Software Projects Planning AN EMPIRICAL RESEARCH IN VIETNAM SOFTWARE SECTOR

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This article investigates the planning of software projects and its outcomes in practice. The results come from the survey on 80 software projects in Vietnam. The planning is considered on 3 aspects: personnel involved in planning, techniques and methods applied for project planning and management approach. The writing also indicates the planning performance of software projects as well as their outcomes.

I.INTRODUCTION

Vietnam may be the next success story of software industry in Asia, highlighting the growing competition in Asia in this knowledge-intensive sector *(Asia Pacific Bulletin, 2002)*. Production activities in the software industry have characteristics of a project in which each product is unique and non-routine tasks are involved. Therefore in the software industry many techniques of general project management are applicable to software project management. However, the software industry also achieved a notorious reputation for being out of control in terms of schedule, cost, and quality assurance. Estimating, planning, and quality control are so bad that a majority of large system projects run late or exceed their budgets, and many are canceled without ever reaching completion (Jones, 1998). This "software crisis" can be attributed not only to the non-application of principles and methods, but also to inadequate project management caused by a lack of recognition and understanding of what the real problems are in carrying out software development (Ratcliff, 1987).

Project management includes four main activities: planning, monitoring, coordinating, and reviewing. Many previous studies have mentioned the important role of planning in software project management. Project planning can have a major influence in explaining the variation in the success of organizational projects (Pinto and Slevin, 1986) such as IT projects. Aladwani (2002) also reported a positive relationship between IT project planning and performance. However, Callahan and Moretton (2001) could not find out in their research the relationship between the time spent on planning and the software development time. Dvir, Raz and Shenhar (2003) have also studied the relationship between project planning and project success, their finding has indicated no correlation between the implementation of planning procedures and the project success.

These issues have never been discovered by Vietnamese software companies. Although the software industry is now encouraged by the Government, only few researches were done in this field. Most of them are related to macro policies rather than to study how software projects are managed and what are main factors influencing the project outcomes. The goal of this article is to investigate the practice of software project planning in Vietnamese software companies. The results will contribute not only to project managers in Vietnamese context but also to whom in the similar context of an emerging software industry, especially in transition economies.

II. RESEARCH METHODOLOGY

1. Questionnaire design

To clarify the research issues related to planning in software projects, an empirical research was conducted. First a pre-pilot survey was implemented by in-depth interviews with 13 project managers involved in different kinds of software projects from a variety of software companies. Based on this pilot-survey, a questionnaire was designed for self-administrated answer. This questionnaire was pre-tested to ensure all of questions of self-administrated survey are clear and understandable without additional explanation.

The revised questionnaire includes 35 questions with a mixture nominal scale and a 5- point Likert scale as well as multiple-choice items. It includes:

- Background on software companies (name, location, number of employees, products, clients)
- Background on software projects (name, type of project, clients, project duration and cost, number of people involved in the project)
- Personnel involved in project planning (experience and authority of project manager; knowledge, experience and commitment of team members; involvement of customer)
- Tools/ techniques used in project planning (applied method/ tools/ software in project management; system development and life-cycle of software development)
- Management approaches in project planning (management support; objective statements, leadership style; communication methods and goals; availability of resources)
- Planning performance of the software project (in terms of defining requirements and technical specifications of software products; estimating timeline and cost; scheduling; analyzing risks)
- Project outcomes (in terms of time, cost, quality of delivered products, customer satisfaction, organization benefits and project personnel satisfaction)

2.Sampling

The data analysis unit of this survey is professional involved in software projects. The population frame should be based on the list of software companies. There are some available lists of software companies, such as the lists of Yellow Pages, HCMC Computer Association (HCA), Vietnam Software Association (VINASA) and Vietnam IT Directory. The list of Vietnam IT Directory (2002) is most complete. Based on this list, 375 companies involved in software development activities were identified, with 265 located in Hà N?i and HCMC. This group is included as the sample.

According to Neuman (2000), sample size is frequently defined purposively – a commonly accepted amount. For small population (under 1,000) in

this case, the sampling ratio should be large, about 30%. Applying this rule sample size for the survey should be 80.

