help managers perform human resource functions in an effective and systematic way using technology. From early mid-1990s, many scholars started arguing about human resource information system function to show its influence in business strategic decision making.

James (2000) analyzes the influence of business information system from a special perspective, which shows that information systems are reshaping the basic of business. He indicates that information systems use people, hardware, software, data, and communications network resources to collect, transform, and disseminate information inside a business organization.

There is a research about information systems' influence on football club decision making.

Richard (1999), in his research "Football information services: fanzines, "Match of the Day" and the modem", examines character, growth and demand for football information services in England and Wales. He argues that internet and information technology are set to have a big impact on football information service and to the market clubs as global "brands".

However, there are some studies about Information systems' influence in other industries' decision-making.

In a transportation industry, Shih (2011) illustrates the importance of geographic information systems; Maria, Vincenzo and Peter (2009) describe an integrated information system framework for the assessment of transportation planning and management.

In a public health area, Bara (2009) argues that public health agencies at state and local levels are integrating information systems to improve health outcomes for children.

Inshakov and Mizintseva (2007) illustrate the interconnection between information system construction principles and informational mechanisms development patterns. They establish an economic information system development pattern and explain the importance of database to make information system function efficiently.

There are a few direct studies about Information systems' influence on football club business strategies for competitive advantages.

In "Strategic use of customer relationship management (CRM) in sports: The Rosenborg case", Furuholt (2007) shows how the Norwegian football club - Rosenborg Ballklub uses customers relationship management as a strategic tool to enhance the relation between club and its supporters - fans.

Thanos (2009), in his work "A strategy for managing customer relations on the internet: evidence from the football sector", illustrates the critical role of internet to maintain electronic customer relationship management in football industry. The study investigates football industries' online environment and customer service methods. The conclusion shows that football web site is very important for the relationship between clubs and their customers. Football clubs' web-design needs to support the main business goal and contain self-problem solving functions.

Shaw (2007) investigates a special coordination method called "network orchestration" with the case of Manchester United Football Club in "A conceptual framework for the implementation of enterprise information portals in large organizations" study. He uses business process modelling and theoretical systems concepts to investigate complex horizontal and vertical relationships between partner firms and then develop a multi-level model of network operation, sustainability and governance.

However, there are some studies about information systems' influence on other industries' business strategies for competitive advantages.

In a manufacturing industry, Thomas and Duncan (2010) argue that real-time location systems (RTLS) provide a promising approach to reduce a waste of time in manufacturing operations.

In a retail industry, John (1993) emphasizes the pivotal role of information systems to identify fraud and applications in sales audit, stock audit and security functions.

Maria and Sofia (2009) prove the advantages of Nursing Information Systems, Clinical Information Systems and Hospital Information Systems in health service industry.

Some studies, which contain football clubs' operation and organizational structure information, could be valuable as a reference. For example, a Spanish football club "Barcelona", which club's management structure information is contained in a research "Futbol club Barcelona: Globalization opportunities" by Stanford graduate school of business (Atonio, George and Jaume, 2007).

Chris and Lawrie (1999) analyze the management structure and characteristics of football clubs. They argue that there are a few officers at the top and remainder of the board as a tight-knit strategic team; below the top level there is another group which consists of managers and coaches to develop strategies to ensure the highest level of performance by a football team itself; at the bottom of the club there is a support group which consists of physiotherapists, trainers, fitness, kit, and dietary specialists to enable club's basic business to be implemented.

Jacco (2005) challenges the traditional opinion that football clubs' success is determined by the performance of teams in matches, poor results can cause a spiral of decline in numbers of spectators, sponsor revenues, media attention, value of players, merchandise sales, and so on. Instead, he re-identifies football club as a multi-entertainment company with commercial opportunities.

Hallgeir (2009) analyzes the organization characteristics of football clubs in Scandinavia. Although all Scandinavian professional football clubs emerged from voluntary sports clubs, the organization of their professional football at present has minor different forms which to a large extent follow national borders. The minor difference mainly exists only in the share hold

percentage difference, however, organisation structure inside football clubs are almost the same.

There is no information system development methodology research related directly with football clubs. However, studies of information system development methodology will still be useful.

Gane and Sarson (1979) propose Structured Analysis and Design of Information Systems methodology which reflects the process modelling theme. This methodology consists of functional decomposition, decision trees, decision tables, data flow diagrams and structured language.

Jackson (1975) creates a program design methodology – Jackson Structured Programming, which is based on teaching and practicing of commercial computer programming. Afterwards, Jackson Systems Development was devised by Jackson (1983) as an extension of the program design task and that the same techniques can be used for both. These two methodologies are concentrating on the design of efficient and well-tested software, which reflects the specification.

Structured Systems Analysis and Design Method is a methodology to support the UK Civil Service's computer training and some procurement. It is developed by the UK consultants Learmonth and Burchett Management Systems and Central Computing and Telecommunications Agency. It is mainly used in Civil Service applications (Weaver, 1998). It includes data flow diagramming, entity life histories, and using of toolsets.

Merise is the most famous and widely used methodology in France and now has been spreading in whole Europe (Tardieu, 1983). This methodology is based on a decision cycle, a life-cycle and an abstraction cycle. They argue that process and data have same priority and should be paralleled.

Martin (1991) improves Information Engineering, which was first developed by Clive Finkelstein in Australia in the late 1970s. This methodology is claimed to be a comprehensive methodology, which covers all aspects of the life-cycle and be regarded as an effective way to develop good quality information system with various technologies in a framework.

Welti (1999) proposes Information system development methodology as a collection of applications rather than a single technique or a method from the perspective of enterprise resource planning systems. His enterprise resource planning development is consisted by four phases: Planning, Realization, Preparation and Production.

Yourdon and Argila (1996) enhance a well-known analysis focused methodology, which is called Object-oriented Analysis methodology. It consists of five major activities: finding objects, identifying structures, identifying subjects, defining attributes and defining services.

Jacobson (1999) develops Rational Unified Process methodology, which is regarded as a "full-fledged process able to support the entire software development life-cycle". It suggests acquiring and learning basic ideas before developing a process.

Martin's Rapid Application Development is a combination of techniques and tools to develop information systems quickly due to consistent changing business requirements. It bases on evolutionary and prototyping approaches and contains four main phases: Requirements planning, User designs, Construction and Cutover (Martin, 1991).

Some system developers from companies come together to form a group and develop a standard Rapid Application Development methodology. This methodology was designed in order to prevent Rapid Application Development from becoming "rapid but poor". Then the methodology was named as a Dynamic System Development Method (Stapleton, 1997).

Mumford (1995) proposes a methodology called Effective Technical and Human Implementation of Computer-based Systems (ETHICS) to encompass socio-technical view and make technology to fit social and organizational factors in the application domain. Meanwhile, this methodology embodies an ethical position as its name, which makes itself different from other methodologies from philosophical perspective.

Wielinga (1993) develops a formalized approach to expert systems development - KADS, which has its origins from European Union ESPRIT research project. KADS has total six steps: Organizational model, Application model, Task model, Model of cooperation, Model of expertise and Model design. Then, Schreiber (2000) improves another methodology called CommonKADS, which relates to the wider domain of knowledge management but bases on KADS.

Checkland and Scholes (1990) propose Soft Systems Methodology, which is used to decompose a complex system into its constituential parts to enable analysis. This methodology embodies that properties of the whole are not entirely explicable in terms of the properties of the constituent elements. It contains seven steps: an unstructured problem situation, a problem situation expression, a root definition of relevant systems, a conceptual model, a comparison of second and fourth steps, feasible and desirable changes, an action to improve the problem situation.

Lundeberg (1983) develops Information Systems Work and Analysis of Change methodology to identify basic reasons of users' problem. This methodology is focused on the analysis of changing process in organizations.

Besides, there are also some system development methodology studies in different industries.

Alistair, Chris and Steve (2004) argue that engineering companies information systems need to be built on an understanding of how engineers work. In their study, they indicate how personal, local group and company-wide information is used.

Panichpapiboon and Pattara (2008) illustrate necessity of immediate network connectivity to facilitate the dissemination of time-critical information in a transportation industry. They analyze that time-critical messages should be able to propagate and reach all vehicles on the road segment without any delay.

In the information industry, Brown, Dillard and Marshall (2005) analyze requirements of information firms. Emerging environmental requirements make firms to take more environmental risks and activities than before. So, they develop an information matrix to identify alternative management strategies for responding to environmental issues; they also provide a tool to identify which information should be collected, stored, analyzed, and reported in environmentally attuned accounting information systems.

Daniel, Eduardo and Mario (2006) present some critical security standards as requirements at stages of software development in security information system designing. They prove the importance of providing a security resources repository as well as integrating common criteria into software life-cycle.

3.4 Relevant literature sources

After literature sources searching, there are a few studies related about information systems' influence on football clubs, which can provide direct help and reference.

James (2000) emphasizes information system's importance in his book "Introduction to Information Systems". He uses some cases to support his opinions from three perspectives: supporting business processes and operations, supporting decision making by managers and employees, and supporting business strategies for competitive advantages.

Atonio, George and Jaume (2007) analyze football club organizational structure of Barcelona football club in their research "Futbol club barcelona: Globalization opportunities". This research is valuable to be a reference.

In Dario's research, he illustrates the importance of technology-based feedback applications, which can be used in theoretical research (Dario, 2002).

Paul (2009) deems that the role of information system is to help different business enterprises collect transactional data about their own operations, co-operators and competitors' operations and plans. His research could be reference in football club internal communication systems.

Gedam's research could be used at human resource management part. Human resource information system can help managers perform human resource functions in an effective and systematic way (Gedam, 2011).

Trisuwannawat's research is valuable when developers are designing human resource database. In his research, data is divided into three main categories: information of player and staff profile, health and physical information of players, information of club, association and competition (Trisuwannawat, 2010).

In "Strategy and financial management in the football industry", Tony Grundy (2005) illustrates the importance of financial management in football industry.

Yoshida (2009) analyzes the characteristics of customer relationship management in sports industry. It helps find some areas that information systems may facilitate football clubs.

Jamie Cleland (2011) proves the relationship changes between media and football supporters. It could afford reference that football club social relationship areas might be facilitated.

In the research "An advanced emergency medical care system at National Football League games", Peter (1985) analyzes medical supporting in football industry. It could give some valuable reference in football club medical areas that information systems could facilitate.

In "A conceptual framework for the implementation of enterprise information portals in large organizations", Shaw (2007) investigates the relationships between partner firms and then develops a multi-level model of network operation, sustainability and governance. This study will give reference to football club business strategy area.

In the research "Effective Requirements Analysis and Systems Design: The ETHICS Method", Mumford (1995) designs a methodology called Effective Technical and Human Implementation of Computer-based Systems (ETHICS). It is closely related with the second part of theoretical research.

There are mainly two theories used in Mumford's methodology: Social-technical approach and Job satisfaction. Mumford (1983) illustrates a social-technical approach in his research "Designing Human Systems". It is a special prospective view according to which technology should be more related with social and organizational factors.

Mumford and Weir (1979) argue about job satisfaction's definition in "Computer Systems in Work Design – The ETHICS Method". Also, job satisfaction is used to measure if one method meets people's demands.

Parsons and Shils (1951) illustrate job satisfaction from five different measurements in the study "Towards a General Theory of Action": knowledge fit, psychological fit, efficiency fit, task-structure fit and ethical fit.

In the research "Assessing participatory systems design: some conclusions from an exploratory study", Hitschheim (1983) illustrates importance and its special role of participation to Information system development methodology.

3.5 Information systems' influence on football club business processes and operations

Firstly, this study analyzes from the first perspective that information system could support football clubs' business processes and operations. In James' research, the way information system influences business companies' processes and operations mainly is embodied in five aspects: marketing, human resource management, finance, accounting and production/operation (James, 2000).

Based on Stanford University's research, worldwide typical football clubs –Barcelona's organizational characteristics are shown in figure 3.2:

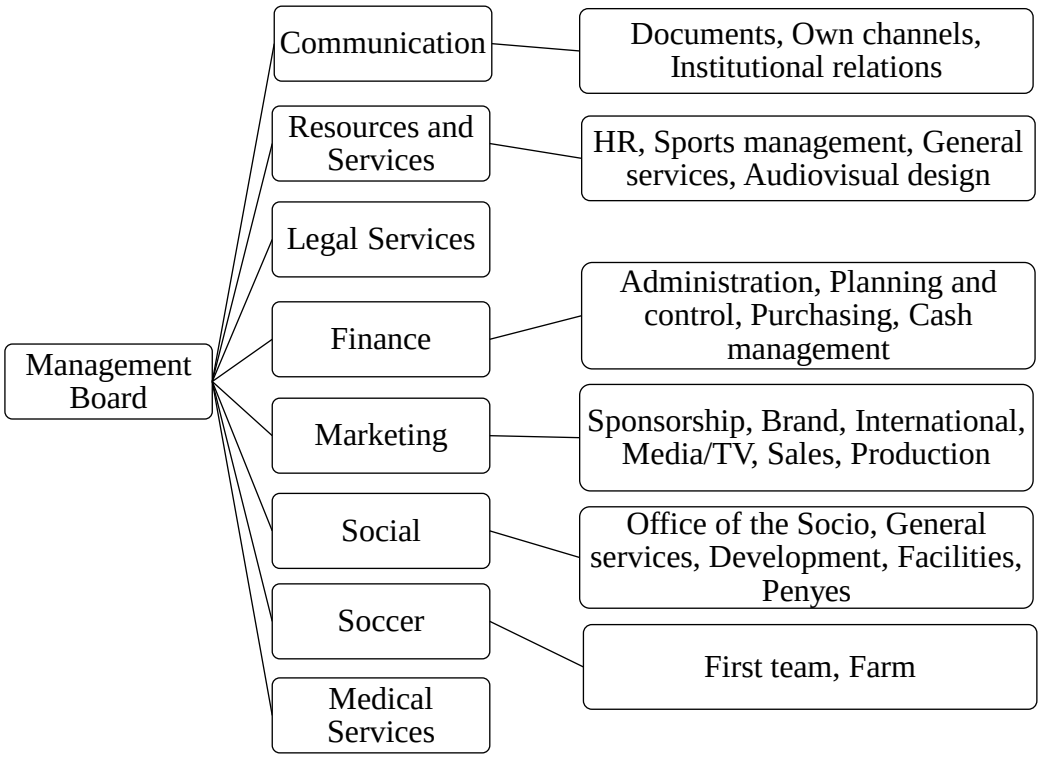


Figure 3.2: Barcelona's organizational structure (Atonio, George and Jaume, 2007)

Combining the structure above and James' research (2000), there are several aspects that information systems influence football clubs' processes and operations: Internal Communication, Resources and Services, Finance, Marketing, Social relations, Soccer management and Medical Services.

Research starts with how information system influences football clubs' processes and operations:

1. Information system may support football clubs internal communication, such as Online chat, Instant message, Video conference, Web conference, E-mail and Document management (Paul, 2009).

Information communication system offers football employees online chat and instant message functions to send text-based messages to each other by using personal computers or other devices. This function is not influenced by different directions of information flows and space distances. It helps users send messages both in point-to-point and multicast way and dramatically reduce communication time (Paul, 2009).

It can support video conference and web conference. It uses interactive telecommunication technologies to support employees from remote locations to interact meeting and share information in real-time. Applications for conference usually include meetings, training events, lectures and presentations (Paul, 2009).

An e-mail information system provides employees some functions such as mail receiving, mail forwarding, mail delivering and storing. Advantages of E-mail information system are that both sending and receiving users are not required to be online; they just need to connect briefly to E-mail server as long enough to send or download e-mails (Paul, 2009).

Document management system could help football clubs' staff publish, retrieve, store electronic documents and so on. It provides users publishing functions such as reviewing, authorizing, printing and so on. Published documents should have a specific format that cannot be easily changed without an authorization. It supports users to retrieve targeted electronic documents from storage. System could allow users to specify the unique or partial document identifier, and then use a basic index to retrieve the document. A document management system helps users to store documents such as managing similar documents, classifying different documents, determining the term-length of documents-keeping, migration of documents from one storage media to another, and document destruction control (Paul, 2009).

2. Information systems could also influence football club in aspects of Resources and Services, such as human resource management (Gedam, 2011).

Human resource management information system is designed to effectively and efficiently use human resources of a company. Thus, a human resource management information system contains functions of recruitment, selection, hiring, placement, performance evaluation, employee benefits analysis, training and development. For example, football clubs could use commercial recruiting services and own database to publish job recruitment information, interview and backup favourite candidates. A human resource management information system can collect data from employees' input, and then design different targeted tasks and distribute them to employees (Trisuwannawat, 2010).

A human resource management Information system could allow employees to view their own reports of expenses and travels reports, verify their work agreements' details and salary information, update their personal profile (Gedam, 2011).

A human resource management information system can also afford the function to track and record human resource and make their usage maximized (Gedam, 2011). For example, a travel record-keeping system keeps tracking of travel addition, deletion, adjustment and so on. All information will be put in travel records; expense changes in travel records will influence travel and job assignment; all information will be used to update database expense.

A human resource management information system could also assist human resource managers to plan and monitor training and development programs by analyzing the training history and present program status (Gedam, 2011). It helps managers to analyze development progressing status; it helps generate results to show whether development plan suits each employee; it helps conclude which training schedule should be recommended.

Another function of a human resource management information system is to analyze the amount of compensation (Gedam, 2011). Comparing with compensation standard in other football clubs, it helps keep the compensation competitive and equitable to control compensation costs.

The last, a human resource management information system may help football club to generate reports such as the report to government agency. It can help football club collect relevant regulations, track statistics and produce reports. For example, if English football clubs are going to hire an un-European football player, they have to apply work permit first. To be eligible for a work permit, a player must have played for his national team at least 75% of its competitive "A team matches"[4] during the two years preceding the date of the application; the player's national team must be at or above 70th place in the official FIFA world rankings (IWP, 2011). According to this law relevant statistics should be collected first; and then a report should be handed in to UK Border Agency. Human resource management information system can help collect and prepare such statistics and documents easily.

3. Information system can be also used to help financial managers to make decisions about financing and the control of financial resources within a football club. A financial management information system may support football clubs' processes and operations from different perspectives such as cash management, investment management, capital administration, financial planning and control (James, 2000).

A financial management information system could collect cash receipts and payment records in time. This function could make relevant business processes efficient (James, 2000). For example, this real-time information helps football club make decisions of deposit easily and invest an amount of cash; this can help increase football clubs' benefit. Besides, records of

[4] "A team matches" mean World Cup Finals game, World Cup Qualifying group game and Football Association confederation tournament game.

cash changing could be used to analyze and predict cash deficits or surpluses; reports could be helpful to decide financial and investing strategies.

Information systems could help financial managers manage investment such as project-changing from high risk to high return (James, 2000). It can afford financial managers useful information for buying, selling, changing decisions of each investment, or even make a combination of minimized risk and maximized profit.

Information systems could also help evaluate profitability and financial impact of current capital expenditures (James, 2000). It can analyze expected cash flows, potential risk, long-term expenditure proposals and combination of all capital projects.

Financial planning and control could be supported by Information Systems (Tony, 2005). Relevant financial analysis software can evaluate present situation and expected financial purpose of football club. In details, it can help collect information of cash balance, available financing types, interest rates, stock and bond prices, and current business operation; besides, it can also help input valid data and produce a set of optional plans.

4. Business marketing means a process to decide which products or services to provide customers and relate specific business strategy to use in sales and market development (Lisa, 2008). Thus, marketing plays an important role in nowadays business and football industry. A marketing information system could merge information technologies into football clubs' processes and operations such as interactive marketing, sales force automation, advertising, promotion, sales management, brand and sponsorship management.

For football cubs, interactive marketing means a type of marketing based on information systems and internet between football clubs and customers/fans or potentials (Gedam, 2011). Interactive marketing use information systems to enable football clubs attract and keep customers, and change fans into clubs partners by fans products designing, match tickets pricing, customer services improving and so on. With an interactive marketing information system football clubs could easily identify potential customers; create advertising/promotional material; send materials to customers; interact with customers; and learn from customers. Relevant information technologies include chat and discussion groups, web forms, questionnaires and e-mail correspondence.

Information systems not only promote efficiency of marketers but also speed up transmission and analysis of sales data for marketing department (Paul, 2009). For example, salesmen use mobile devices or personal computers to record results of their communication with customers at daytime; and then all data are uploaded immediately to servers and may be analyzed at night; afterwards, statistics generate result and output; next working day, new sales orders and analysis reports will be available and sent to salesmen's terminals.

A marketing information system could build a market promotion models to choose a promotion strategy, a suitable media, an financial resource, a marketing resource, an evaluate and control present promotion project (Yoshida, 2009).

A marketing information system may help marketing managers monitor salesmen's performance, customers' reactions and marketing results (Yoshida, 2009). These data help managers plan and control new marketing strategy such as choosing different media, brand and product designing. Relevant information could be provided by marketing information system, such as price, revenue, cost, sales trend and new product prospect.

A marketing information system can collect information from different sources, such as football clubs' internal database, data warehouse, World Wide Web sites, telemarketing services companies, even competitors (Yoshida, 2009). Collected information includes economic trends, fans and customers' behaviors, and competitive clubs' plans. Analysis tools could help managers research, analyze and forecast football market trends.

