Developing Software Patterns in Thai Supply Chain

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***Abstract*— The research aim were to design and to evaluate software patterns in Thai supply chain. Three steps of the research study were: reviewing literature to analyse and synthesize, designing the patterns, and evaluating the software patterns in Thai supply chain. The sample group included ten experts who specialized in supply chain and in information system The research tool was evaluation form to evaluate software patterns in Thai supply chain comprises six main elements, namely suppliers , component manufacturers, Distribution, Retailer and customer. The research result reported that ten experts agreed that the patterns was appropriate in the highly and the patterns to support sustainable software production.**

Keywords*— software patterns, supply chain*

1. Introduction

Software program have the potential to change organizations and promote the emergence of new businesses. Their main goal is to enhance information flow and facilitate the decision making process that enables companies to maintain key information in an accessible format and helps to take operational and planning decisions. The adoption and successful implementation of software and network technology contribute in a large way for the supply chain success facilitating the flow of information and enhancing the efficiency of supply chain activities. namely planning, designing, implementing and managing the flow, storage of materials and information exchange in order to support basic logistics functions such as procurement, distribution, transportation, inventory management, packaging and manufacturing. Information technologies are seen as a resource of a company, as a source of its competitive advantage With the growing trend toward the use of international supply chains and e-commerce, logistics service providers for product warehousing, transportation and delivery are placing greater emphasis on information technologies in order to remain competitive globally. In the last decades, innovative technologies that have deeply affected the way business are performed and the way that companies compete. Innovations in digital commerce play a key role in managing inter-organizational networks of supply chain members. The internet represents a powerful technology for commerce and communication between supply chain participants as well as a technique for the improvement of supply chain management. [9] so software program or tools are required to ensure that the organization operates smoothly and effectively based on the determined strategies. Based on this realization, the researcher have decided to design and to evaluate software patterns in Thai supply chain for increase satisfaction of customer.

2. Literature review

Supply Chain Software Development Life Cycle
A life cycle for supply chain comprised five process namely Plan, Develop (Source), Make, Deliver and Retune as following [11]
2.1 planning : Planning is the initial stage of the supply chain process, which needs to develop a plan or strategy to show how the products and services will meet the demands or necessities of the customers, optimize the flow of process to balance supply of materials. This stage is mainly focus on creating a strategy that provide maximum profit. But this is the old ways of supply chain management. With software supply chain, no human labours needed! The coordination is making sure the right code applied for the product features. Moreover, the planning activities is now minimized by develop models. Companies that devops is an emergency need to fight against legal, regulatory, contractual and customer obligations making the process lengthy and tougher. The supply chain approach to planning involves optimizing interfaces between different roles and different planning rules, and an important success factor is the ability integrate them in an effective way.
2.2 Develop or source
After planning, the next step in the traditional supply chain management involves developing or sourcing. In this stage, businesses mainly concentrate on building a strong relationship with suppliers of the raw materials required for production. This includes not only identifying trusted providers but also define different planning methods for shipping, payment and delivery of products. But what if you can't find a match supplier for your supply chain, what would you do?

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Software development also based primarily on the source component-according to a recent study by Sonatype, open source now forms the majority of the software products: approximately 80-90 percent of the code in modern applications is from open source components. Companies don't need to select suppliers to deliver the items and services they require to develop their product. In this stage, delivery, payment processes and a set of pricing are all set by software which can also create metrics for managers controlling and improving their process.

2,3 Make

The stage includes with production activities schedule, products testing, packaging and release. Companies must also manage performance rules, data must be stored, regulations and compliance facilities. These things are quickly removed if you start to choose automate it on a system which will help you in data storage, schedule activities, and a set of time to release.

2.4 Deliver

The delivery stage includes all steps from processing customer inquiries to selecting strategies for distribution and transport options. Companies must also manage warehousing and inventory or pay for these tasks for a service provider. The delivery stage also includes any period of trial or warranty, customers or retail sites have to be invoiced and payments received and companies must manage import and export requirements for the finished product. With supply chain software development, no worries to letting the product deploy when a prospect cancelled, the software is able to surface all of the in – progress activities undertaken for a specific contract or all of the features planned for a new customer which is visibility and traceability throughout the entire lifecycle.