Totally 400 questionnaires were sent (300 in the first time and 100 in repeat time, sent to selected companies which did not have response in the first time) and 80 qualified responses were received from 65 software companies (20%). Several companies have more than one response (from different software projects). This sample size is acceptable under Newman rule.

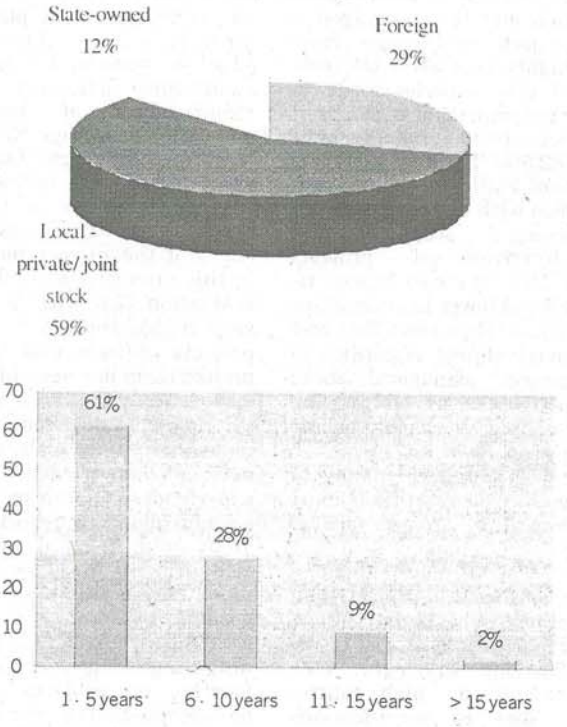
3.Sample characteristics

About 58.5 % are local private or joint- stock companies; 29.2% are foreign investors and the rest (12.3%) are state-owned. Software companies in Vietnam are very young and small. Most (61%) have been established within 1- 5 years, 27% from 6 – 10 years, and only 4% were established more than 15 years (Figure 1). 44% are small companies having less than 20 employees and only 10% have more than 140.

The software products that most companies have produced are applications in finance & accounting (62.5%) for trading and service (58%). Other software are for education and training (45%); government administration (45%); telecommunications (34.4%) and manufacturing (36%). Very few companies have software in the engineering area (such as software for construction or specific sectors). Only 7.8% of companies are specialized in one field, most companies produce software for 2 – 4 application fields (64%).

Most of companies produce software for both local and foreign clients. Their main foreign clients are in North America (36%) and Europe (36%), an emerging overseas market is Japan. In the local market, their products are mainly sold to private organizations (79.5%) and government agencies (70.5%).

Figure 1: Characteristics of surveyed software companies in terms of ownership and age



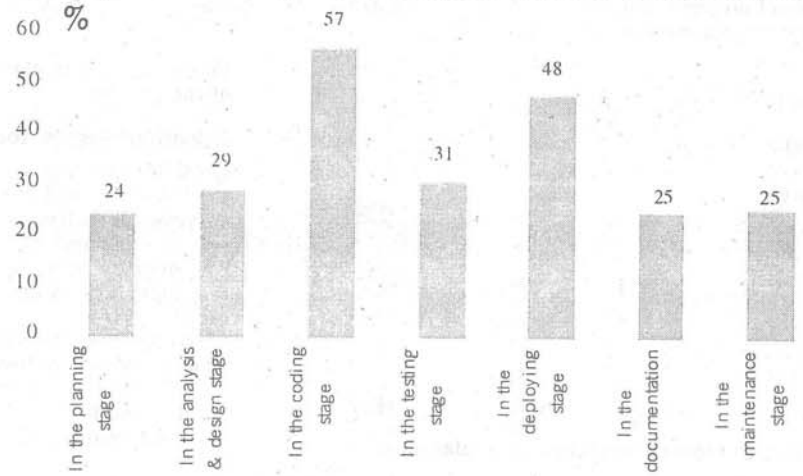
III.PLANNING IN SOFTWARE PROJECTS

The software professionals were asked to describe one project they have done (that could be a successful or failure project). The information is focused on planning of the software project and its outcomes.