A marketing information system also could play an important role when managers need to choose a sponsorship and sign an agreement. When football club managers decide to sign a sponsorship agreement, the sponsor's brand, industry, influence and collaborators can be regarded as important factors (Yoshida, 2009). When football clubs evaluate agreements provided by sponsors, there are a lot variable bonus relevant with teams' performance such as how many competitions a team can attend, how far it can reach in different competitions, how many titles can get and so on. These variables should be analyzed with football clubs' strength, short-term goals and long-term goals.

5. Information systems could support football clubs to promote social relations such as relation with fans, media and so on.

With supporting of information systems, football clubs can easily communicate with fans (Jamie, 2011). Specific internet-based communication channel could be created to promote relations between club, players, managers and fans. For example, on an official website football clubs could upload latest news, photos and videos to share with fans; players could update their blogs and interact with supporters; fans could feedback their opinions and suggestions to clubs, players or coaches.

Information systems could help football clubs manage and promote relation with media (Jamie, 2011). Beside of some important official decisions which need to be released on a press conference, other information could be published on a public information system such as an official website. Information systems could help analyze and choose suitable media partners to enhance clubs' influence and benefits. Television rights can be exchanged to income for football club; clubs' own information systems can provide fans some other media services such as traditional broadcasting and mobile service. Besides, because of influence of worldwide internet, information systems may provide localized websites to attract fans from every corner of world.

General services could be promoted by information systems such as tickets booking, useful information checking, fans travel group creating, fans online shop, media interview booking, and mobile application software downloading (Jamie, 2011).

6. Information systems could support football clubs to manage first team, reserve/youth teams, youth soccer school and so on.

For example, information systems create players' information database and update it regularly (Atonio, George and Jaume, 2007). Managers can make teams' short-term and long-term plans according to different analysis; financial department could collect players' salary balance and analyze financial situation; social department could arrange various social activities according to players' information like habits, language skills, knowledge and religious. Players' tactical and physical status assessment reports rely on analysis of tactical and physical coaches' data input. Training coaches watch, record and upload players' physical and tactical data on players' attribute database; research centre makes corresponding research according to players' attribute data; major coaches choose ideal players to attend matches; training coaches change training plans for each player; medical department gives injure forecast and suggestion.

Information systems also could help manage different levels reserve/youth teams (Atonio, George and Jaume, 2007). With analysis of youth players' attributes data and changing trend, youth training centre would decide players' transferring between different levels. Youth players' performance status will be analyzed and sent to managers as a reference of a new contract making.

Many football clubs have established youth soccer schools worldwide to explore talents (Atonio, George and Jaume, 2007). According to youth schools' feedback and scouts' reports, potential talents' database is established and updated. Analysis reports are available for a human resource department to choose ideal new youth players.

7. Information systems also could be used in football clubs' medical departments. Medical information systems could enhance quality and efficiency of medical service teams. Medical information systems could provide football players better protection by working together with medical teams. When players got injured, a medical information system could help transmit injury reports quickly; decrease time needed to conclude before injury becomes worse; provide possibility for more suggestions from different experts; make whole treatment process transparent; help expert groups easily to find mistakes in treatments; simplify medical evaluation tasks and division of responsibilities (Peter, 1980).

In practice, for example, a medical information system could establish a grading standard and divide injuries into different levels. Each level has a corresponding priority; each priority is related to various scales of resources. High priority cases need rapid response and many experts' participation. In contrast, low priority cases usually follow a sequence in a medical information queuing system (Peter, 1980).

3.6 Information systems' influence on football club decision making

Furthermore, information systems could support and strengthen an ability of football clubs' decision-making of managerial users such as executives, managers and employees (James, 2000).

Information systems provide users different types of information, which relates with different levels of management decision making. In football clubs, even though business structure is not hierarchical as before, management decisions discrimination exists in some extent (James, 2000).

There are mainly three levels of managerial decision-making that could be supported by information systems from the top level to the bottom: strategic management, tactical management and operational management (James, 2000). They are shown in figure 3.3:

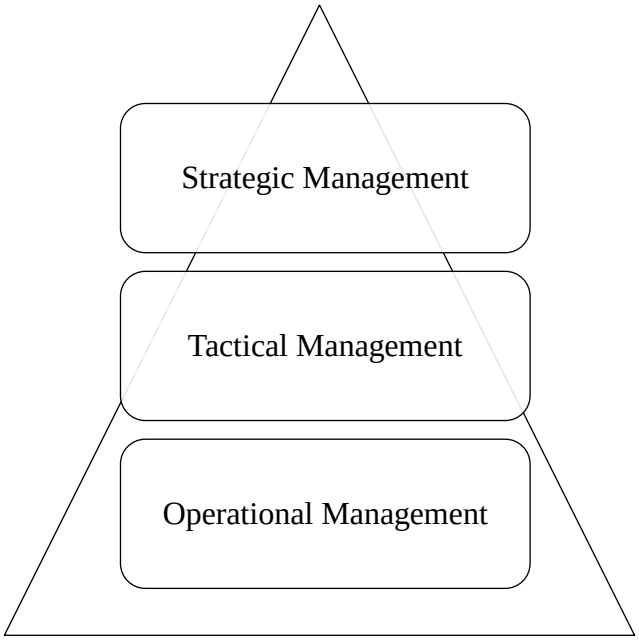


Figure 3.3: Different managerial decision-making levels

Operational management means those short-range plans such as weekly training schedules, which could be arranged by self-directed teams or operating managers (James, 2000). In this type of management, staff uses direct resource from systems and follows self-established schedules. For instance, when human resource staff considers whether renew a player's agreement, he/she needs to seek out relational materials such as player's usual match performance, training status, capability arising status, age, potential, business value, role in a team, present agreement details, injuries situation and so on.

Tactical management represents medium-range plan objectives, which influence business target of football club departments (James, 2000). For example, financial department uses information and resource to achieve financial task such as salary cutting and bonus system changing.

Strategic management is the highest level of decision-making which is supported by information systems (James, 2000). Decision makers consist of a board of directors and executive committees of CEO. They monitor football clubs' strategic performance and then make some strategic changes. This significant decision-making process needs managers or CEO to collect great quantities of information from a system.

Information systems can provide football clubs necessary information to make all levels management decisions. Usually, those functions are supported by three major information system types: management information system, decision support system and executive information system (James, 2000). They are shown in figure 3.4:

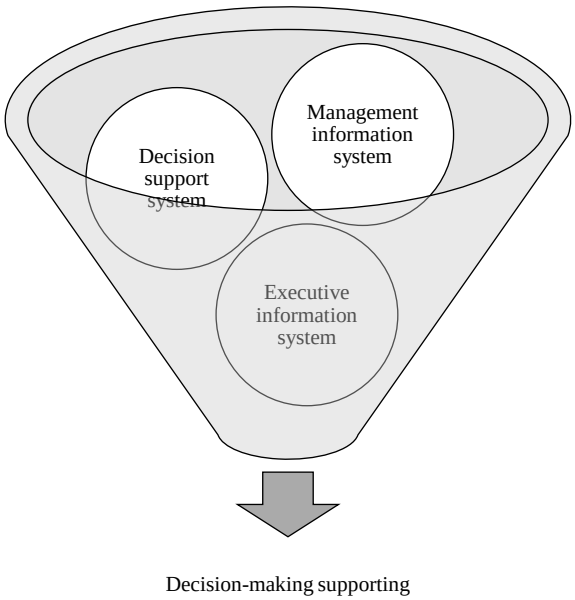


Figure 3.4: Decision-making supporting types

Management information systems could support football clubs with many day-to-day decision-making management works (Paul, 2009). It solves planners and managers' requirements with information products of reports, displays and responses. For example, before each match an assistant should hand in a recommended starting list to a major coach. An assistant's recommended starting players list relies extremely on physical reports, which show players' physical status in details.

Coaches, managers and other decision makers could use a management information system to request information to support their decision making. Management information systems

usually provide football club users three information products: periodic scheduled reports, exception reports and demand reports (Paul, 2009).

A periodic scheduled report is a traditional form of providing regular information to users in a designed format. Typical examples of a periodic scheduled report are weekly ticket income, weekly salary cost, daily training reports, daily transfer market information collection and so on.

An exception report is produced when some irregular or unexpected things happen. For instance, players are training according to daily plans as usual. If someone got hurt, he has to stop current training task; training coaches should make another training plan according to his recovering process.

A demand report means some provided information when a decision-maker demands for it. For example, when a football club has a financial problem and then decides to clean up redundant, human resource department staff would search reserve players' information such as performance rating, salary level, agreement period left, contract termination compensation and so on.

A decision support system provides interactive information support for decision-making. This system contains analytical models, specialized database and interactive modelling process. The system model is shown as figure 3.5:

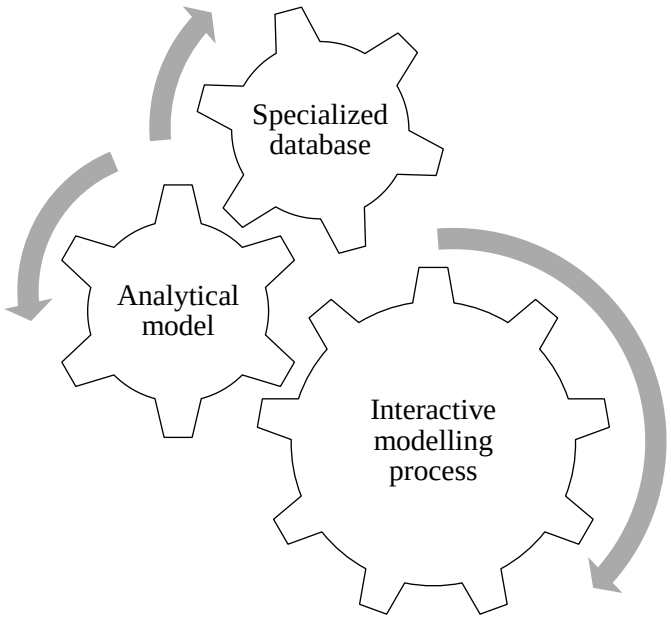


Figure 3.5: Decision support system

Decision support system relies on a model, which uses computational and analytical methods to express mathematical relationships among different variables (Paul, 2009). For example, a

funds-transferring program could contain models that calculate relationship about transferring funds: Transfer funds budget + transfer funds income − transfer funds expenditure = transfer funds balance. A decision support system model could calculate more difficult relationship such as budgeting present value models, which involve many values such as football clubs' expected return on real estate investment, expected ticket income, expected sponsorship revenue, transfer income by instalments, expected match bonus income and so on.

In decision support systems running process, interactive analytical modelling plays a critical role (Paul, 2009). Four types of analytical modelling activities can be used to support football club users in a decision support system running process: What-if analysis, Sensitivity analysis, Goal-seeking analysis and Optimization analysis.

A what-if analysis could support football club users to make changes to variables, their relationships and results (Paul, 2009). For instance, budget-transferring influences football clubs' performance in a transfer market. Before annual transfer window opens, human resource managers could use a transfer plan simulation model to make a detailed plan, which contains a club's targeted players' level, scale, and salary offering extent. If a budget-transferring has been changed by a financial department, human resource managers need to recalculate in a plan simulation model. So, this model would suggest managers a new combination with fewer players, low player level, shorter contact period and so on.

A sensitivity analysis is a special what-if analysis, which has only one variable that is always changing and causing different results (Paul, 2009). Sensitivity analysis could repeatedly calculate with small changes to a variable and give users many results caused by different changes. For example, when a physical training coach makes a training schedule for an injured player to help him catch up an important match, the only changing variable is how many days left after he recovers from injure until the match date. So, training plans contain a daily weight, a gym plan schedule, an aerobic exercise schedule, a tactical exercise schedule, a skill exercise schedule and so on. They will be shown to a physical coach according to the only variable - training days.

A goal-seeking analysis could help users analyze another situation that one value is going to be achieved until the other variable changes reach a satisfied result (Paul, 2009). For example, in Spanish football industry, a football club should pay different tax proportion to government for native players and foreigners. They are separately 44% and 25%. After foreigners have been working for Spanish football clubs for five years, some of them can get Spanish nationality. Then, football clubs have to raise their tax proportion from 25% to 44%. So, for some football clubs which want to keep same player salary balance, they should monitor foreign players' working duration length and then try to adjust other variables such as number of players, number of foreign players, transfer strategy, and salary space.

An optimization analysis could help decision makers to calculate in this situation: find one or more target variables with certain values; and then change other values to conform those

target variables (Paul, 2009). For example, a football club plans to replenish a summer transfer market with new players. Transfer funds limitation and needed new players' positions are given. Other variables such as player level, transfer fee, salary, signing bonus, appearance fee, other bonus and numbers of players are changing repeatedly until it is possible to get a manager's favourite combination.

An executive information system contains many features of a management information system and a decision support system (Paul, 2009). An executive information system can provide top executives with simple and rapid information for a decision-making. Displays of critical information usually consist of key factors and show briefly.

An executive information system collects valuable information from many resources, such as letters, e-mails, periodicals, reports, meeting summary, telephone calls and social activities (Paul, 2009).

3.7 Information systems' influence on football club business strategies

Information systems use information technology to produce products, provide service, and develop capabilities which give football clubs a competitive advantage. There are several competitive strategies that can be provided by information systems: cost leadership strategy, differentiation strategy, innovation strategy, growth strategy and alliance strategy (James, 2000).

Cost leadership strategy can be supported by information systems to give a football club cost advantage (James, 2000). With information systems' supporting, football clubs can communicate with fans, product suppliers, advertising providers, media, agents, customers and fans more efficiently. Information systems help reduce football clubs' purchase cost, advisement cost, selling cost and operation cost. Also, information systems reduce the cost of business processes.

Differentiation strategy means that information systems could support football clubs to differentiate service and brand with other competitors (James, 2000). For example, a football club adopts new information system features to differentiate brand concept and service; uses new information system features to learn and reduce competitors' advantages.

Information systems could help football clubs in innovation strategy (James, 2000). Information systems make dramatically changes to football business processes, brand building and marketing; information systems can also help develop new markets. For example, information systems could help train staff from different departments to collect knowledge and experience. Information systems would help clubs to create a new and efficient training method.

Information systems may support football clubs' growth strategy such as expanding global market (Shaw, 2007). Information systems can support football clubs to collect sufficient information and analyze global market's situations. Moreover, information systems can help football clubs to make a targeted strategy to enter new markets. Information systems can help football clubs manage a regional and global football club expansion. For example, football clubs' overseas market expansion strategy depends on analysis results of local fans' supporting extend. When a football club considers establishing a football training camp or youth football school, the first thing that should be done is to send staff for investigating and collecting target market information. Afterwards, an expert group will be appointed to assess the quantity about youth players and the situation about competitors. If there are some other youth football schools, this strategy would help gain students from competitors; if not, this strategy could focus on establishing a training base of young players.

Information systems could help football clubs with an alliance strategy (Shaw, 2007). It can help football clubs establish alliance with fans, other football clubs, sports companies and business companies. Top clubs form alliance with low-level domestic clubs and share players' information through information systems. Clubs can loan youth players to alliances, which can bring benefits from a few of aspects: low-level clubs can get high-level players; reserve players could maintain their competitive state; young players could get experience; information systems could support football clubs to monitor their players' performance.

3.8 Football club information system development methodology

Methodology is often regarded as recommended series of steps and procedures to be followed when designers are developing an information system (Avison and Fitzgerald, 2006). Maddison (1983) indicates that a system development methodology is a recommended collection of philosophies, phases, rules, techniques, tools, documentation, management and training of developers for an information system development.

As shown at previous research part, many methodologies were designed by different researchers. Those methodologies are based on different knowledge and from perspectives.

Process-oriented methodologies are created to focus on a process. Structured Analysis and Design of Information Systems methodology reflects the process modelling theme (Gane and Sarson, 1979); Jackson Structured Programming is based on teaching and practicing of commercial computer programming (Jackson, 1975).

There are some blended approaches that have been designed. Structured Systems Analysis and Design Method includes a data flow diagramming (Weaver, 1998); Merise regards process and data at the same priority and paralleled (Tardieu, 1983); Information Engineering covers all aspects of life-cycle and is regarded as an effective way to develop a good quality information system with various technologies in a framework (Martin, 1991).

Object-oriented methodologies are focusing on objects as the targets. Object-oriented Analysis methodology consists of five major activities: finding class-&-objects, identifying structures, identifying subjects, defining attributes and defining services (Yourdon and Argila, 1996); Rational Unified Process methodology suggests to acquire and learn the basic ideas before developing because understanding processes is important for a commercial development (Jacobson, 1999); Martin's Rapid Application Development is a combination of techniques and tools to develop information systems faster due to rapidly changing business requirements (Martin, 1991).

There are some organizational methodologies. Soft Systems Methodology decomposes the whole complex system into constituent parts to enable analysis (Checkland and Scholes, 1990); Information Systems Work and Analysis of Change methodology identifies the basic reasons of user's problem and investigates overcoming problems by analyzing initiation of changing processes and activities (Lundeberg, 1983).

Comparing with methodologies above, Effective Technical and Human Implementation of Computer-based Systems methodology (ETHICS) uses tenets of participation and socio-technical approach for information system development. From a social-technical prospective view, it claims that technology should be more related with social and organizational factors. Mumford (1983) argues:

> Social-technical approach recognizes the interaction of technology and people and produces work systems which are both technically efficient and have social characteristics which lead to high job satisfaction.

Distinct with others methodologies, ETHICS has a special philosophy in information system development. It focuses on system process changing and can be regarded more as an organizational issue than a technical issue.

Job-satisfaction is also used in order to measure if one method meets people's demands. Mumford and Weir (1979) argue that:

> It is the attainment of a good "fit" between what the employee is seeking from his work - his job needs, expectations and aspirations - and what he is required to do in his job - the organizational job requirements which mould his experience.

There is a framework consisting from five measurements and be used to identify and measure job-satisfaction. Job-satisfaction contains knowledge fit, psychological fit, efficiency fit, task-structure fit and ethical fit (Parsons and Shils, 1951). These measurements are described as below:

The knowledge fit focuses on how efficiently employees think that acknowledge and working skills have been used. After employees' acknowledge and skills have been used completely, someone still wants to get a chance to develop their experience and ability. The others don't

want to improve. For example, some experienced football players prefer moving to a comparatively small football club and enjoying football rather than an endless training. In contrast, many young football players choose comparatively small football clubs as the first step in their football career because they can get more space to develop themselves.

The psychological fit means that a good job suits employee's social-state and working-interest. Employees could be divided according to sex, age, education background or social classes. For example, a director with many years experience in a top football club wouldn't accept a similar level position in a low-level club. In top leagues, famous football players would hardly accept to move to low-level leagues or underdeveloped leagues.

The efficiency fit consists of three parts. Firstly, the effort-reward bargain shows how much an employer wants to pay for employees. Also, it is influenced by employee's opinion that how much he deserved. Secondly, work controls show how tight or loose they are and how they suit employee's expectations. Lastly, supervisory controls reflect necessary fundamentals such as an information, knowledge and supervisory help. For example, an effort-reward usually embodies on employees' contact counselling process such as basic wage, bonus terms and annual growth rate. Also, in scouts' contract, it is generally written how often the overseas visiting will be. Results of the consultation is basically satisfied by both sides. Work control would show an unbalanced state if one side changes.

The task-structure fit is used to measure how much employees' tasks fit their demands and fulfils. There are some important parts, such as needed skills quantity in task, task targets' quantity, task target's feature, task's feedback system, task's specificity and the level of how much an employee controls the task. Technology plays a critical role to influence task-structure fit and reduce it by simplification. For example, a youth department training director should have enough skills such as tactical knowledge, youth players training experience, player potential judging ability, specific working attitude, man management ability and so on. Football clubs' youth departments have many tasks such as to win youth league champion, to explore talents, to develop young players, to provide useful players to first team and so on.

The ethical fit (also could be called social value fit) is used to measure if employer's organization and employee's values fit. Some firms are efficiency-oriented and other enterprises are cultural-oriented. They need different employees to match their different enterprise value and reach a high-level job satisfaction. For example, a couch's dream is to work with a lead champion team. So, he wouldn't work for a football club which just care about finance balance and sell famous players on a transfer market.

The other philosophical concept in ETHICS methodology is participation, which means that persons are involved or participated in a system and influence a decision-making process, a designing and an operation. Football club information system users consist of managers, coaches, staff, players and fans. Participation has a limited range, for example, competitors in the same football league can also be influenced and do not need to participate in the same

system. Hitschheim (1983) argues the critical role of participation in ETHICS methodology than others. In others methodologies, users have only limited power to influence the information design and quite limited options offered by design groups. However, in ETHICS, users are regarded as indispensable part of design because users are involved almost into every process. For example, how to improve users' job satisfaction is considered in a design process.

In ETHICS, one important process is to change original work flows. It may cause some conflicts between all users and participants such as staff and managers. A successful implementation of new system is also a victory of negotiation between relevant original parties. Undoubtedly, those parties and participants, who are going to be removed some authority from initial decision-making process, would not comply with a new information system too easily.

In football industry, there is quite common that when one football club changes one manager, usually it follows with a lot of staff replacements. Also, it is common that managers have the final power to decide football players' transfer and staff's replacement. Undoubtedly, it is harmful for football clubs. Managers are trying to establish personal connections and influence club's operation.

From a positive perspective, those influenced groups have much influence on a new information system development due to their long-term experience about original work mode and possible contribution for future. However, all conflicts need to be recognized and brought on the table. This solution should reach the maxim requirement extent for all parties. Mumford (1983) argues:

> Successful change strategies require institutional mechanisms which enable all these interests to be represented, and participation provides these.

In system-changing process, participation indicates various meanings about different groups involving. Different groups need unequal participation and they also have discrepancy expectations concerning about their benefits. For example, football club management group cannot get the result exactly as they expected. But if the resulting participation is required, then they should do what they have been asked to. Enlightened self-interest will be enough only if users are voluntaries to have a moral or ideological preparation of participation.

The difference between structure, content and process are important and embodied on ETHICS methodology. Mumford (1983) indicates:

> Structure is the mechanism of participation, which can be consultative, representative, or consensus.

A consultative participation is the weakest form of participation and is not recommended to be uses at detailed decision-making. It means that participants just give decision-makers

useful evidence to influence their results rather than to mislead or blend. For example, football clubs' decision-making layer wants to know which player is most valuable in a team. A manager may just make a simple report to show his match performance such as the numbers of goals, assistants, representative and so on.

Representative participation means that an elected representative of various interests is involved in decision-making process. It is the most popular and widely-accepted way for the tactical or middle management type of decision-making. To pick up the most valuable player, beside of his performance in a match such as number of goals, assistants and representatives, factors from outside the field should also be shown as a reference, for example, an injury report, a salary level, training performance and so on.

Consensus participation involves all opinions in the decision-making. It suits detailed design best. Beside of all factors mentioned above, there are some behaviour outside football which could be considered such as professional attitude, social influence, dedication and so on.

For example, scouts are sent to every corner of world to observe young and potential players. Information systems should not only help scouts receive orders from headquarters and send back observation results, but also establish a new evaluation system according to scouts' experience. Standardized using of data should be contained to evaluate players' levels. Subdivision of data should be adopted to analyze players from different aspects. Dynamic data is used to analyze players' growing state and potential estimation. Experience and acknowledge added in the information system will make scouts' job clear and specific. It also reduces chances of human operational errors. Because scouts' reports contain detailed and objective results, managers will not have excuses to say only "yes" or "no".

Participation includes many issues and boundaries of activities. Generally, football club managers do all that they can to keep original authorities more priority in participation. On the other side of the coin, participation also requires relevant knowledge and experience from managers. More importantly, participants should be a group of people who have enough knowledge to discuss and influence final decision-making. So, training users who have necessary knowledge is a critical aspect of ETHICS.

ETHICS is regarded as a comparatively complex methodology because it needs high-skilled users to handle it properly. It requires more training and exercises to overcome with this. However, staff will bring more knowledge, experience and opinions than those information system designers and developers. Furthermore, football club managers could be on the opposite side of this methodology in order to avoid the abolition of managing. To overcome with this problem, managers will be often welcomed to participate into the new system development process. In the new information system, managers should corporate with a system rather than oversee information working state and make final decision. Concerning football industry's speciality and human factors, ETHICS has more advantages comparing with other methodologies.

3.9 Summary of theoretical findings

This theoretical part answers two questions: which areas in football clubs could information system facilitate? Which methodology is suitable for football clubs' information system development?

1. Which areas in football clubs could information systems facilitate?

Theoretical study proves that there are mainly three areas information system could facilitate football clubs. They are daily business area, decision-making area and strategies area.

Information systems could facilitate football clubs' daily business area such as football clubs' internal communication area, resource management area, financial area, marketing area, social relation area, football management area, and medical area.

Information systems could facilitate football clubs' decision-making area such as strategic decision-making area, tactical decision-making area, and operational decision-making area.

Information systems could facilitate football clubs' strategies area such as cost leadership area, differentiation area, innovation area, growth area, and alliance area.

Beside of these areas which have been mentioned above, there are still a lot of areas that information systems can facilitate football clubs. For example, information systems could help football clubs prevent football violence and reduce security cost.

2. Which methodology is suitable for football club information system development?

Effective Technical and Human Implementation of Computer-based Systems methodology (ETHICS) is chosen to be a suitable football club information system development methodology because of its two main characteristics: job-satisfaction and participation.

In this methodology, job-satisfaction is used to measure if an information system meets football clubs and staff's requirements. As discussed above, a football club information system must meet football clubs' business specialities because football industry is very different from other industries. So, it is important to have job-satisfaction as an important factor of a methodology to measure if a new information system fits football clubs' acquirements.

Participation is also important in the process to develop a football club information system. Participation means that all football clubs' staff should participate in the new information system development processes rather than just learn how to use it. A football club information system needs many staff to share their working experience when a new football club information system is developing.

Because of the importance of these two special characteristics, ETHICS has been chosen to be a suitable football club information system development methodology.

3.10 Arguments for an empirical study

This chapter has analyzed some areas information systems could facilitate football clubs and answered why ETHICS is chosen as a suitable information system development methodology.

However, managers may still have doubts about football clubs' specific working processes. Next chapter will design a relevant football club information system model to give football club managers an intuitive result. Afterwards, it will contain an investigation to testify the model's effectiveness and completeness.

4 Empirical study

4.1 Purpose

Some areas of football clubs have been analyzed that they can be facilitated by information systems in theoretical study. Besides, a suitable information system development methodology was chosen. However, football club managers need an intuitive result, not only theories. In addition, opinions from experienced football club managers are also important for this study.

So, the purpose of the empirical study is to design a general football club information system model, form a survey questionnaire to acquire opinions from experienced football club managers. The data and information obtained from the empirical part will serve the analysis in the next chapter.

4.2 Sampling

As it was mentioned in the first chapter, there are 326,527 football clubs officially registered in FIFA in all over the world. Obviously, it is neither possible nor necessary to make a survey about all these clubs. So, because of the mature development and representation of European countries' football leagues, a few football clubs from several top football leagues are chosen as a sample.

UEFA Country Ranking 2011 (Kassies, 2011)								
#	**country**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**ranking**	**teams**
1	England	16.625	17.875	15.000	17.928	18.357	85.785	7
2	Spain	19.000	13.875	13.312	17.928	18.214	82.329	7
3	Germany	9.500	13.500	12.687	18.083	15.666	69.436	6
4	Italy	11.928	10.250	11.375	15.428	11.571	60.552	7
5	France	10.000	6.928	11.000	15.000	10.750	53.678	6
6	Portugal	8.083	7.928	6.785	10.000	18.800	51.596	5
7	Russia	6.625	11.250	9.750	6.166	10.916	44.707	6
8	Ukraine	6.500	4.875	16.625	5.800	10.083	43.883	6

Table 4.1: Some countries' league-ranking

According to some countries' league-ranking (table 4.1) in EUFA's official document, the top four countries are chosen: England, Spain, Italy and Germany. The UEFA country ranking is determined by the sum of the UEFA country coefficients over the last five years. The column "teams" lists the number of participating teams in European league and European cup in the last year. The competition's result cannot represent one country's football league development level, but it is definitely valuable as a reference.

In England's top football league – Premier League, there are 20 football clubs: Arsenal, Aston Villa, Blackburn Rovers, Bolton Wanderers, Chelsea, Everton, Fulham, Liverpool, Manchester City, Manchester United, Newcastle United, Norwich City, Queens Park Rangers, Stoke City, Sunderland, Swansea City, Tottenham Hotspur, West Bromwich Albion, Wigan Athletic and Wolverhampton Wanderers.

In Spain's top football league – Primera BBVA, there are also 20 football clubs: Athletic Bilbao, Atletico Madrid, Barcelona, Espanyol, Getafe, Granada, Levante, Malaga, Real Mallorca, Osasuna, Racing Santander, Rayo Vallecano, Real Betis, Real Madrid, Real Sociedad, Real Zaragoza, Sevilla, Sporting Gijon, Valencia and Villarreal.

In Germany's top football league – Bundesliga, there are 18 football clubs: Borussia Dortmund, Bayer Leverkusen, Bayern Munich, Hannover 96, FSV Mainz 05, FC Nuremberg, FC Kaiserslautern, Hamburg, SC Freiburg, FC Koln, 1899 Hoffenheim, Stuttgart, Werder Bremen, Schalke 04, Wolfsburg, Borussia Monchengladbach, Eintracht Frankfurt and FC St Pauli.

In Italy's top football league – Serie A, there are AC Milan, Atalanta, Bologna, Cagliari, Catania, Cesena, Chievo, Fiorentina, Genoa, Inter Milan, Juventus, Lazio, Lecce, Napoli, Novara, Palermo, Parma, Roma, Siena and Udinese.

According to an authoritative report of the most valuable European Football club brands of 2010, there are also some football clubs on the top 25, but they are out of these four top leagues above. They are Olympique Lyonnais and Olympique de Marseille from France, Ajax from Netherlands, and Celtic from Scotland (Dave, 2010).

In total, there are 82 football clubs from European top leagues that are selected as samples in this survey. These clubs have a comparatively complete organizational structure and a mature business process. A questionnaire will be sent to these 82 clubs by e-mail[5].

4.3 The questionnaire

First of all, because empirical sources are focused on football club information system model designing and related with investigation, there is a need to collect information of football clubs' daily business processes. Afterwards, this information can be combined with knowledge from the theoretical research on the third chapter of this study.

Preparations:

Based on the organizational structure information collected from the published articles such as Barcelona club (Atonio, George and Jaume, 2007), and official website (Murieston Utd,

[5] E-mail addresses of these 82 football clubs are listed in appendix 1.

2011), a common football club structure which contains major departments is shown in figure 4.1:

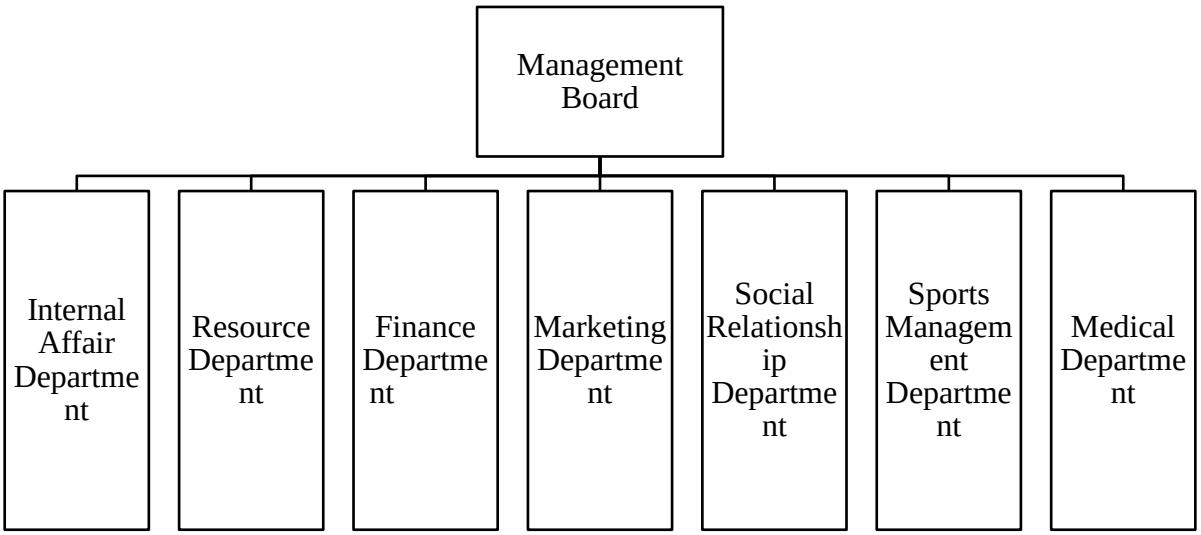


Figure 4.1: A general football club structure

Mainly, there are seven major departments in each football club: internal affair department, resource department, finance department, marketing department, social relationship department, sports management department and medical department. For example, an internal affair department is mainly responsible for the coordination and management for football club internal working communication; medical department is responsible for providing football players medical support, studying physical medic and preventing occurrence chances of injuries.

Meanwhile, information systems could support football clubs in three parts: supporting football clubs' business processes and operations, supporting football clubs' decision-making by managers and employees, and supporting football clubs' business strategies for competitive advantages.

The third part - football clubs' business strategies for competitive advantages support could be embodied through the first two parts: football clubs' business processes and operations, and football clubs' decision-making. So, a general football club information system's structure is shown in figure 4.2:

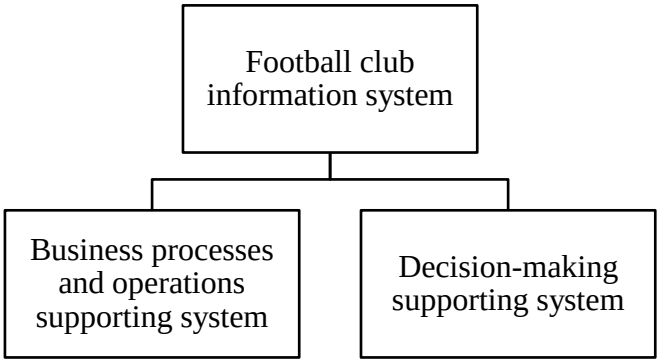


Figure 4.2: A general football club information system structure

After combining information system's functions with football clubs' basic business processes and operation, seven major sub-systems are divided: internal communication system, human resource management system, financial management system, marketing management system, Social relationship management system, football management system and medical system. The structure is shown in figure 4.3:

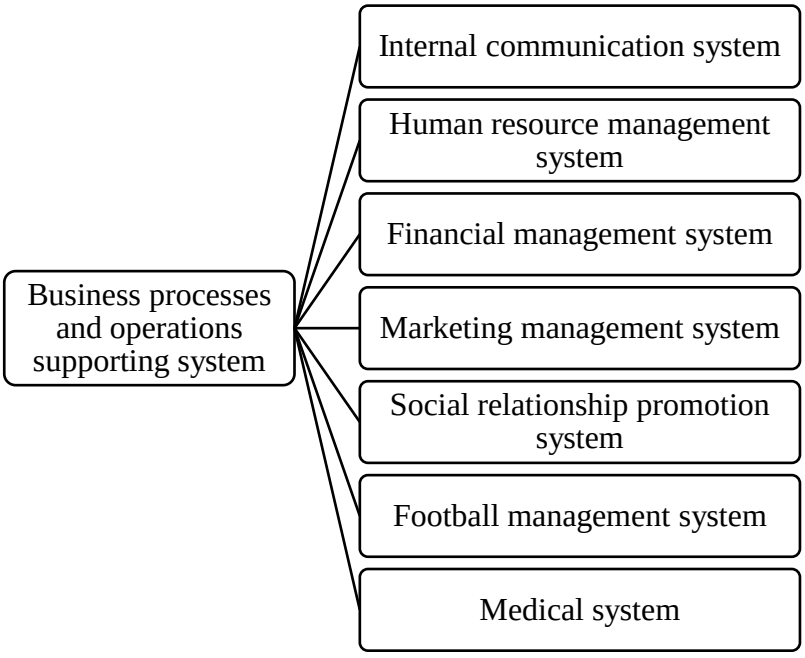


Figure 4.3: Business processes and operations supporting system structure

According to the differences of decisions-making supporting levels and three types of decision-making support system, the relation between these three systems and management types is shown in figure 4.4:

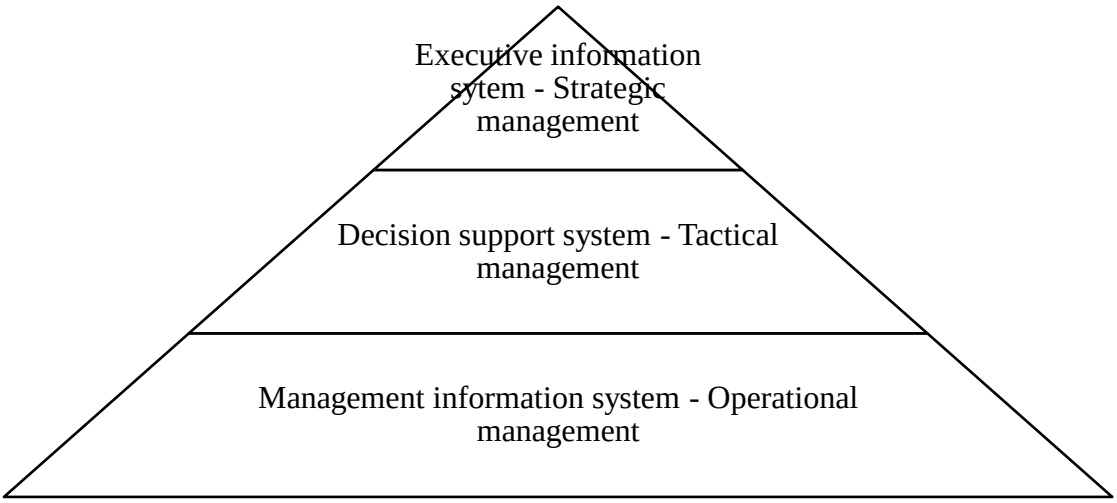


Figure 4.4: Relationship between decision-making support systems and management

The football club information system model starts with designing of the first sub-system of business processes and operations supporting system - internal communication system.

An internal communication system provides users several functions: online chat, instant message, Video conference, Web conference, E-mail and Document management. Users need support of sub-system functions and choose between different sub-systems. Internal communication system is shown in figure 4.5:

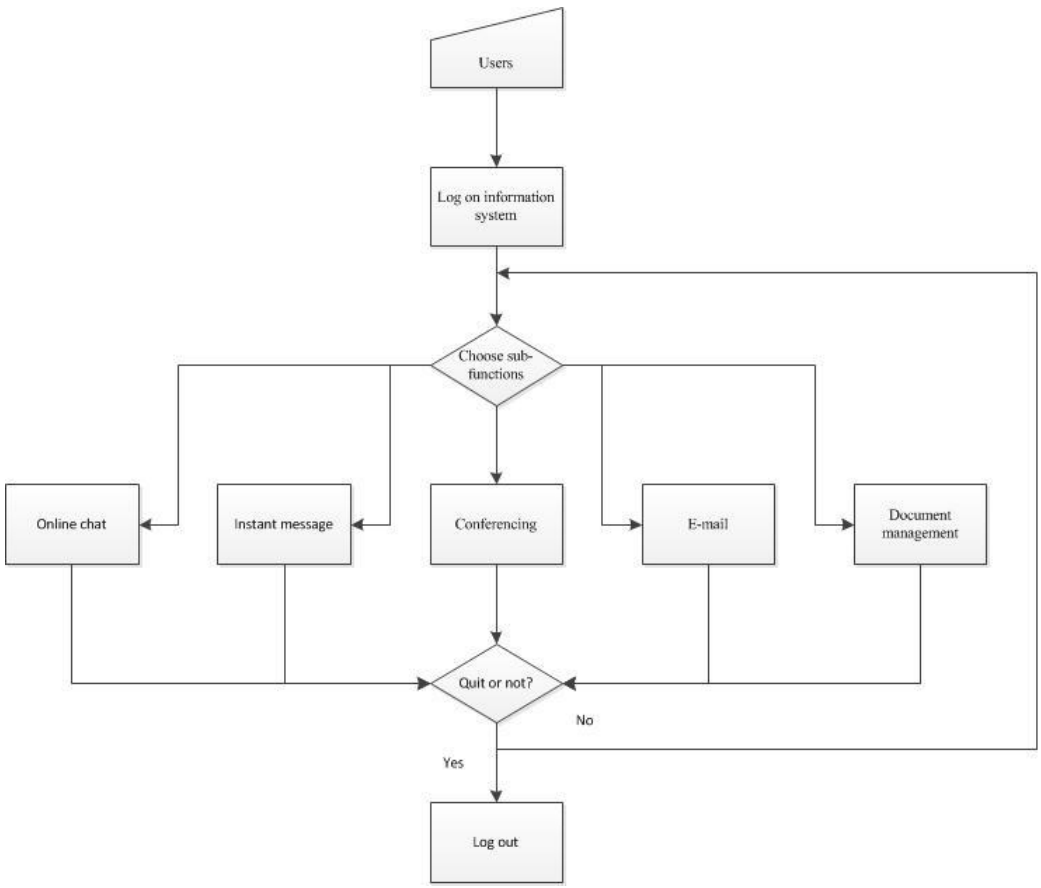


Figure 4.5: Internal communication system model

An online-chat system should support users to show other online users' list, to show online status to others, to send online-chatting request, to receive and to choose requests from others, and to provide a platform to chat. The model of online-chat system is shown as figure 4.6:

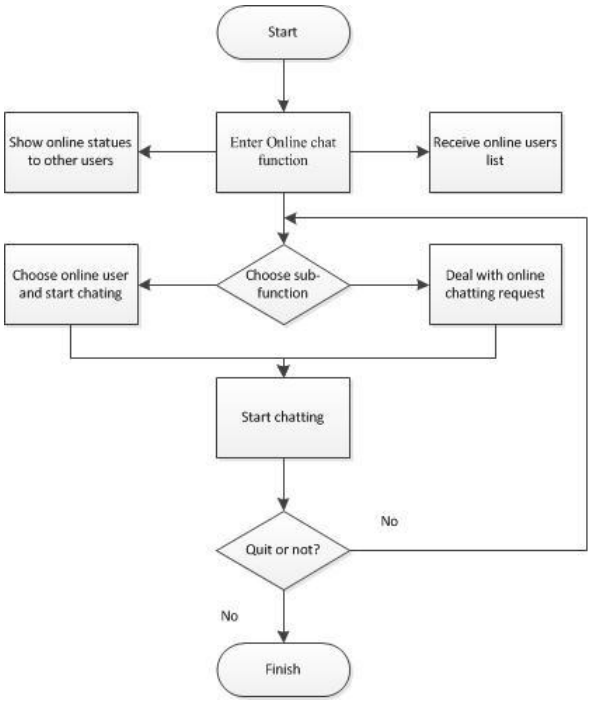


Figure 4.6: Online-chat system model

Comparing with online-chat system, instant message system is simple. Online state is not necessary to show. Three main functions are: showing contract list, sending message and receiving message. A instant message system model is shown in figure 4.7:

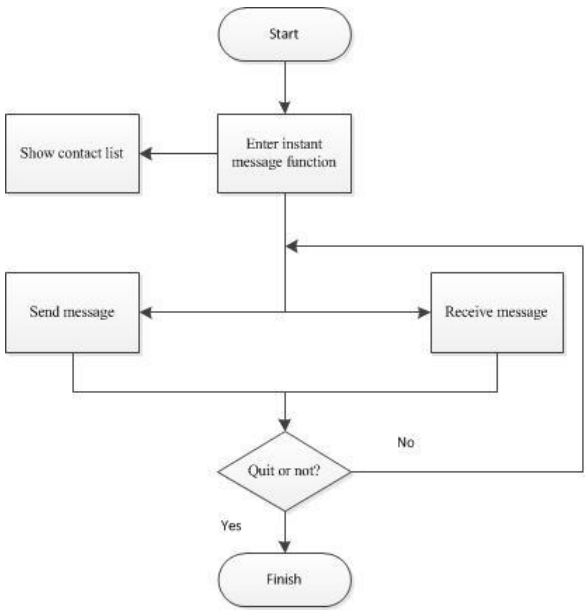


Figure 4.7: Instant message system model

Conference system lets users to host or accept a conference. Besides, document sharing is another important function. The conference system model is shown in figure 4.8:

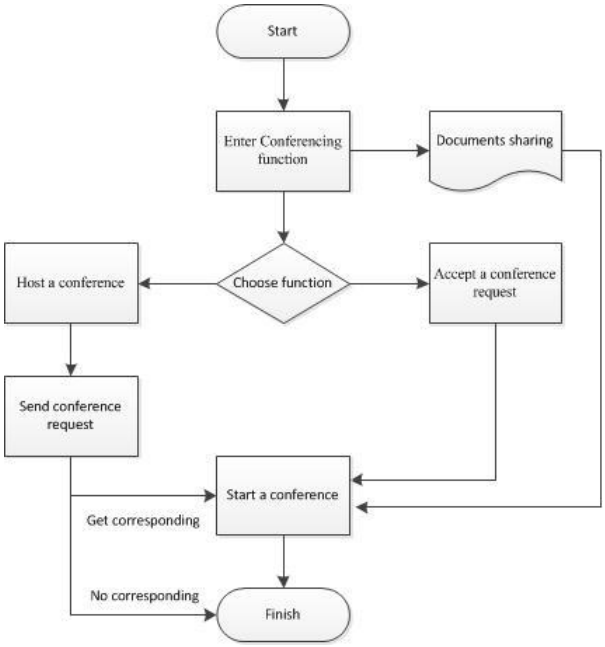


Figure 4.8: Conference system model

E-mail system affords users to send/write e-mails, and upload/download attachment. The e-mail system model is shown in figure 4.9:

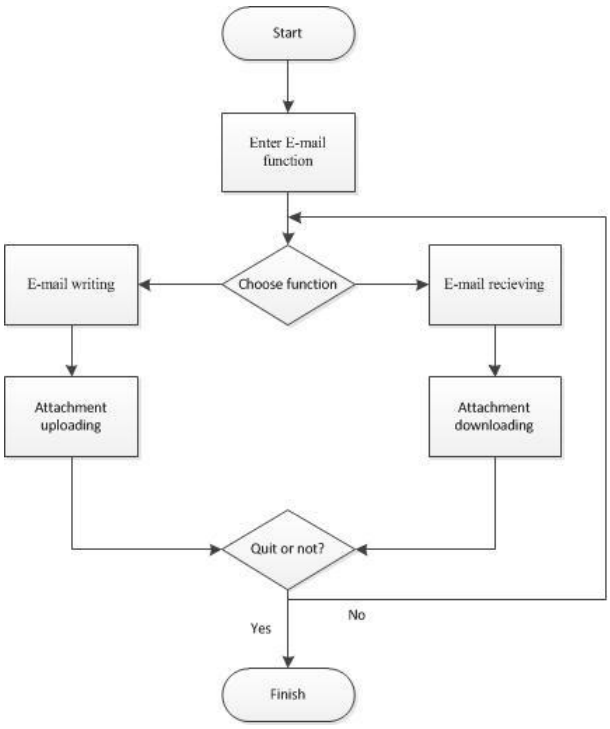


Figure 4.9: E-mail system model

Document management system supports users to establish, retrieve and publish documents. When users try to establish documents, relevant authorizing is needed; established document will be transferred to document database. When users retrieve a document, retrieval information will be turned to a database; and the target document will be transferred to users. Publishing function needs users' request and then supports users to publish target documents. The document management system model is shown in figure 4.10:

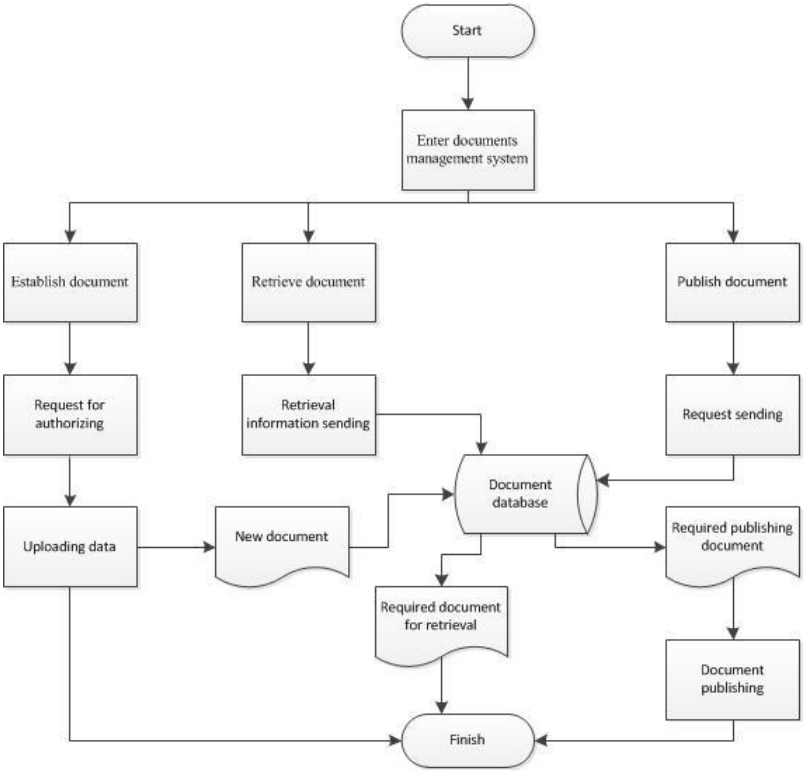


Figure 4.10: Document management system model

An internal information system in football clubs is more or less similar to other business companies; however, football club human resource management contains more specific content. A football club human resource database should contain several sub-databases, such as players, coaches, medicals and scouts (Chelsea fc, 2011), which is shown in figure 4.11:

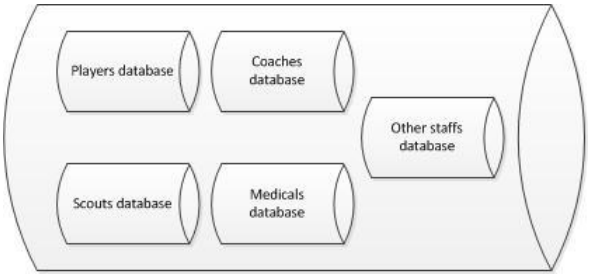


Figure 4.11: Football club human resource database model

A database of players should contain at least six sub-databases: basic profile, technique ranking, physical ranking, mental ranking, contact and transfer, and reports (Chelsea fc, 2011). These databases are shown in figure 4.12:

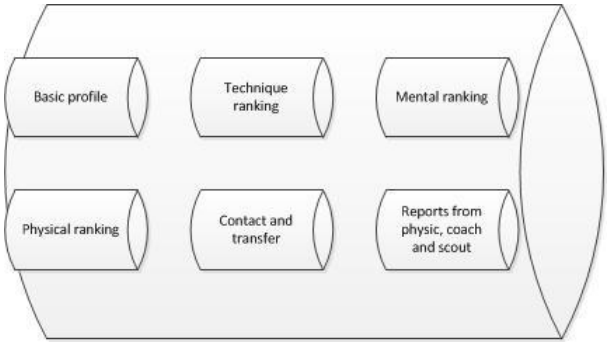


Figure 4.12: Player database model

A basic profile contains information such as name, age, position, nationality and so on (Arsenal, 2011), which is shown in table 4.2:

Name	Nationality	Birthdate	Age	Position	Prefered foot	Height	Weight
Player A							
Player B							

Table 4.2: Player basic profile database model

A technique ranking database contains many technique abilities such as passing, finishing and heading (Mastersport M. L., 2011), which is shown in table 4.3:

Name	Corners	Crossing	Dribbling	Finishing	First Touch
Player A					
Player B					
	Free Kicks	Heading	Long Shots	Long Throws	Marking
Player A					
Player B					
	Passing	Penalty	Tackling	Technique	
Player A					
Player B					

Table 4.3: Player technique ranking database model

A mental ranking database contains some mental description such as creativity, influence and teamwork (Jack, 2004), which is shown in table 4.4:

Name	Aggression	Anticipation	Bravery	Composure	Concentration
Player A					
Player B					
	Creativity	Decisions	Determination	Flair	Influence
Player A					
Player B					
	Off the ball	Positioning	Teamwork	Work rate	
Player A					
Player B					

Table 4.4: Player mental ranking database model

A physical ranking database involves several aspects such as balance, jumping and strength (Muniroglu and Koz, 2006), which is shown in table 4.5:

Name	Acceleration	Agility	Balance	Jumping
Player A				
Player B				
	Natural Fitness	Pace	Stamina	Strength
Player A				
Player B				

Table 4.5: Player physical ranking database model

A contract and transfer database contains information such as salary, transfer value and transfer status (Transfermarkt, 2011), which is shown in table 4.6:

Name	Basic Wage	Bonus Terms	Floating Rate	Starts date
Player A				
Player B				
	Expires date	Market Value	Transfer value	Termination Fee
Player A				
Player B				
	Transfer availability	Squad status	Interested club	
Player A				
Player B				

Table 4.6: Player contract and transfer database model

A player analysis reports database contains reports from different departments, such as health report from medical team, potential report from scouts and behavior report from social department (Manchester City FC, 2011), which is shown in table 4.7:

Name	Match-performance	Advantage ability	Potential

Player A			
Player B			
	Training status	Physical status	Health status
Player A			
Player B			
	Business value	Social influence	Behavior
Player A			
Player B			

Table 4.7: Player analysis reports database model

A coach database is similar to player database but more simple. Coach database consists from three sub-databases: basic profile, knowledge ranking and training ranking (Liverpool FC, 2011), which is shown in figure 4.13:

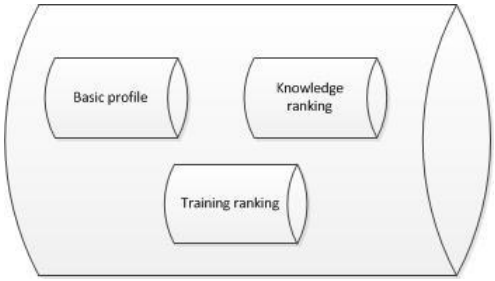


Figure 4.13: Coach database model

A coach basic profile contains information such as name, age, position, nationality and so on (Liverpool FC, 2011), which is shown in table 4.8:

Name	Nationality	Birthdate	Age	position	Reputation	Contract details
Coach A						
Coach B						

Table 4.8: Coach basic profile database model

A coach knowledge ranking database contains many kinds of knowledge and abilities, such as tactical, motivating and man management (Sportdevelopment.info, 2011), which is shown in table 4.9:

Name	Ability judging	Man management	Motivating
Coach A			
Coach B			
	Potential Judging	Tactical knowledge	Working with youngsters
Coach A			
Coach B			

Table 4.9: Coach knowledge ranking database model

A training ranking database shows training description such as strength, tactics and defending (Sportdevelopment.info, 2011), which is shown in table 4.10:

Name	Strength	Aerobic	Goalkeeping	Tactics	Ball control
Coach A					
Coach B					
	Defending	Attacking	Shooting	Set pieces	
Coach A					
Coach B					

Table 4.10: Coach training ranking database model

Comparing with the coach database, other staff databases are even simpler. Medicals and scouts have similar basic profile databases, but they have different knowledge ranking databases.

Medicals should have different types of medical knowledge, such as muscle stain knowledge, fracture knowledge, first aid and so on (PhysioRoom.com, 2011), which is shown in table 4.11:

Name	Muscle strain	Ligament damage	Fracture	Operation
Medical A				
Medical B				
	First Aid	Injury risk estimates		
Medical A				
Medical B				

Table 4.11: Medical knowledge database model

For scout ability ranking database, there are also some important aspects such as player's ability judging and potential judging (Steve, 2008).

Name	Ability judging	Potential judging	Intercultural communication
Scout A			
Scout B			

Table 4.12: Scout ability ranking database model

Other staff's databases are too simple and not necessary to be shown here.

After a human resource database designing, a human resource management system will be designed. There should be two systems as input: one is human resource recording system; the other one is analysis system. Data exchanging exists between these two systems. Staff input data in recording system; some data need to be analyzed by analysis system before it enters a database; some analyzed data need to go back to a recording system and be changed artificially; some of them need to be combined with others. There are at least five outputs from the human resource database: working force recruiting system, working force planning

system, working force management system, compensation system and reports generating (Barocci and Wever, 1982). A human resource management system is shown as figure 4.14:

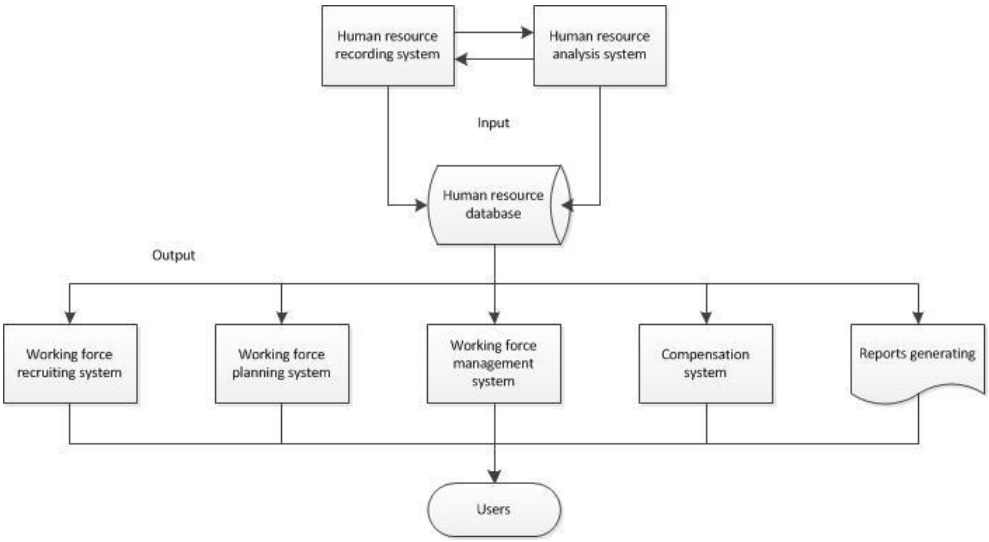


Figure 4.14: Human resource management system model

Next sub-system is a football club financial system, which consists of cash management system, investment management system, capital administration system and financial control system. Cost, income and balance information are needed for financial control system to analyze. Through the analysis of the financial system, sub-tasks will be divided and assigned to different sub-systems: a cash management system, an invest management system and a capital management system. Relevant financial tasks-changing will be recorded in financial database (Tony, 2005). A financial management system model is shown in figure 4.15:

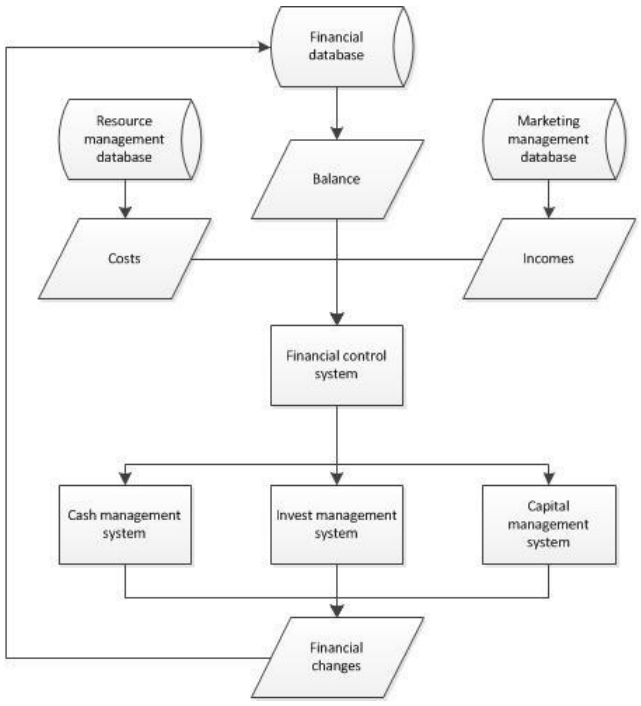


Figure 4.15: Financial management system model

Football club marketing management system contains interactive marketing system, marketing information collection system, marketing monitoring system and sponsorship management system. Interactive marketing system produces the main marketing plan of football club; different tasks are assigned to three sub-systems: marketing monitoring system, marketing information collecting system and sponsorship management system; information generated by collecting system will be inputted into the marketing database. Through the monitoring system, football clubs will check and follow the targeted customer information; data from the marketing database will be used by interactive marketing system and sponsorship management system; signed contact from sponsorship management system will be inputted into a financial database (Yoshida, 2009). A marketing management system is shown in figure 4.16:

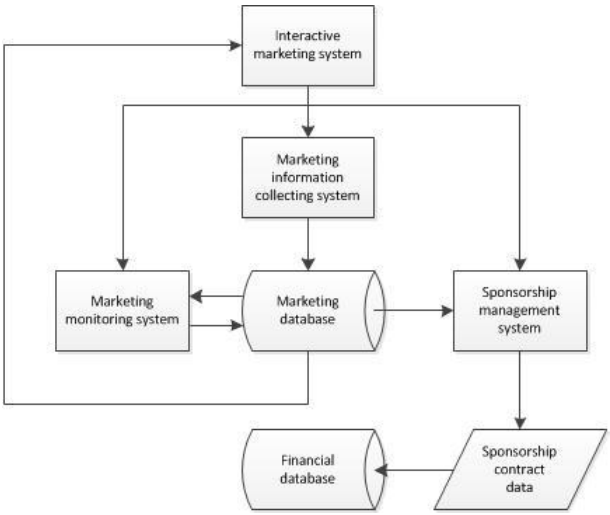


Figure 4.16: Marketing management system model

Football club social relationship management system mainly consists of media and fans interactive activities. There are some common sub-systems contained in a social relationship management system. They are divided into two types: television rights control, news publishing and press conference between social relationship management system and media; online tickets-booking, interactive activities, online shop and mobile service between Social relationship management system and fans (Jamie, 2011). Social relationship management system is shown as figure 4.17:

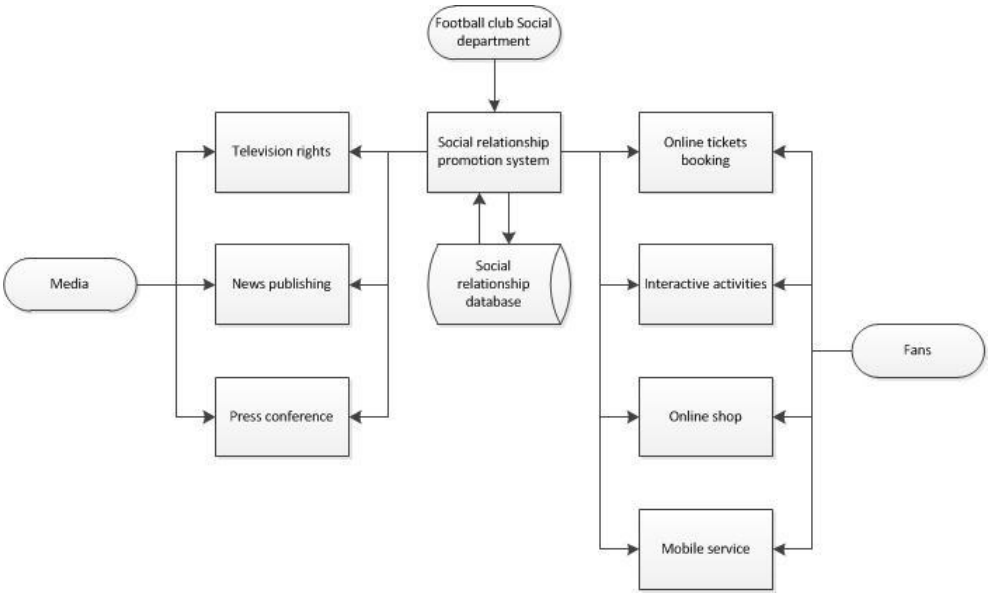


Figure 4.17: Social relationship management system model

Another critical sub-system, football management system, consists of several sub-systems: first team management system, reserve team management system, youth soccer school management system, training management system and scouting management system. Players, coaches, scouts, medicals and directors are involved in the system. In each sub-system, there are three types of data: players' data, training plan and report, and scout report. Coach and director manage relevant team or youth school according to those three types of documents. Players receive training and match plans, and give a feedback. Training feedback and injury information will be separately transferred to the training management system and the medical system (Atonio, George and Jaume, 2007). Football management system is shown in figure 4.18:

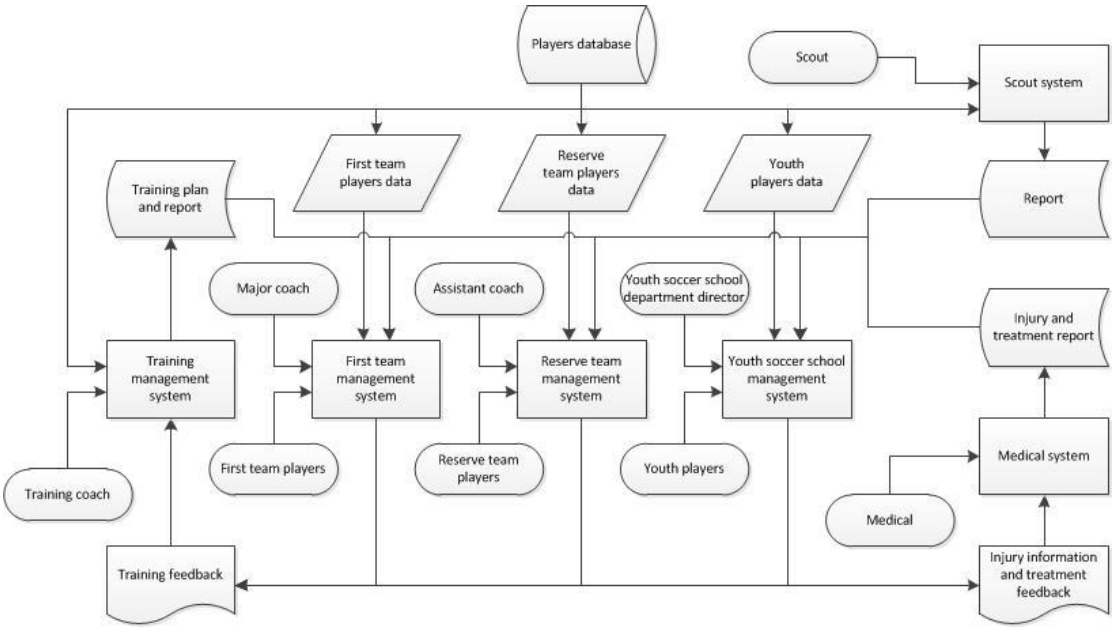


Figure 4.18: Football management system model

A first team management sub-system contains several functions: players evaluating, tactical formulating, line-up formulating, match and training schedule planning, and changing room managing. A first team management system model is shown in figure 4.19:

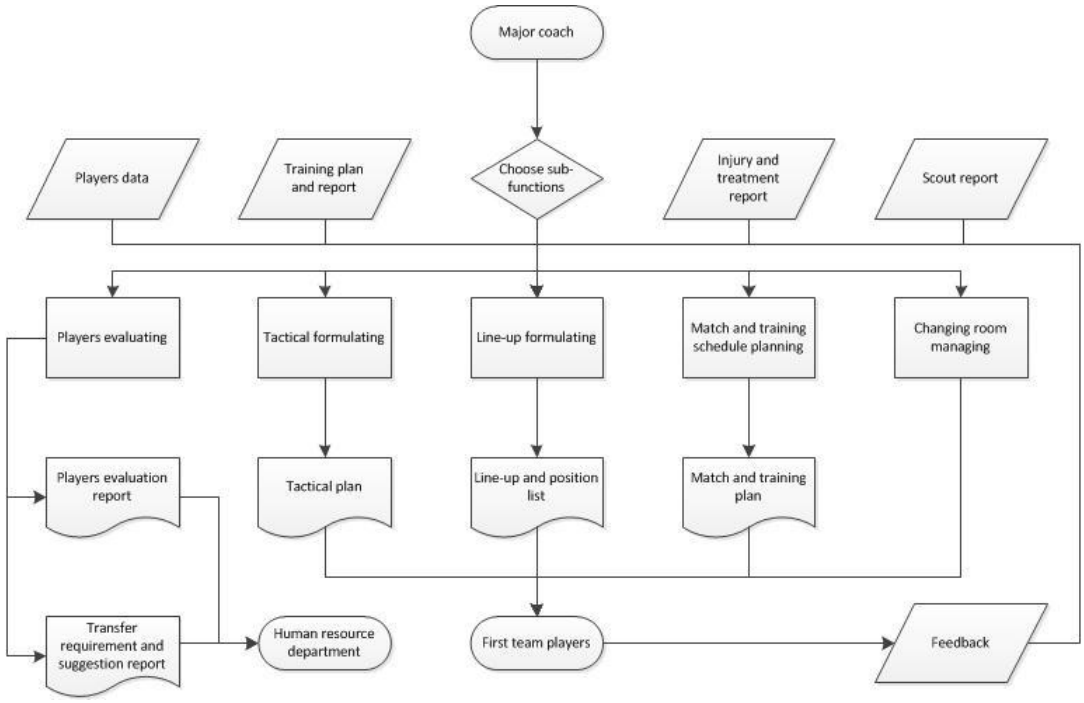


Figure 4.19: First team management model

A reserve team management system is similar to a first team management system. However, a youth soccer school management system could be different because there are not too many match tasks comparing with adult team; more importantly, the main purpose of youth school is to train and uncover promising young players. Through youth players evaluating, evaluating reports and transfer suggestion documents will be inputted into a human resource database. A youth soccer school management system model is shown in figure 4.20:

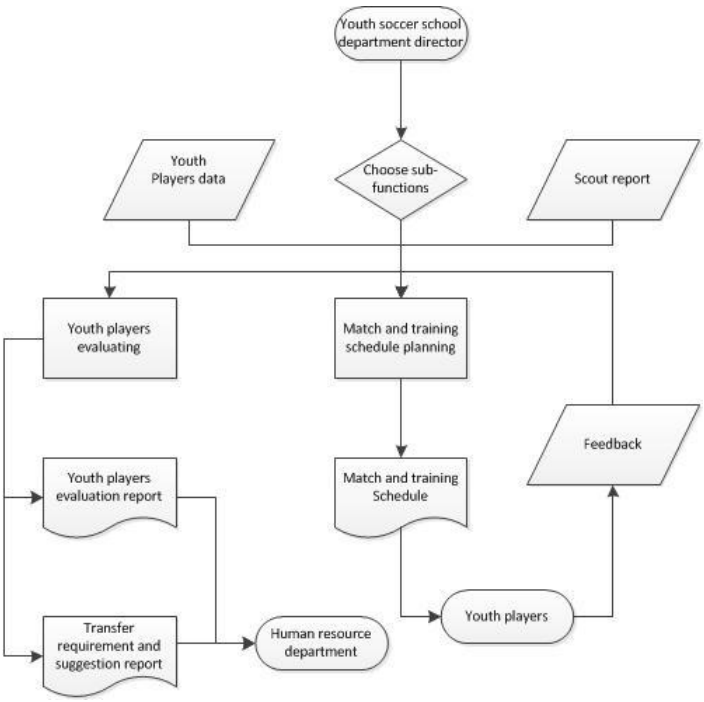


Figure 4.20: Youth soccer school management system model

Beside of these sub-systems introduced above, there are also two sub-systems in football management system: training management system and scouting management system.

A training management system involves different types of training coaches and data recorders. Coaches make different training plans according to player training data feedback. This data is recorded and collected by data recording staff. Training system model is shown in figure 4.21:

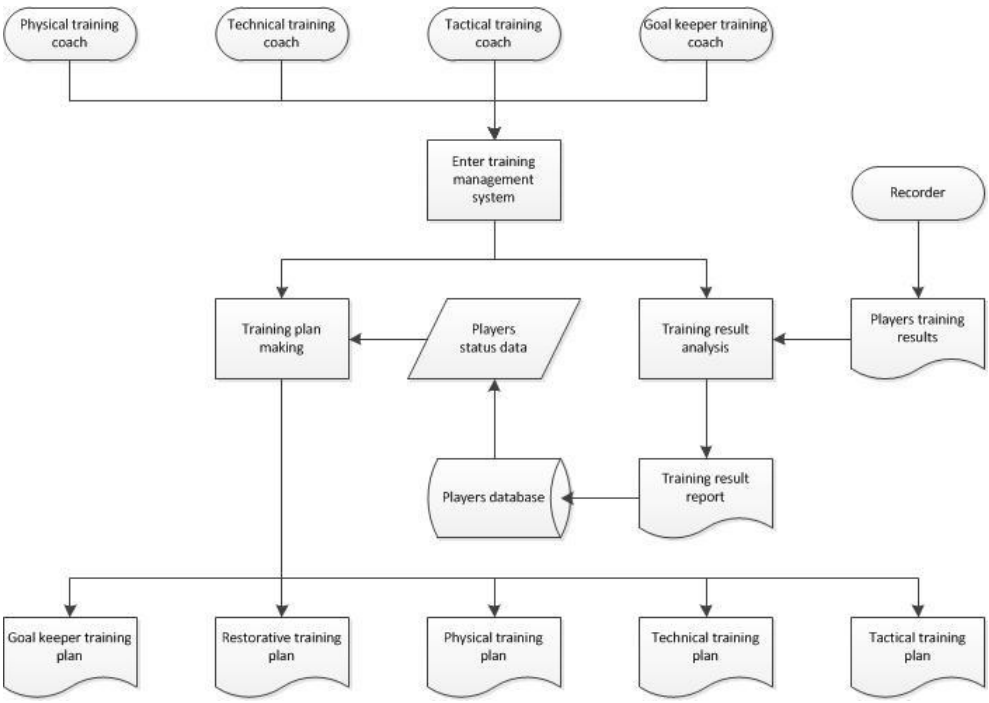


Figure 4.21: Training management system model

A scouting management system contains two main functions: scouting task generating and scouting task feedback. Scouts' knowledge should match the targeted players' situation. Scouting result will be inputted back to player database. A scouting system model is shown in figure 4.22:

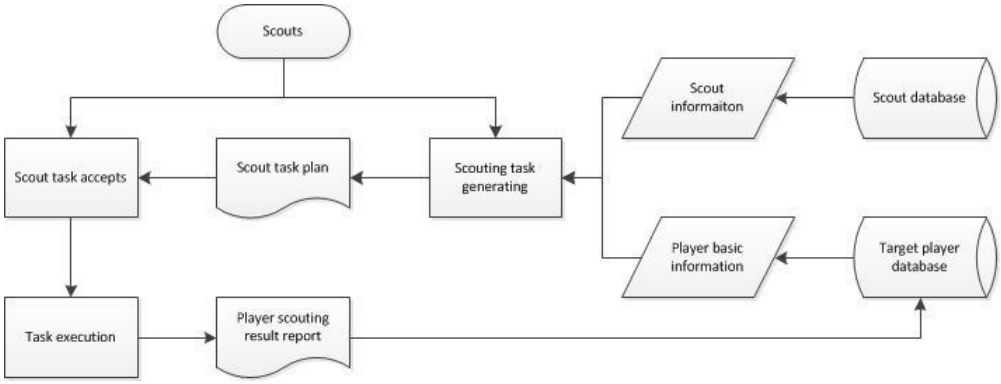


Figure 4.22: Scouting system model

A medical system should have three main processes: diagnosis process, treatment process and medical science analysis process. Medicals make diagnosis according to injury information; generated diagnosis reports could be inputted into player database and also used by treatment process; treatment process could generate two documents: treatment report and rehabilitation plan; medical science analysis process could also generate two documents: health report and risk prediction report. All these documents should be inputted into the player database (Peter, 1980). A medical system model is shown in figure 4.23:

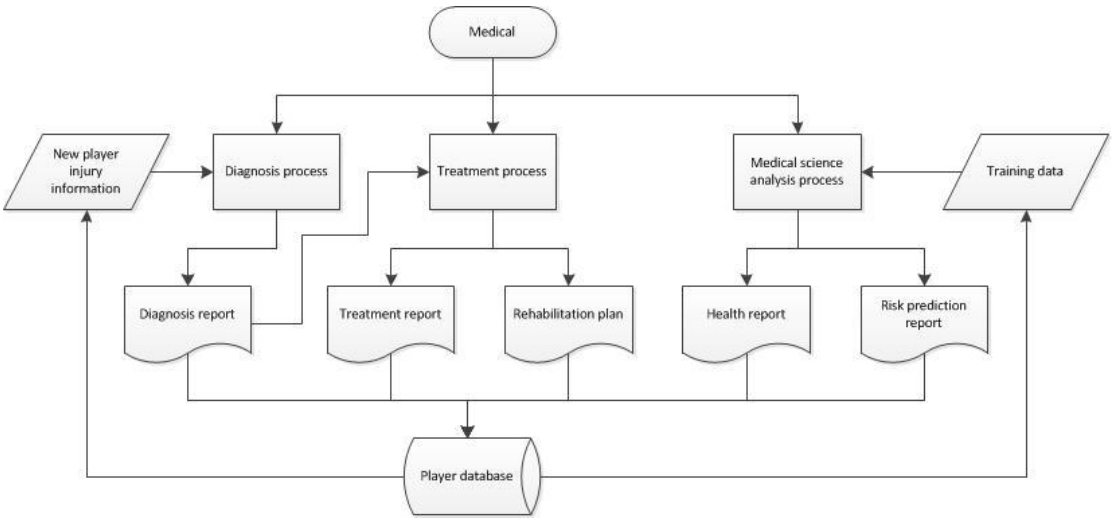


Figure 4.23: Medical system model

After showing football club business process and operation system, a football club decision-making support system can be started to design. According to the knowledge created in theoretical part, three-level management-facing systems support different managers. A management information system serves operational managers and runs on top of all business processes and operations supporting systems; decision support system serves tactical managers and runs above the management information system; executive information system serves strategic managers and is based on the other two systems. A decision-making supporting system model is shown in figure 4.24:

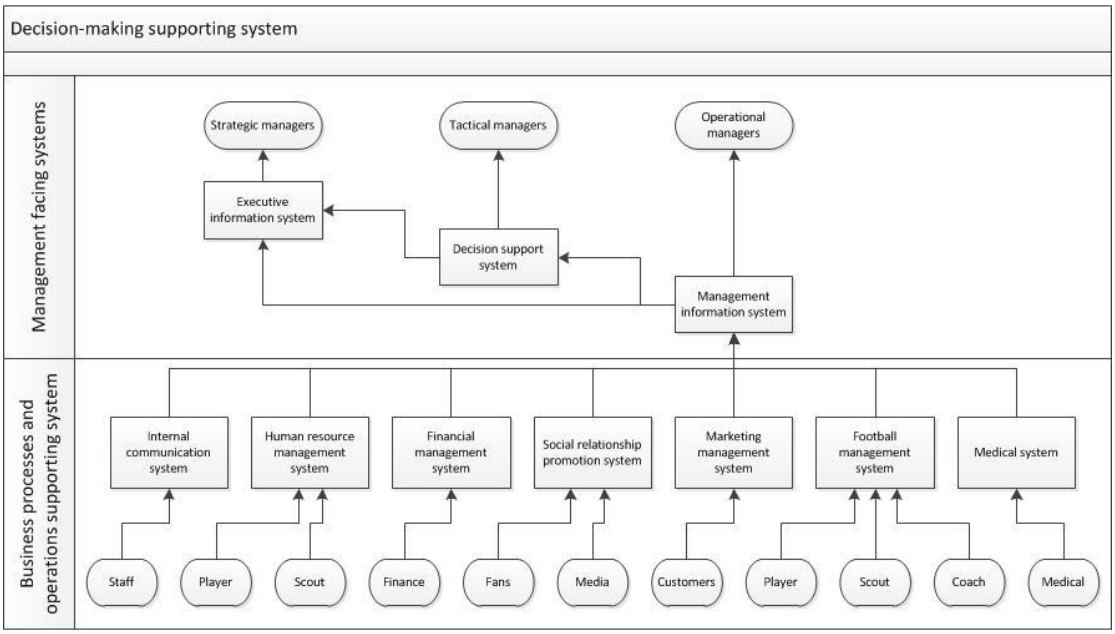


Figure 4.24: Decision-making supporting system model

Questions:

The purpose of questions is to test if each sub-system model satisfies relevant requirements.

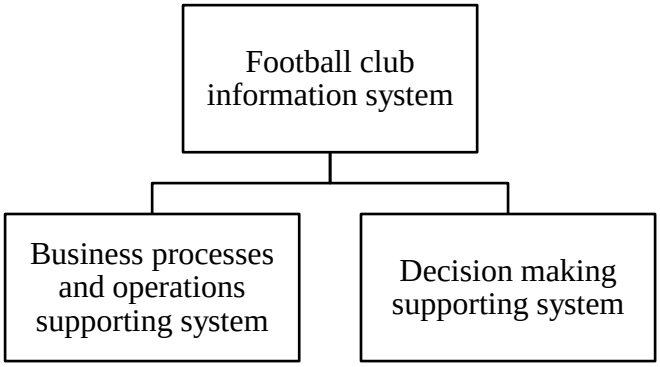
Basic questions are mainly about the effectiveness and integrity of sub-system models. For example, could online-chat sub-system effectively facilitate relative work? Does an internal communication system contain necessary sub-systems?

Question selections are divided into five levels to test the effectiveness: 0% - invalid, 25% - limited effective, 50% - effective, 75% - very effective, 100% - extremely effective. Question selections for testing integrity are 0% - none, 25% - small part, 50% - incomplete, 75% - almost complete and 100% - totally complete.

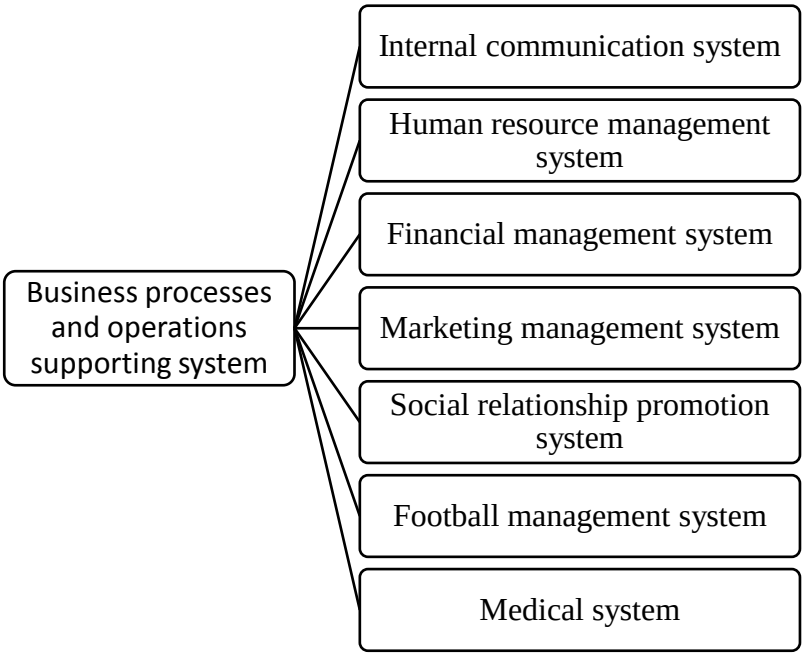
So, according to these principles above, a questionnaire is presented below:

Information systems have been used in many different industries and proven that they promote relevant industries' development. A research on football clubs' information system application is a natural trend. To infer the influence of information systems on football clubs, the whole system is divided into sub-systems according to different business areas, and then each sub-system model will be shown. All sub-system models are put into questionnaire to collect experienced managers' opinions. There are two types of questions, one is to test integrity, and the other is to test effectiveness.

The whole football information system is divided into two parts: Business processes and operations supporting system, and Decision making supporting system.