Most of projects are made – to – order (62%), 23% are commercial software and 13% are outsourcing projects. The reason that project managers talk more about made-to-order projects is not only because the high volume of this kind of project in their companies but also they think that the software production has a lot of characteristics of a project. These software projects are mainly for education and training (23.4%) and finance & accounting (17%). Most of clients of these projects are local: 52% from government agencies, 25% from local private organization and 46% from oversea (with 22% from North America). Many software projects were made and provided for variety clients, both local and overseas. This indicates the local market remains sifnificant to software companies (both local and foreign).

The size of software projects is rather small in terms of both duration and number of project team members. 42% of projects were implemented within 6 months, 30% were completed from 6 – 12 months, 19% of projects had duration from 1 to 2 years. The remaining took more than 2 years. The average number of people involved in a project team (in the whole project life cycle) was about 9 persons. In which, the coding stage used most workers and the planning the fewest. Although not all projects can be divided into separate stages, but in general, the personnel during different stages of software development is described in Figure 2.

Figure 2: The personnel during different stages of software project development



In this study, planning in software project is not considered through specific tasks but the related factors, namely human, technique and management as inputs

1.People involved in project planning

People involved in software project planning include the project team members and customers. Involvement of the customer in the early stage of software development process has a big effect on capturing their requirements, especially in the case of software made to order. For commercial software, the involvement of customer is lower and the project team sometimes plays the role of users. The results in Figure 3 indicate that 59% of software projects have high customer involvement in planning, only 3% evaluated that it is low. The reason is that customers of these projects don't have much knowledge about software engineering and they also could not visualize how the software works. Customer involvement in the software development process (except the commercial software projects) is through assigning a person or a group to participate into the project team. 62.7% agree that the customer is involved in planning. This is described in figure 4.

As in previous studies, the role of project team, especially project manager is very important. The project managers in this survey had about 3 years of experience in their position and they managed 6 projects on average. They highly evaluated the role of this experience. It is most important to the project team management (82.5%). The next is important skills in communication with customer and defining scopes and objectives of projects (71%). The role of experience is lower in estimation of cost, time and effort and in scheduling. According to project managers, these activities are much depending on each specific project.

The project managers usually focus on their most important project. 59% of project managers said that they spent more efforts on planning this project than others. The higher effort, the better control of specifications they get. 60% considered high control related to specifications while only 1% said that it was low.

Project team members are based on their ability and commitment in planning. In general, knowledge in system development and definition of requirements of team members is average (3.28 with 5 as very high). Only about 6% projects indicate very high ability of the project team. The experiences of the project team in this area gets a similar evaluation (3.6 with 5 as very high), about 10% of projects indicate that the project team has very high experience with system development and requirements definition. Although necessary knowledge and experiences of team members for planning is evaluated only average, the commitment and persistence during this stage is good (70% of projects indicate this level). The planning stage it is uncertain whether the projects will be accepted. The project team's attitudes could improve the success potential of the project.

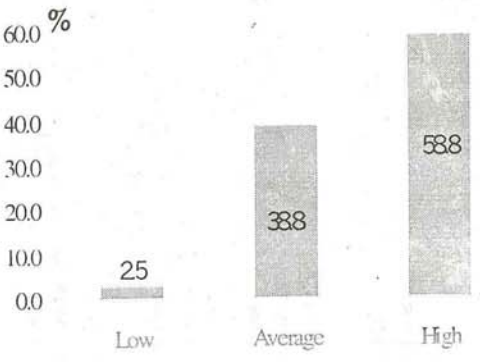
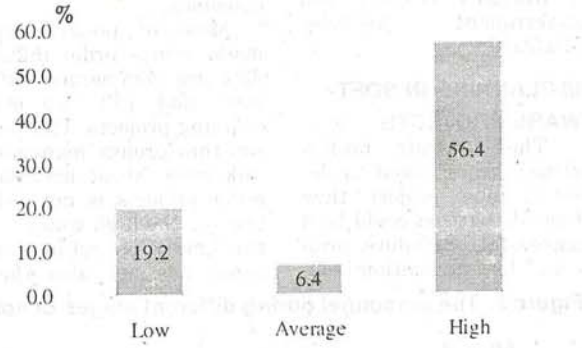


Figure 3: Customer involvement in planning

Figure 4: Participation of the client's functional dept.