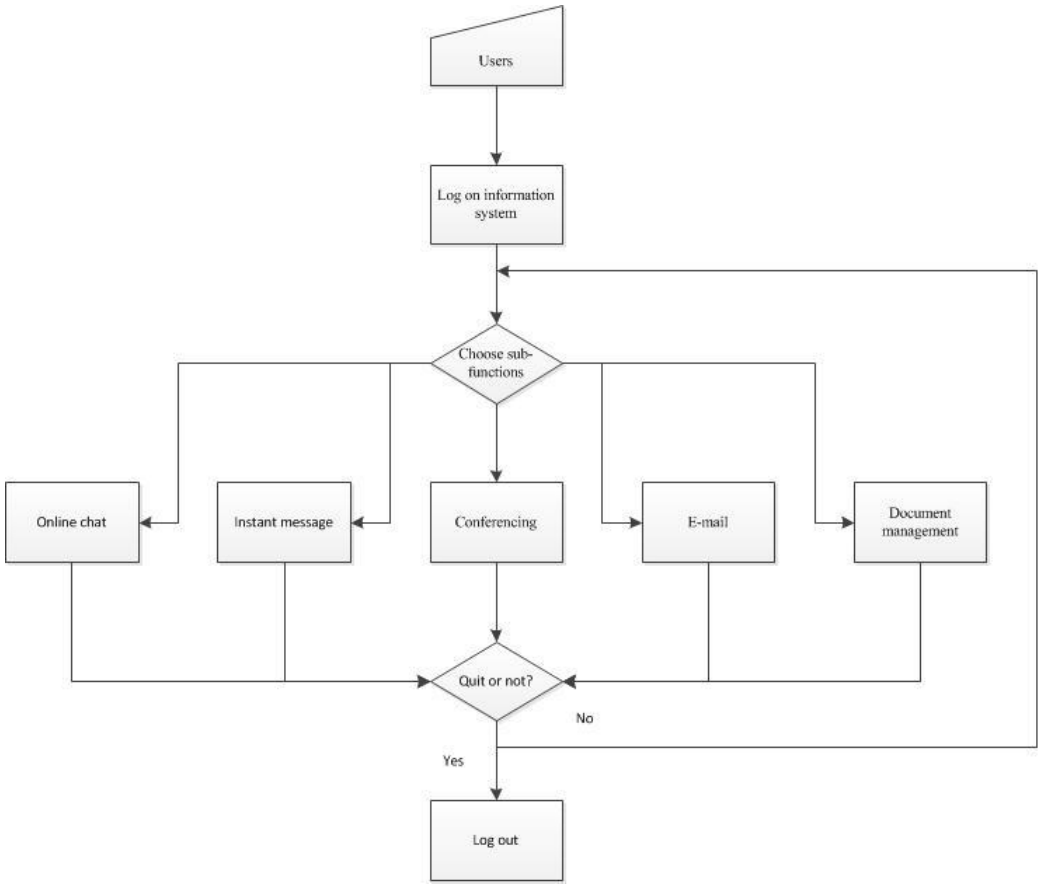


1. Is the business processes and operations supporting system complete?



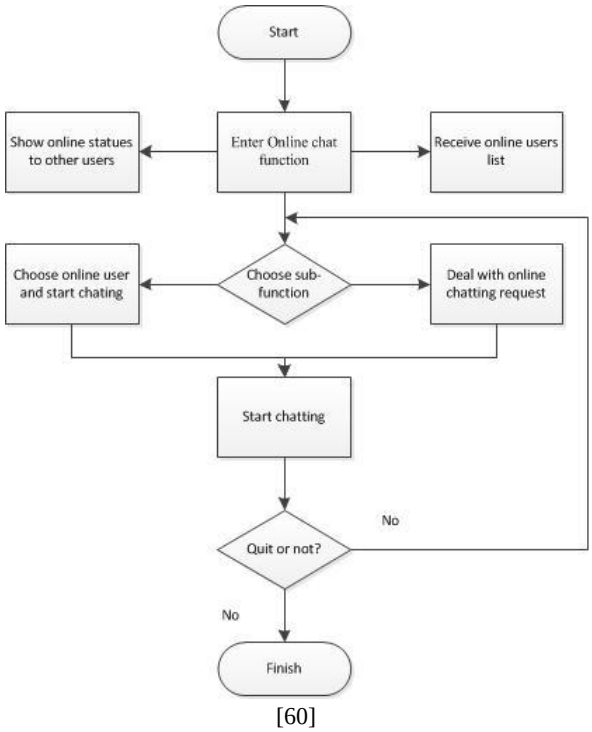
A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

2. Does the internal communication system contain all necessary sub-systems?



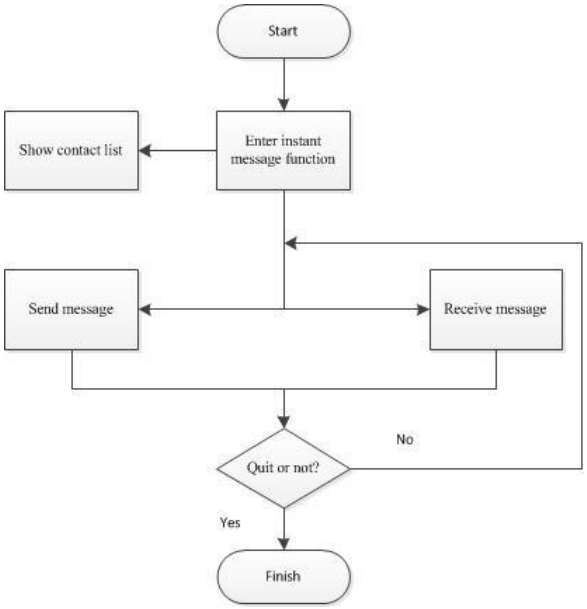
A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

3. Could the online-chat sub-system effectively facilitate internal communication?



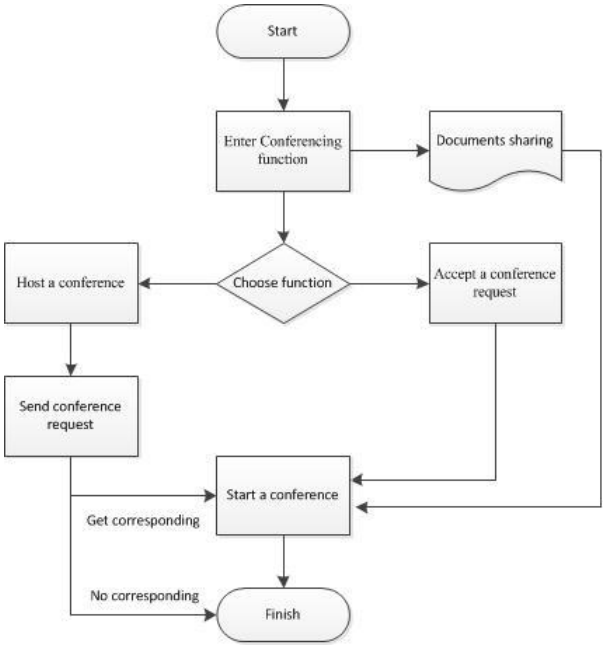
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

4. Could the instant message sub-system effectively facilitate internal communication?



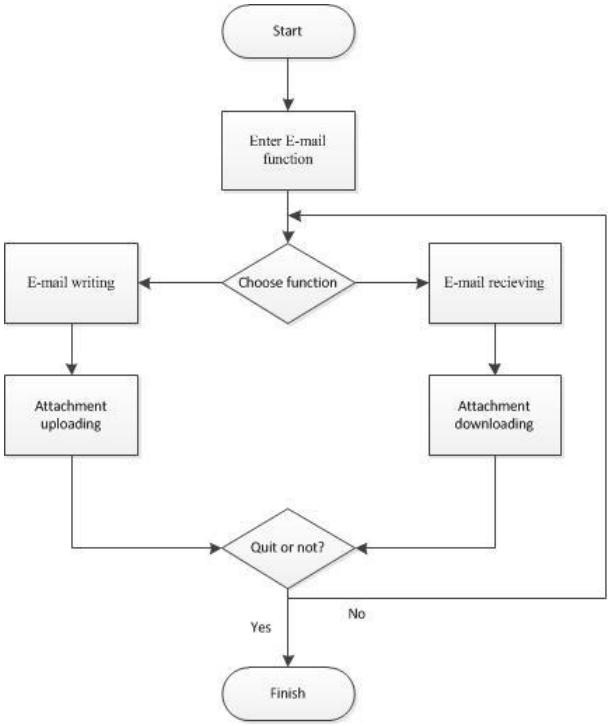
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

5. Could the conference sub-system effectively facilitate the internal communication?



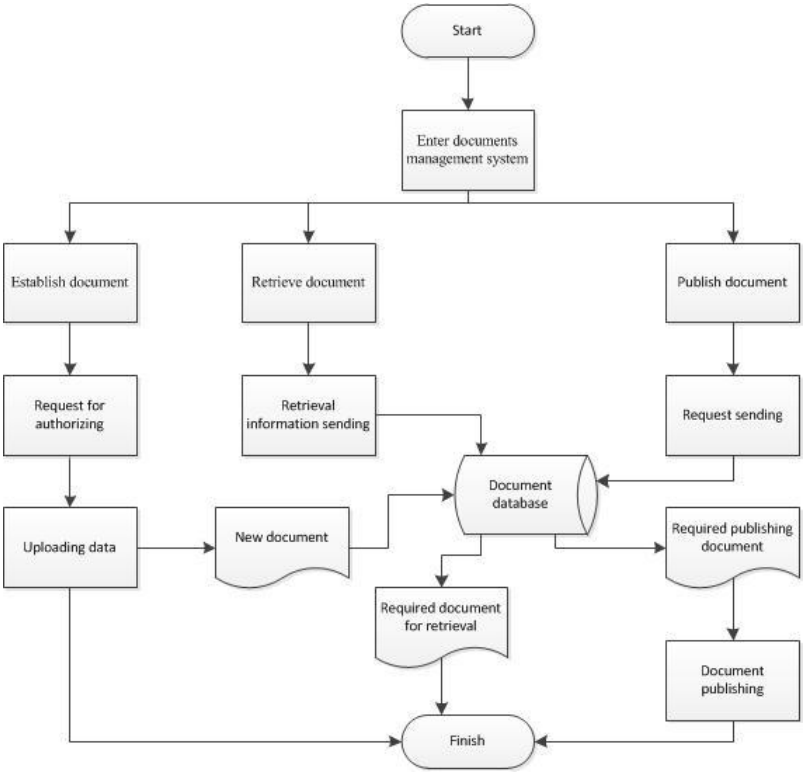
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

6. Could the e-mail sub-system effectively facilitate internal communication?



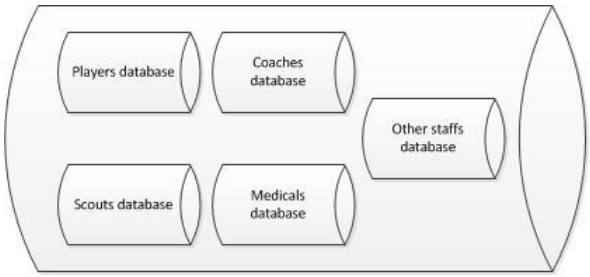
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

7. Could the document management sub-system effectively facilitate internal information sharing?



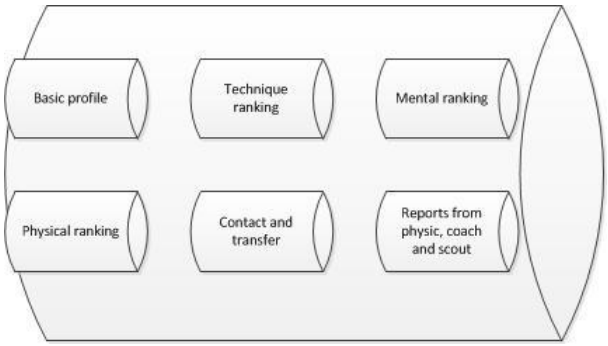
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

8. Does the human resource database contain necessary sub-databases?



A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

9. Does the player database contain necessary sub-databases?



A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

10. Does the player basic profile database contain necessary contents?

Name	Nationality	Birthdate	Age	Position	Prefered foot	Height	Weight
Player A							
Player B							

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

11. Does the player technique ranking database contain necessary contents?

Name	Corners	Crossing	Dribbling	Finishing	First Touch
Player A					
Player B					
	Free Kicks	Heading	Long Shots	Long Throws	Marking
Player A					
Player B					
	Passing	Penalty	Tackling	Technique	
Player A					
Player B					

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

12. Does the player mental ranking database contain necessary contents?

Name	Aggression	Anticipation	Bravery	Composure	Concentration
Player A					
Player B					
	Creativity	Decisions	Determination	Flair	Influence
Player A					

Player B					
	Off the ball	Positioning	Teamwork	Work rate	
Player A					
Player B					

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

13. Does the player physical ranking database contain necessary contents?

Name	Acceleration	Agility	Balance	Jumping
Player A				
Player B				
	Natural Fitness	Pace	Stamina	Strength
Player A				
Player B				

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

14. Does the player contract and transfer database contain necessary contents?

Name	Basic Wage	Bonus Terms	Floating Rate	Starts date
Player A				
Player B				
	Expires date	Market Value	Transfer value	Termination Fee
Player A				
Player B				
	Transfer availability	Squad status	Interested club	
Player A				
Player B				

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

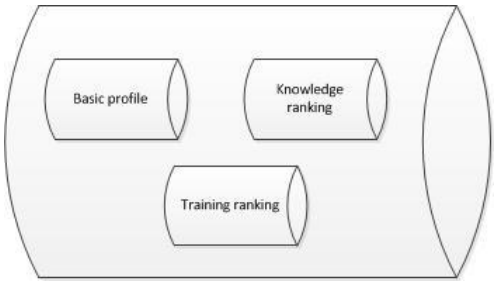
15. Does the players' analysis report database contain necessary contents?

Name	Match-performance	Advantage ability	Potential
Player A			
Player B			
	Training status	Physical status	Health status
Player A			
Player B			
	Business value	Social influence	Behavior

Player A			
Player B			

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

16. Does the coach database contain necessary sub-systems?



A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

17. Does the coach basic profile database contain necessary contents?

Name	Nationality	Birthdate	Age	position	Reputation	Contract details
Coach A						
Coach B						

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

18. Does the coach knowledge ranking database contain necessary contents?

Name	Ability judging	Man management	Motivating
Coach A			
Coach B			
	Potential Judging	Tactical knowledge	Working with youngsters
Coach A			
Coach B			

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

19. Does the coach training ranking database contain necessary contents?

Name	Strength	Aerobic	Goalkeeping	Tactics	Ball control
Coach A					
Coach B					
	Defending	Attacking	Shooting	Set pieces	
Coach A					

Coach B					

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

20. Does the medical knowledge ranking database contain necessary contents?

Name	Muscle strain	Ligament damage	Fracture	Operation
Medical A				
Medical B				
	First Aid	Injury risk estimates		
Medical A				
Medical B				

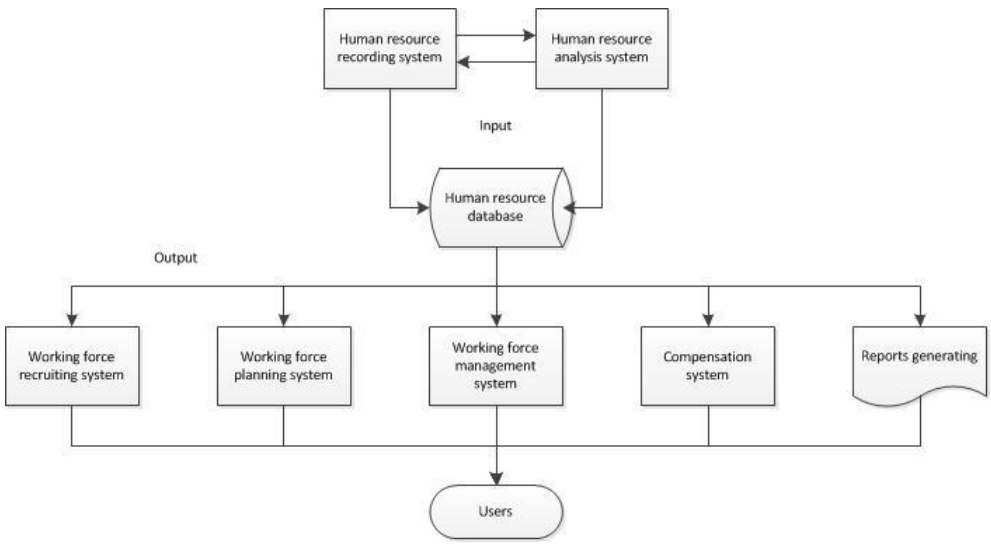
A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

21. Does the scout knowledge ranking database contain necessary contents?

Name	Ability judging	Potential judging	Intercultural communication
Scout A			
Scout B			

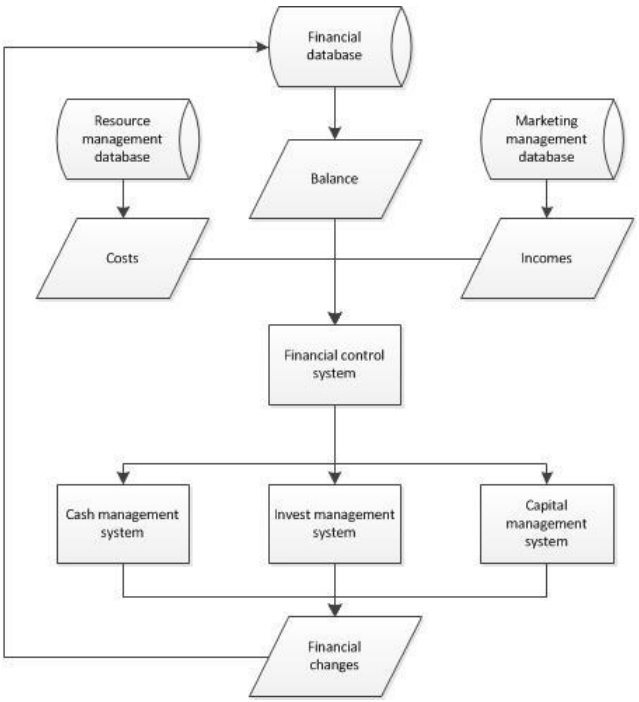
A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

22. Could the human source management sub-system effectively facilitate human source management?



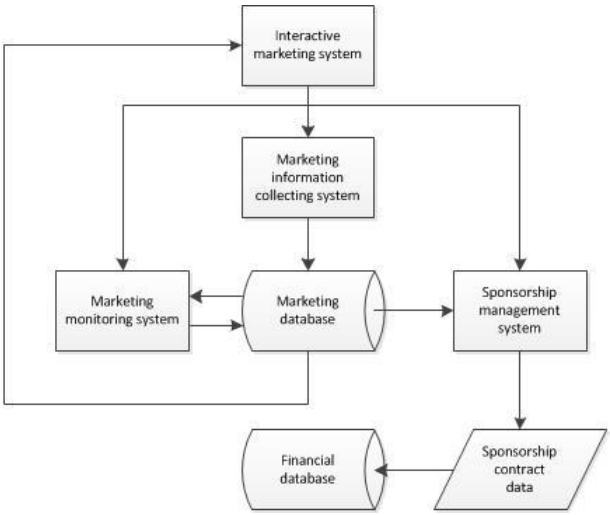
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

23. Could the financial management sub-system effectively facilitate financial management?



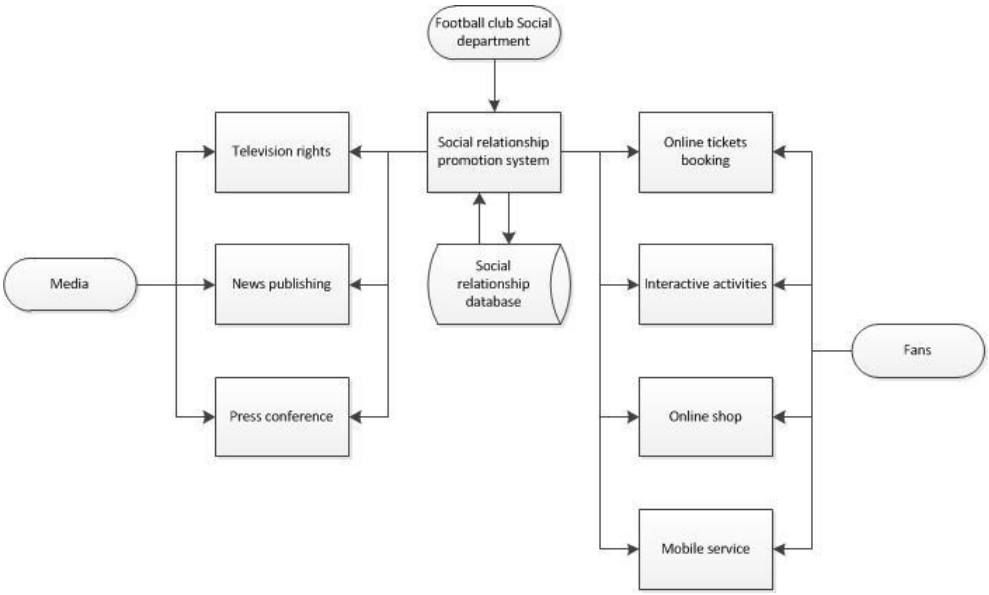
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

24. Could the marketing management sub-system effectively facilitate marketing management?



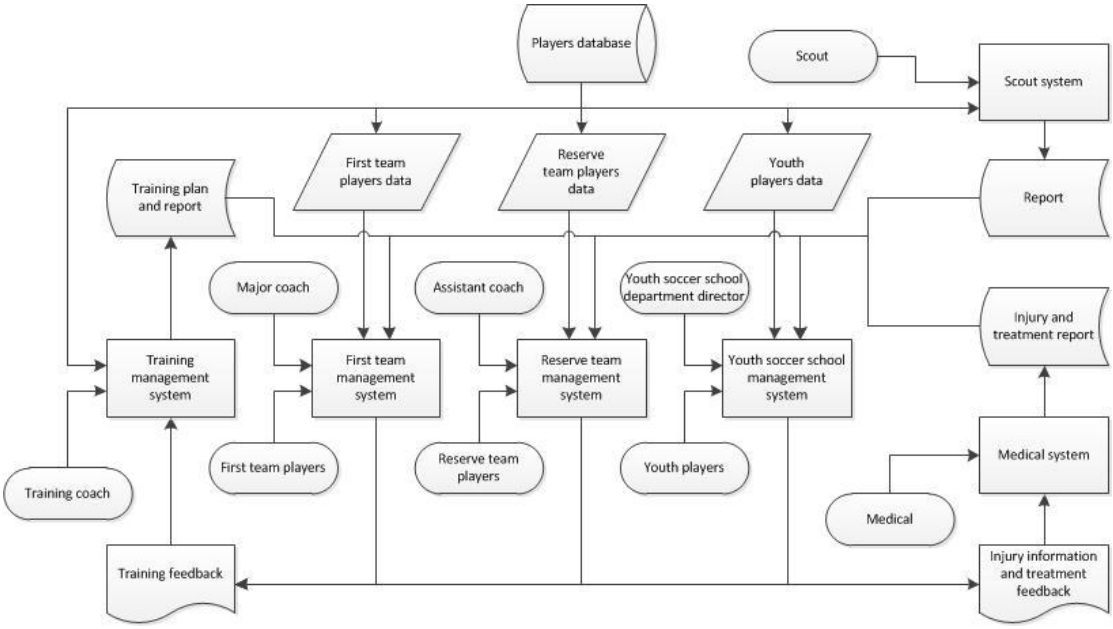
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