2. Methodologies/ tools used in planning

Three kinds of methods surveyed in software project development are project management, system development and lifecycle.

Syxty-two percent of projects have applied different project management methods. These methods mainly are borrowed from foreign software companies (55%), some methods were mentioned are RUP (Rational Unified Process) and Rational Rose. They are commonly applied in the popular local or foreign companies like FPT, CMC, TMA or Global EIS. Most of companies modify these methods adapted by their projects. 41% of projects applied project management methods developed by the companies themselves. Although only a half of the projects applied a project management method, 66% have applied different software and tools to support project management. 94% of the software comes from foreign companies. Many projects mentioned the software of Microsoft Project Management. A few companies self-developed software or tools (like worksheet) for project management, mainly for scheduling and tracking the project progress. The project managers indicated two main reasons that they do not apply project management method. First, many software companies don't have a system for managing software development and quality insurance. Second, the available methodologies are not appropriate or necessary to small-sized projects.

Concerning system development, 94% projects could indicate a specific method has been applied in their project. The remaining is unknown. The most common method is object-oriented (44%), followed by Rational Unified Process (RUP) with 29% of projects. Other methods such as structure approach, prototyping or Rapid Application Development (RAD) each accounts for 15 – 16%. The system development method used could affect the management project, for example RUP is also the method to guide the software project management. Most methods

are borrowed from foreign companies (65%) who have been their partners or from manuals and modified by software companies themselves (27%).

The life-cycle method for software development is very important; it is a framework for the project team to follow during the process of software development. However about 35% of project managers don't follow any life-cycle method (commonly small and local companies). The most method widely used is Spiral (20%), next is Waterfall (17.5%), it is followed by Prototyping and Incremental delivery (both 12.5%). The Life-cycle method will affect the way the project team plans projects. If they follow the old method like Waterfall, they can separate the process of software development into different stages, but not with the Spiral model. However, the Spiral or Incremental model is assessed as the most modern method to help the project team become more flexible to meet the customer's requirements. Although Waterfall is considered as old method, the project managers believe that, in case the software is not complicated or new to the project team, and the customer could clearly define their requirements, the developers usually apply the Waterfall model. In other cases, the developers need to apply the Spiral or Prototyping model.

Project managers seem to focus more on software engineering method (system development) rather than management (project management and project life-cycle), this indicates not only the lack of their knowledge in project management but also their routine work, it related more on technique, they are both project managers and developers. It usually happens with small projects.

Choosing methods to apply in the software is mainly the responsibility of project managers (81%). Sometimes the clients are also involved in this selection (29%). Senior managers (22%) does not participate very much, usually they decide the process or method of project management for the whole company.

3.Management approach

Most project managers said that they were given full authority for all work related to their projects (71%), especially technical and personnel issues. Related to financial issues, they sometimes have to get approval from the higher level. With projects sponsored (third party), the project team also has the commitment to support projects (64%). In sum, most projects have good support from top management, and project managers satisfy with this.

Defining objectives in the early stage of the software development process will influence project outcomes, although they can adjust this during the development process. 55% of the projects indicated that software quality is very important. Customer satisfaction is the following important objective with 43% projects marking it as very important. Minimized cost is not a major objective (it is very important by 5% projects). Defining the project does not always satisfy all members within project team and customers (11% indicated conflict in goal definition). The relationship between setting objectives and project results will be tested in the next section.

Communication is very important not only to the customers but also within project team. Some common communication methods indicate the differences between communication inside and outside project. With the customer, the common method is by email (78%) and telephone (72%). Formal meetings are not preferred (only in 36% of projects). The formal meeting is only used when the project team and the customer have to discuss important issues related to their contracts. Other discusses during software development process are common through telephone and email, these save time and solve the distance problem with overseas clients.