25. Could the social relationship promotion sub-system effectively facilitate social relationship?



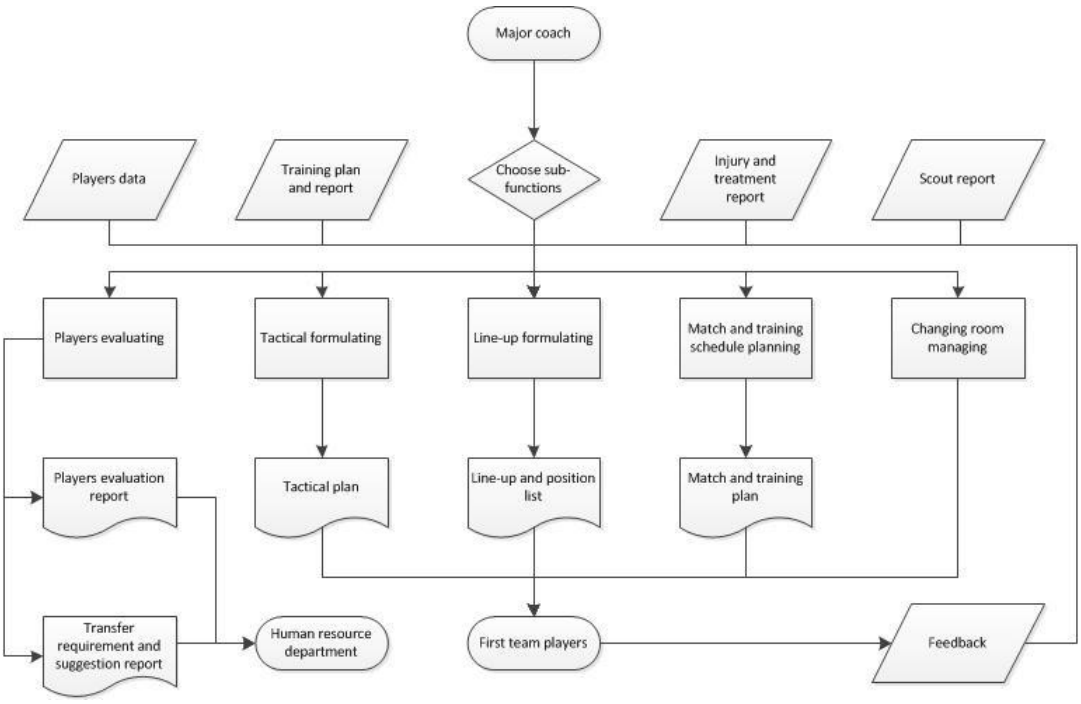
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

26. Could the football management system effectively facilitate relative work?



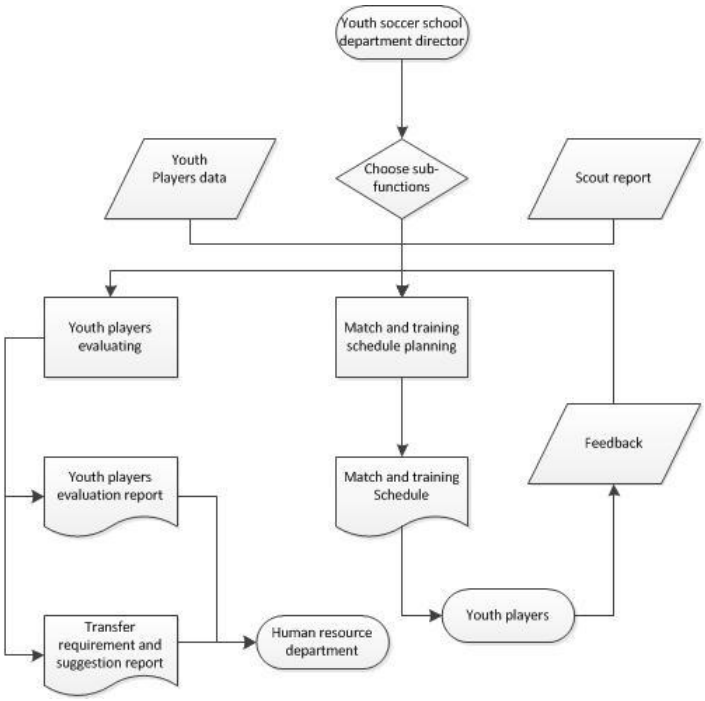
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

27. Could the first/reserve team management sub-system effectively facilitate relative work?



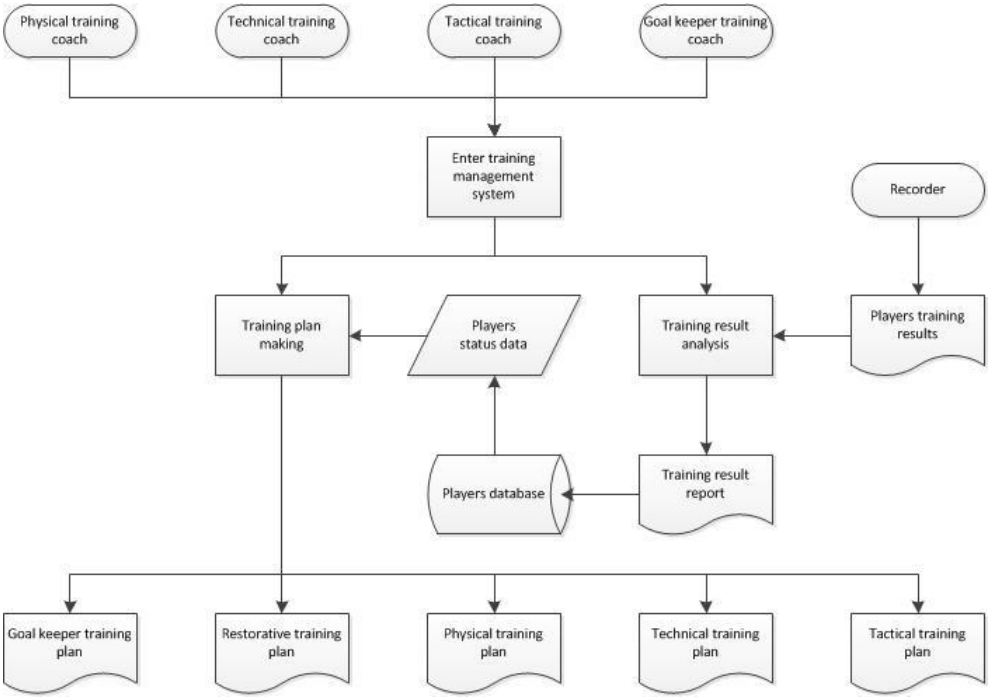
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

28. Could the youth soccer school management sub-system effectively facilitate relative work?



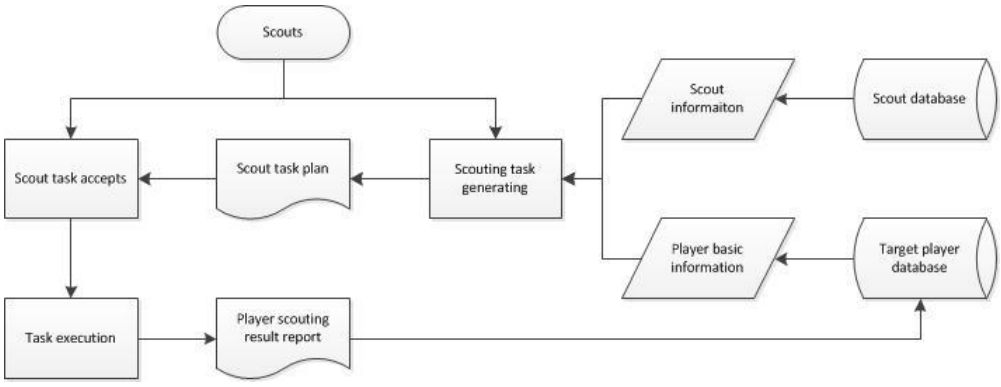
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

29. Could the training management sub-system effectively facilitate training management?



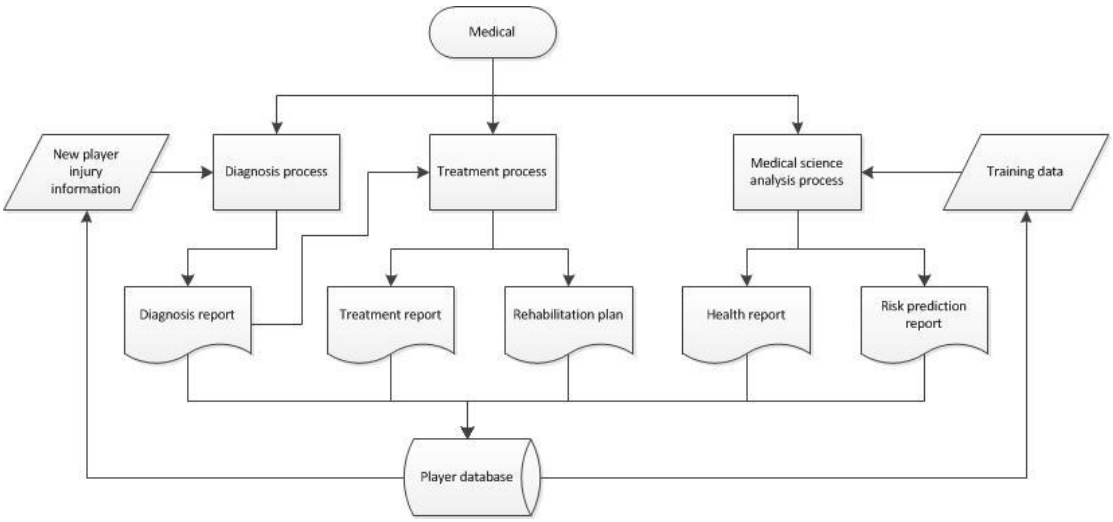
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

30. Could the scouting management sub-system effectively facilitate scouting management?



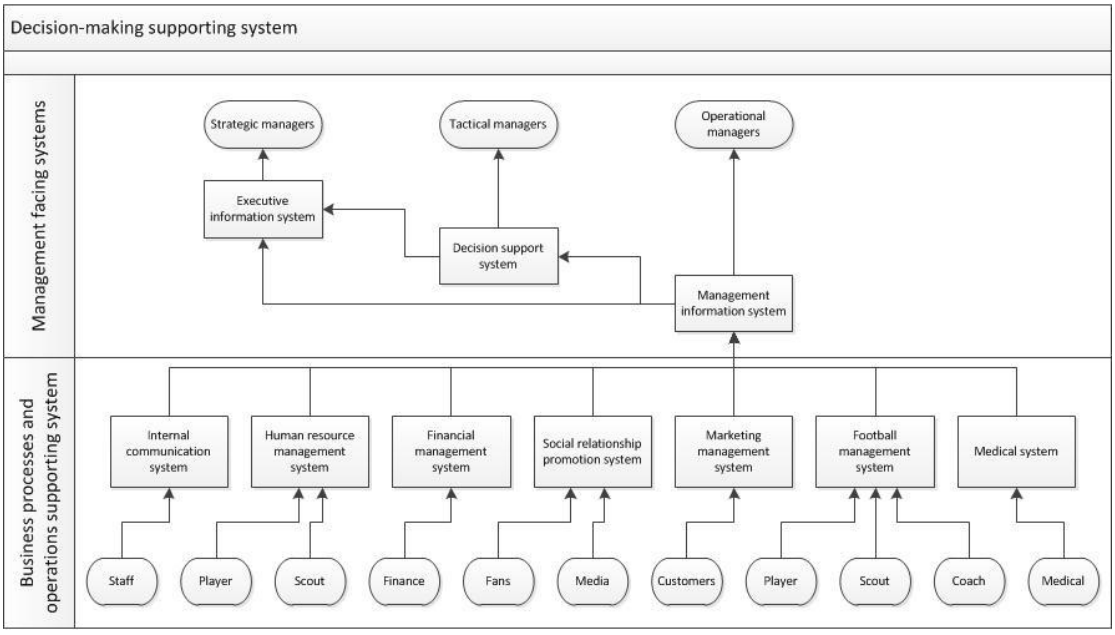
A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

31. Could the medical system effectively facilitate medical work?



A. 0% - invalid; B. 25% - limited effective; C. 50% - effective; D. 75% - very effective; E. 100% - extremely effective.

32. Does the decision making supporting system contain necessary sub-systems?



A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

33. Is this football information system model complete?

A. 0% - none; B. 25% - small partial; C. 50% - incomplete; D. 75% - almost complete; E. 100% - totally complete.

34. What sub-systems do you think should be added in this model?

Collection of questionnaires

Questionnaires are sent by e-mail. After that, results from questionnaire are gathered together and put into table 4.13.

4.4 Questionnaire answers collection

The questionnaire was sent to 82 football clubs, and 30 effective replies were received. All selection results are collected and shown in table 4.13:

Question No.	Answer options									
	Option A		Option B		Option C		Option D		Option E	
	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage
1	0	0.00%	2	6.67%	10	33.33%	18	60.00%	0	0.00%
2	0	0.00%	6	20.00%	18	60.00%	6	20.00%	0	0.00%
3	0	0.00%	2	6.67%	6	20.00%	17	56.67%	5	16.67%
4	0	0.00%	4	13.33%	8	26.67%	15	50.00%	3	10.00%
5	0	0.00%	4	13.33%	10	33.33%	14	46.67%	2	6.67%
6	0	0.00%	3	10.00%	6	20.00%	17	56.67%	4	13.33%
7	0	0.00%	5	16.67%	10	33.33%	11	36.67%	4	13.33%
8	0	0.00%	0	0.00%	15	50.00%	15	50.00%	0	0.00%
9	0	0.00%	0	0.00%	8	26.67%	19	63.33%	3	10.00%
10	0	0.00%	15	50.00%	9	30.00%	6	20.00%	0	0.00%
11	0	0.00%	6	20.00%	15	50.00%	8	26.67%	1	3.33%
12	0	0.00%	3	10.00%	8	26.67%	16	53.33%	3	10.00%
13	0	0.00%	0	0.00%	7	23.33%	22	73.33%	1	3.33%
14	0	0.00%	0	0.00%	4	13.33%	26	86.67%	0	0.00%
15	0	0.00%	0	0.00%	4	13.33%	24	80.00%	2	6.67%
16	0	0.00%	0	0.00%	3	10.00%	20	66.67%	7	23.33%
17	0	0.00%	1	3.33%	26	86.67%	3	10.00%	0	0.00%
18	0	0.00%	4	13.33%	10	33.33%	16	53.33%	0	0.00%
19	0	0.00%	0	0.00%	3	10.00%	23	76.67%	4	13.33%
20	0	0.00%	3	10.00%	18	60.00%	7	23.33%	2	6.67%
21	0	0.00%	10	33.33%	15	50.00%	5	16.67%	0	0.00%
22	0	0.00%	2	6.67%	9	30.00%	15	50.00%	4	13.33%
23	0	0.00%	4	13.33%	14	46.67%	12	40.00%	0	0.00%
24	0	0.00%	12	40.00%	13	43.33%	5	16.67%	0	0.00%

25	0	0.00%	7	23.33%	9	30.00%	14	46.67%	0	0.00%
26	0	0.00%	3	10.00%	5	16.67%	20	66.67%	2	6.67%
27	0	0.00%	2	6.67%	7	23.33%	21	70.00%	0	0.00%
28	0	0.00%	6	20.00%	10	33.33%	14	46.67%	0	0.00%
29	0	0.00%	5	16.67%	12	40.00%	13	43.33%	0	0.00%
30	0	0.00%	2	6.67%	11	36.67%	14	46.67%	3	10.00%
31	0	0.00%	4	13.33%	17	56.67%	9	30.00%	0	0.00%
32	0	0.00%	5	16.67%	20	66.67%	4	13.33%	1	3.33%
33	0	0.00%	10	33.33%	14	46.67%	6	20.00%	0	0.00%
34	Accounting system, Payroll system, Transfer market monitoring system, Scouting information sharing system.									
Average	0.00	0.00%	3.94	13.13%	10.7	35.76%	13.8	45.96%	1.55	5.15%

Table 4.13: Questionnaire results

Some sub-systems are not completely accepted by interviewed managers. They are marketing management, social relationship management, medical management, strategic management, tactical management and operational management. This type of problem could be caused by information system model designing flaws.

For example, the internal information system is regarded not complete. According to Duncan's research, which illustrates the importance of relationships between football clubs and especially partner clubs, it can be inferred that the access to business network could be the missing critical element in this internal communication system model (Duncan, 2007).

Some managers think that human resource database is incomplete. Four main members - players, coaches, scouts and medicals' databases are contained in system. However, there are also some other important staff that should be added such as managers, director, masseur, clerk, system maintenance staff, press officer, physiotherapist and so on (Inter, 2011).

In player database parts, 30% of managers think that player basic profile database is incomplete; 50% of managers think that player basic profile database contains only a small part of necessary data. Through the survey feedback and material searching, it is found that player's historical data should be also involved in a player's basic profile database such as original served football clubs, received honor and so on.

Beside of this data which should be involved in a player basic profile database, the statistical data of field performance is another indispensable data. In a research of Ian and Phil (2005), they use an official player rating system - Actim index, to rank players in Barclays Premiership. They collect players' performance statistics and input to the system to rank players according to their field performance.

50% of managers feel that football player's technique ranking database is incomplete; 20% of managers think that only a small part of data is contained. Through the searching in the

relevant material, it is found that goalkeeper technique data is neglected. In a professional goalkeeper training website, it is found that some important goalkeeper technique categories such as aerial ability, area control, communication ability with defenders, handling, kicking accuracy, one-on-one ability, reflexes speed, rushing out speed, throwing accuracy and so on (Peter, 2011).

Around 90% of managers think that coach basic profile database is incomplete. It could be similar as the player basic profile database's problem. So, coach historical information should be contained this sub-database such as reserved club, reserved positions, obtained achievements and even historical information as a player.

60% of managers think that medical knowledge ranking database is incomplete; 10% of managers believe that only a small part of necessary contents are involved; 50% of managers believe that scout knowledge ranking database is incomplete; 33% of managers think that just a small part of scout knowledge contents are involved. These could be caused by the lack of professional materials of medical and scout working areas.

47% of managers think that a financial management sub-system could promote financial management effective; 13% of managers believe that this could provide a limited effective support. According to football club managers' feedback and the research, it is found that an accounting system is critical in a financial management system. From a perspective of the capital composition, Fareeha and Howard (2005) infer that the accounting system could improve football industry's development.

43% of managers believe that marketing management sub-system could only facilitate a marketing management in some extent; 40% of managers think that the effectiveness is limited. From one previous research (Atonio, George and Jaume, 2007), football clubs' marketing should be focused on three aspects: sponsorship, brand and new industries such as video games. According to this research, football club marketing system should involve the other two elements: own brand building and new industries developing.

The medical management model was not accepted very well by interviewed managers. It can be caused by the lack of critical sub-systems. For example, a laboratory information system is regarded as an important component of football club medical management system (AC Milan, 2011).

A strategic management system, a tactical management system and an operational management system are regarded weak in questionnaire results because these three sub-systems are not designed. These three systems' designing is not the emphasis of the football club information system model.

A transfer marketing monitoring system, an accounting system, a payroll system and a scouting information sharing system should be added to a football club information system according to managers' feedback.

For example, James (2000) argues that an accounting system is the oldest and most widely used information system in most business companies. It can support to record and report the flow of funds through producing important financial statements. It shows the importance of an accounting system for general companies. Football clubs could also be benefited by an accounting information system.

4.5 Empirical research results

The empirical research investigates the third sub-question: how should a general football club information system model be?

Through analysis, a general football club information system model should contain all parts which were designed in this chapter, and also some sub-systems which were suggested by interviewed managers.

The average data show that 35.76% of managers think that this football club information system model is effective and relatively complete; 45.96% of managers believe it is very effective and almost complete. In a sum, this system which is designed in this empirical study is comparatively complete and effective.

So, a general football club information system model should contain: an online chat system, an instant message system, a conference system, an e-mail system, a document management system, a human resource management system, a human resource database, a cash management system, an investment management system, a capital administration system, a financial planning and a control system, an accounting system, a marketing management system, a social relationship management system, a first team management system, a reserve/youth teams management system, a youth soccer school management system, a training management system, a scouting management system, a medical management system, an executive information system, a decision support system and a management information system.