Within the project team, communication by email is the most common (86%), but formal meeting and telephone are also usual (61%). For formal meetings, the main objectives are to solve issues for the project (93%), and also motivate the project team into the action (70%). Many software professionals referred "chatting" as communication type they used not only within the

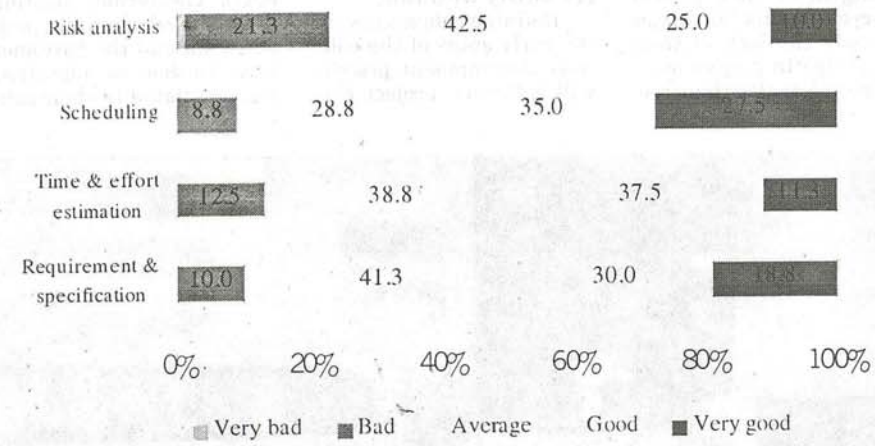
project team but also with the customers.

Leadership style in projects is considered as a factor influencing the project outcomes. However, not all project managers could identify what style they applied. In this survey, most of project managers said that their making decision approach was to consult the project team before final decisions (61%) The common management style is work – oriented (51%). However the democratic style was not applied very much (12% showed that all project members could participate in the making decision process). Only 21% of projects applied people-oriented management style.

IV. PLANNING PERFORMANCE AND PROJECT OUTCOMES

Planning performance of a project is assessed through defining requirements and specifications; estimating time and effort for the whole project; scheduling and analyzing risks. In general, these indicators of software projects are at average level (3.2 – 3.8 with 5 as very good). Scheduling is the best performance in planning; it is evaluated "very good" by 28% of projects. Next is defining requirements and specifications (19% of projects). Only 11% of projects assessed estimating project time and effort and analyzing risk were very good. 23% of projects were bad in risk analyzing (Figure 5). This evaluation reflects the difficulty in estimating time and effort for project. The software project is always uncertain, In addition analyzing risks of projects is also not very good, so it is very difficult to produce an exactly estimation regarding many available tools or software for this.

Figure 5: Plan evaluation



As mentioned in Figure 2, the human resource used in planning software projects is least. Time and effort that the project team spent on planning are also not much. 41% projects spent less than 10% of the project time and 48% of projects spent less than 10% of total efforts for planning.

The project outcomes were considered on both aspects: quantitative and qualitative. The quantitative indicators are to measure how the project duration and cost fit the plan. The qualitative assessment considered how the project results satisfy the customer; project team and its company. Similarly the planning performance (on average, about 50% of projects indicated a good achievement, see figure 6), about 51% of projects completed on time and 62% of projects completed within planned budget. Ratio of the projects that were over 30% behind schedule and cost overrun is rather high: 49% and 38% respectively. However, 70% of projects were self-evaluated as success. The reason for this satisfaction of project team is because of completion on time or budget is not their major objective (as mentioned above). 80% of projects agreed that they had satisfied the customer. 76% of projects indicated that the delivered software met all specifications they had defined the planning stage. Other outcomes of project are to improve the project team capability (91% of projects); enhance the company image (85% of project). Concerning financial issues, 61% of projects indicated the software project brought financial benefit to the company. Some project managers said that their company implemented the project for other benefits (such as a long-term relationship with customer) rather than money.

In short, the software projects were evaluated good by qualitative criteria while only average by quantitative ones.

V. CONCLUSION

This article provides an overview of planning in software projects. The survey results indicate that the planning performance is evaluated average level, with scheduling is best performance and risk analysis is worse. Applying methods and techniques for project management is still at basic level with tools applied mainly for scheduling and progress tracking. The result of project is also average in terms of completion on time or within budget. Other outcomes, especially quality and customer satisfaction, have got good evaluation.■

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