Besides, this general football club information system model should contain some other sub-systems according to some managers' suggestions. Several sub-systems should be added: a transfer market monitoring system, an accounting system, a payroll system and a scouting information sharing system.

A general football club information system model is shown in figure 4.25 as below:

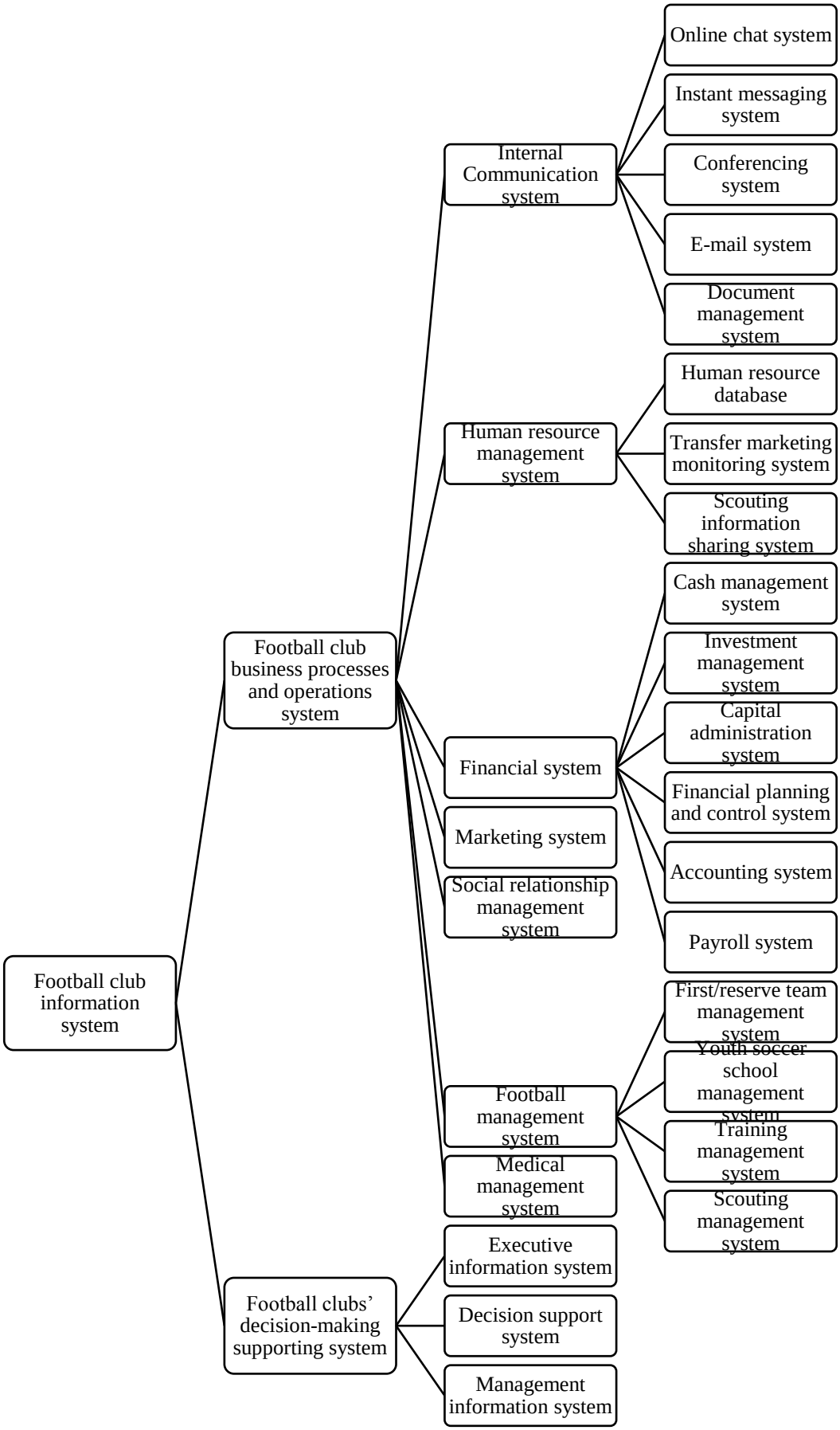


Figure 4.25: Football club information system model

Detailed working processes and content of each sub-system are shown when questionnaire was designed. So, the empirical study designs a general football club information system model, which could give football club managers and system developers an intuitive reference. It can also afford arguments for further analysis of how information systems facilitate football clubs.

5 Analysis and result

5.1 Analysis

After theoretical and empirical studies, three sub-questions have been answered. This analysis part is going to investigate how information systems facilitate football clubs according to theoretical and empirical results.

This analysis study adopts comparative analysis method, which analyzes theoretical and empirical results in three steps: classify different categories, compare results, and analyze facilitation.

Classify different categories

Theoretical results are related with many aspects. These areas should be categorized clearly in order to analyze which areas information systems facilitate football clubs. Group categories are shown in table 5.1:

Football club business processes and operations	Internal Communication	Online chat
		Instant message
		Video conference
		Web conference
		E-mail
		Document management
	Resources and Services	Human resource management
	Finance	Cash management
		Investment management
		Capital administration
		Financial planning and control
	Marketing	Marketing management
	Social relations	Social relationship management
	Football management	First team management
		Reserve/youth teams management
		Youth soccer school management
	Medical Services	Medical management
Football clubs' decision making	Strategic management	
	Tactical management	

	Operational management
Football club competitive advantage	Cost leadership strategy
	Differentiation strategy
	Innovation strategy
	Growth strategy
	Alliance strategy
ETHICS	Job-satisfaction
	Participation

Table 5.1: Area categories

Compare results

Results have been divided into different categories. These categories are areas that information system could facilitate football clubs and characteristics of ETHICS. The general football club information system model shows the relation between different sub-systems and their functions. Now, both theoretical and empirical results should be compared to show how these theoretical areas can be supported by relevant sub-systems.

In table 5.2, theoretical sub-areas are listed at left side; relevant sub-systems from the general football club information system model study are listed at right side.

Area categories	Sub-systems
Online chat	Internal communication system, Online-chat system
Instant message	Internal communication system, Instant message system
Video conference	Internal communication system, Conference system
Web conference	Internal communication system, Conference system
E-mail	Internal communication system, E-mail system
Document management	Internal communication system, Document management system
Human resource management	Human resource management system, Football club human resource database, Transfer marketing monitoring system, Scouting information sharing system.
Cash management	Financial management system, Cash management system
Investment management	Financial management system, Investment management system
Capital administration	Financial management system, Capital administration system
Financial planning and control	Financial management system, Financial

	planning and control system, Accounting system, payroll system
Marketing management	Marketing management system
Social relationship management	Social relationship management system
First team management	Football management system, Training management system, Scouting system, First team management system
Reserve/youth teams management	Football management system, Training management system, Scouting system, Reserve/youth teams management system
Youth soccer school management	Football management system, Training management system, Scouting system, Youth soccer school management system
Medical management	Medical management system
Strategic management	Decision-making supporting system, Executive information system
Tactical management	Decision-making supporting system, decision support system
Operational management	Decision-making supporting system, management information system
Cost leadership strategy	The whole football club information system
Differentiation strategy	
Innovation strategy	
Growth strategy	
Alliance strategy	
Job-satisfaction	
Participation	

Table 5.2: Theoretical and empirical results comparison

Analyze facilitation

Online chat and instant message can be facilitated by an internal communication system and an online-chat system. An internal communication system and an online-chat system help employees to send messages both in point-to-point and multicast way and dramatically increase communication speed.

Video conference and web conference can be facilitated by an internal communication system and a conference system. An internal communication system and a conference system support employees from remote locations to interact meetings and share information in real-time. An internal communication system and a conference system afford employees many functions such as meetings, training events, lectures and presentations.

E-mail can be facilitated by an internal communication system and an e-mail system. An internal communication system and an e-mail system provide employees functions of mail acceptance, mail forwarding, mail delivering and storing.

Document management can be facilitated by an internal communication system and a document management system. An internal communication system and document management system help football club staff publish, retrieve, store electronic documents and so on.

Human resource management can be facilitated by a human resource management system, a football club human resource database, a transfer marketing monitoring system, and a scouting information sharing system. These sub-systems could support football clubs' recruitment, selection, hiring, placement, performance evaluation, employee benefits analysis, training and development. Besides, these sub-systems could facilitate human resource department to monitor transfer markets and share player information with other alliance clubs.

Cash management can be facilitated by a financial management system and a cash management system. A financial management system and a cash management system help football club financial departments collect cash receipts and payment records at the real-time.

Investment management can be facilitated by a financial management system and an investment management system. A financial management system and an investment management system help football club financial departments collect information to change from high risk to high return investment projects.

Capital administration can be facilitated by a financial management system and a capital administration system. A financial management system and a capital administration system facilitate football club financial departments analyze expected cash flows, potential risk, long-term expenditure proposals all capital projects.

Financial planning and control can be facilitated by a financial management system, a financial planning and control system, an accounting system and a payroll system. They facilitate football club financial departments to collect information of cash balance, available financing types, interest rates, stock and bond prices, and current business operation. They help football club financial departments input valid data and generate a set of optional plans.

Marketing management can be facilitated by a marketing management system. A marketing management system increases the efficiency of marketers and speeds up transmission of sales data from marketing department. A marketing management system enables football club to attract customers to become clubs' partners with designed fans products, match tickets pricing, improving customer services and so on. Marketing information system may help marketing managers monitor performance of salesmen, customers' reactions and marketing results.

Social relationship management can be facilitated by a social relationship management system. A social relationship management system facilitate football club to promote its social relations with fans, media and other football clubs.

First/reserve team management can be facilitated by a football management system, a training management system, a scouting system, and a first team management system. They facilitate first teams by players evaluating, tactical formulating, line-up formulating, match and training schedule planning, and changing room managing.

Youth soccer school management can be facilitated by a football management system, a training management system, a scouting system, and a youth soccer school management system. These sub-systems facilitate youth football school to train and uncover promising young players.

Medical management can be facilitated by a medical management system. A medical information system could enhance the quality and efficiency of a medical service team in these processes: diagnosis process, treatment process and medical science analysis process.

Strategic management can be facilitated by a decision-making supporting system and an executive information system. A decision-making supporting system and an executive information system facilitate the board of directors and executive committee of CEO to monitor football clubs' strategic performance and then make some strategic changes and direct tasks.

Tactical management can be facilitated by a decision-making supporting system and a decision support system. Through computational and analytical method, a decision-making supporting system and a decision support system facilitate football clubs' medium-range plan objectives, which influence business target of football clubs' departments.

Operational management can be facilitated by decision-making a supporting system and a management information system. A decision-making supporting system and a management information system support football clubs with many day-to-day decision-making management works.

Cost leadership strategy, differentiation strategy, innovation strategy, growth strategy and alliance strategy can be facilitated by the whole football club information system. The information system give a football club cost advantage by increasing football club staff's work efficiency. It supports football clubs to differentiate services and brand with other competitors. It makes dramatically changes to football business processes; it helps brand building or marketing; it also helps develop new markets. It supports football clubs to collect sufficient information and analyze different global markets' situations and have growth advantage. It helps football clubs establish alliance with fans, other football clubs, sports companies and business companies.

Job-satisfaction and participation are two important factors to facilitate a football club information system development. In contrary, they are also facilitated by a football club information system. A football club information system facilitates clubs' staff by increasing their job-satisfaction. It facilities employees participate in football club operations exhaustively.

5.2 Result summary

From analysis study above, it is clear to see how information systems facilitate football clubs. Through establishing different information sub-systems and relevant databases in all those areas which can be enhanced by information systems, football clubs are facilitated dramatically. In these areas, information systems afford football clubs comprehensive service, operational efficiency, powerful technical supporting and competitive advantages.

6 Discussion

6.1 Conclusions

In a sum, information system can dramatically facilitate football clubs. Information systems have been proven to facilitate football clubs in three ways: participating football club business processes and operations, supporting football club decision-making, and supporting football club business strategies.

There are many aspects have been proven that information systems can definitely facilitate football clubs. Information systems can make football club internal communication more effectively; information systems can exhaustively support football club financial management; information systems can subdivide football management; information systems can help establish a powerful human resource management project.

There are some aspects that information systems perhaps facilitate football clubs in some extent. Information systems may facilitate football club staff's job-satisfaction and participation; information systems may consummate football club human resource database, marketing management, social relationship management, medical management, strategic management, tactical management and operational management; information systems may facilitate football club accounting; information system may help football clubs establish cost leadership advantage, differentiation advantage, innovation advantage, growth advantage and alliance strategy; information systems may afford football clubs high-level ability such as transfer markets monitoring and scouting information sharing; information systems may facilitate football club training management and payroll efficient.

6.2 Implications for Informatics

This study provides some theoretical achievements in informatics: James' theory, job-satisfaction theory, participation theory, football club information system development methodology theory and football club information system model theory.

According to James' theory, a business information system facilitates business from three aspects: supporting business processes and operations, supporting decision making by managers and employees, and supporting business strategies for competitive advantages (James, 2000). This study combines James' theory with football club practical situation and improves James' theory in a specific industry-football clubs.

Job-satisfaction is developed to evaluate how much a job suits an employee (Mumford and Weir, 1979). In this study, this theory is used to measure how much a football club

information system suits football club users. So, in this study job-satisfaction theory is improved as an information system evaluation method in informatics area.

Similarly, participation means that human being are involved or participated in a system which influences a decision-making process, a designing and an operation (Hitschheim, 1983). Participation becomes also an important criterion to judge if an information system suits a football club or other targeted industries.

A system development methodology - ETHIC has been proven suitable to football club information system plan. It will be a useful reference in football club information system research areas.

A comparatively effective system model has been designed. It will be helpful for those developers to understand football club business processes and design a system framework before development project starts. From the system model designing part, users can realize how they influence a whole football club information system running and business process.

6.3 Method evaluation

This thesis adopts design study method, which focuses mainly on information collection and model designing.

In theoretical part, the theoretical framework refers from James's research. Based on James' research and other knowledge collected from different business football club process, a new theoretical analysis is undertaken. However, because of incompleteness of theoretical framework and limitation of knowledge searching, there are some influential parts missed in theoretical part. Besides, it is very difficult to get practical business process information directly from football clubs. More analysis is based on secondhand information. It can cause some important information missing.

Because of the limitation of space in questionnaire designing, there are not too much detailed explanations about each model. Sometimes it can cause difficulties for respondents to understand. Actually face-to-face interviews should be the best way to collect those data because the accuracy of answers. However, the most famous and representative football clubs are centralized in south and middle Europe. It makes interview an impossible project. Similarly, because of limitations of telephone and complexity of questionnaire content, e-mail questionnaire survey was chosen as the only feasible method.

6.4 Result evaluation

In this part, three criteria are chosen to evaluate results: accuracy, credibility and validity.

Accuracy means how much results meet original purpose. This study is meant to help football club managers to realize possible influence and significance brought by information systems; this paper may be useful as a reference for football club managers and software developers, when they try to establish or improve a football club information system. To show football club managers possible influence and significance brought by information systems, this study analyzes many possible areas information systems could facilitate football clubs. To give football club managers and software developers a reference when they try to establish or improve a football club information system, this study designed a general football club information system model. It can be said, this study is very accurate to meet original purpose.

Credibility means how much results can be trusted. The possibility of one-side judgment in theoretical study is minimal because this study is based on around fifty different studies from industries and different information system application areas. The possibility of artificial conclusion is even less because the empirical study is carried out in eighty-two top football clubs from six different countries (30 effective replies received). So, the result of this study is absolutely reliable.

Validity means effectiveness of results. Firstly, there are a lot questions involved in questionnaire that could reflect managers' opinions. These practical experience and suggestions show the validity in some extent. Secondly, the validity of results needs to be fulfilled in practice. So, it only can be said that this study's results are comparatively effective.

6.5 Possibilities to generalize

This study is based on almost all relevant football club information system literature materials. In theoretical part, some studies from other industries are also used. Those created theories can be reference in other sports industries if their organizations and business processes are similar. The sample in empirical part contains 82 most famous football clubs in Europe. These 82 clubs' organizations are comparatively complete; their scales are comparatively large. So, the result from empirical study should be representative to all football clubs. When football clubs from low-level leagues try to establish information system, this football information system model can be changed according to their specific situation.

6.6 Ideas for continued research

This study reveals a lot of areas that information systems can facilitate football clubs. However, there are still some areas missed or hard to be investigated. For example, information systems could be used to decrease policing cost. In England, in total football clubs paid between £12 and £15 million to the police in the season 2007–08 (House of Commons, 2009). England's government and other social associations may have paid more than clubs. A football club information system could be a solution for this kind of problem.

Through establishing specific fans and hooligans' database, polices and relevant staff can trace and monitor suspicious persons. However, it is left to other researchers to resolve in following studies.

This study reveals how information systems facilitate football clubs and how to design a basic model. However, this study has found that some sub-systems are missed in the information system model and the designing of database has some defects. More detailed data mining is needed to consummate this football system information system model.

Beside of those problems mentioned above, the information system modeling is just the start because a football club information system development is a huge project. More things are waiting to be resolved such as software designing, system integration, system evaluation, etc.

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Appendix 1

ENGLAND	
Arsenal	arsenaldirect@arsenal.co.uk
Aston Villa	Questionnaire was sent on official website
Blackburn Rovers	Questionnaire was sent on official website
Bolton Wanderers	media@bwfc.co.uk
Chelsea	Questionnaire was sent on official website
Everton	communications@evertonfc.com
Fulham	enquiries@fulhamfc.com
Liverpool	Questionnaire was sent on official website
Manchester City	Questionnaire was sent on official website
Manchester United	conference@manutd.co.uk
Newcastle United	Questionnaire was sent on official website
Norwich City	reception@ncfc-canaries.co.uk
Queens Park Rangers	stevep@qpr.co.uk
Stoke City	media@stokecityfc.com
Sunderland	enquiries@safc.com
Swansea City	info@swanseacityfc.co.uk
Tottenham Hotspur	foundation@tottenhamhotspur.com
West Bromwich Albion	enquiries@wbafc.co.uk
Wigan Athletic	s.hayton@wiganathletic.com
Wolverhampton Wanderers	info@wolves.co.uk
SPAIN	
Athletic Bilbao	Questionnaire was sent on official website
Atletico Madrid	Questionnaire was sent on official website
Barcelona	oab@fcbarcelona.cat
Espanyol	info@rcdespanyol.com
Getafe	jprensa@getafecf.com
Granada	info@granadafc.com
Levante	Questionnaire was sent on official website
Malaga	administracion@malagacf.es
Real Mallorca	informacion@rcdmallorca.es
Osasuna	prensa@osasuna.es
Racing Santander	oficinas@realracingclub.es
Rayo Vallecano	Questionnaire was sent on official website
Real Betis	info@realbetisbalompie.es
Real Madrid	areavip@realmadrid.es ..
Real Sociedad	realsoc@realsociedad.com

Real Zaragoza	webmaster@realzaragoza.com
Sevilla	sevillafc@sevillafc.es
Athletic Bilbao	Questionnaire was sent on official website
Atletico Madrid	Questionnaire was sent on official website
ITALY	
AC Milan	Questionnaire was sent on official website
Atalanta	info@atalanta.it
Bologna	comunicazione@bolognafc.it
Cagliari	info@cagliaricalcio.net
Catania	info@calciocatania.it
Cesena	Questionnaire was sent on official website
Chievo	Questionnaire was sent on official website
Fiorentina	mailbox@fiorentina.it
Genoa	info@genoacfc.it
Inter Milan	Questionnaire was sent on official website
Juventus	customer@juventus.com
Lazio	direzione.sportiva@sslazio.it
Lecce	Questionnaire was sent on official website
Napoli	infocalcio@sscn.it
Novara	info@novaracalcio.com
Palermo	info@ilpalermocalcio.it
Parma	comunicazione@fcparma.net
Roma	redazioneweb@asroma.it
Siena	info@acsiena.it
Udinese	stampa@udinese.it
GERMANY	
Borussia Dortmund	Questionnaire was sent on official website
Bayer Leverkusen	meinolf.sprink.ms@bayer04.de
Bayern Munich	fcbtv@fcbayern.de
Hannover 96	info@hannover96.de
FSV Mainz 05	info@mainz05.de
FC Nuremberg	info@fcn.de
FC Kaiserslautern	Questionnaire was sent on official website
Hamburg	info@hsv.de
SC Freiburg	redaktion@scfreiburg.com
FC Koln	info@fc-koeln.de
1899 Hoffenheim	info@tsg-hoffenheim.de
Stuttgart	Questionnaire was sent on official website
Werder Bremen	info@werder.de
Schalke 04	post@schalke04.de
Wolfsburg	fussball@vfl-wolfsburg.de

Borussia Monchengladbach	info@borussia.de
Eintracht Frankfurt	info@eintracht-frankfurt.de
FC St Pauli	tim.steffens@fcstpauli.com
FRANCE	
Olympique Lyonnais	dirfin@olympiquelyonnais.com
Olympique de Marseille	Questionnaire was sent on official website
NETHERLANDS	
Ajax	info@ajax-business-associates.com
SCOTLAND	
Celtic	celticview@celticfc.co.uk

University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the **School of Business and IT (HIT),** we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our **courses in business administration** give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our **IT courses**, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The **research** in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department's and university's unit for research-supporting system development.

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