2.5 Return

Return involves managing all returns of defective products, identifying the condition of the product, authorizing returns, scheduling product shipments, replacing defective products and providing refunds. SCM will help companies in product returns, monitoring performance and costs, managing inventory of returned product

Lambert et al (1998) have defined supply chain management as the integration of key business processes from end users through original suppliers that provide products, services and information that add value for customers and other stakeholders. The technologies specifically the information systems enhance information exchange and allow the coordination of business activities, which are the key advantages of an integrated supply chain. They improve communication, data, information and documents exchange among customers and suppliers. Analysing the advantages of using information systems and business intelligence processes it's possible to say that they enable faster completion of tasks and activities, accelerate data preparation and transmission times, increase reaction speed to markets and support the decision-making processes enhancing efficiency. Companies using Information System are more capable of responding to a dynamic environments maximizing supply chain efficiency. In order to create an intelligent value chain network, it is essential to companies to implement an information system with analytical tools that enable the extraction of relevant information from all of these sources. In order to accomplish all these goals, the present chapter will discuss the concepts of information management systems, business intelligence and their appliance to the supply chain.

3 Research Methods

Three Steps in the Study

Steps 1 : Rviewing literature to analyse and synthesize about software patterns in thai supply chain

Steps 2 Design software patterns in thai supply chain, using the synthesized data from the Steps 1 research as a conceptual framework. for the development of the model comprises six key elements, namely, suppliers , component manufacturers, Distribution, Retailer and customer according to definition, supply chain encompasses processes that cover a broad range of activities.

Steps 3 Evaluating software patterns in thai supply chain : ten experts who specialized in supply chain and in information system

Questionnaires were employed to collect data which were analyzed to find arithmetic mean and standard division. The results were presented in table .

4 Results

4.1 Results of research are presented in figure 1 for the whole software patterns in thai supply chain.

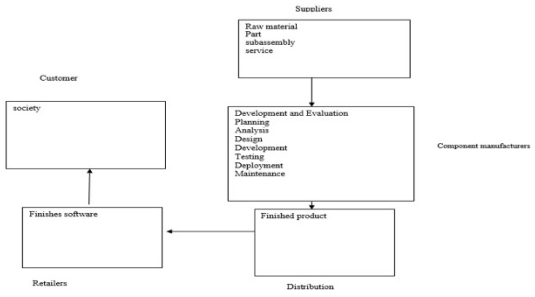

Figure 1: Developing software patterns in Thai supply chain

4.2 Principles of software patterns in Thai supply chain

1 Suppliers

The flow of raw materials comprise raw material parts subassembly and service.

2. Component manufacturers

Raw material sources through manufacturing facilities that transform the raw materials into finished products .A process is seven as follows:

2.1 Planning

The planning phase will determine project goals and establish a high-level plan for the intended project. Planning is, by definition, a fundamental and critical organizational phase. The three primary activities involved in the planning phase are Identification of the system for development, Feasibility assessment and Creation of project plan

2.2 Analysis

End-user business requirement analysis takes place during this phase. Project goals are converted into the defined system functions that the organization intends to develop. The three primary activities involved in the analysis phase are Gathering business requirement, Creating process diagrams and Performing a detailed analysis.

2.3 Design

In the design . we describe the desired features and operations of the system. This phase includes business rules, pseudo-code, screen layouts, and other necessary documentation. The two primary activities involved in the design phase are Designing the information technology infrastructure and Designing the system model and entity relationship diagrams.

2.4 Development

The development phase is when all documents from the previous step transfer into the system. The primary activities involved in the development phase are Development of information technology infrastructure and Development of database and actual code can begin to complete the system according to the specifications.

2.5 Testing

All pieces of code are integrated during the testing phase and deployed in the testing environment. Testers then work through Software Testing Life Cycle activities to check the system for errors, bugs, and defects to verify the system's functionalities work as expected. Testing is a critical part of the software development life cycle. To provide quality software, an organization must systematically perform testing. After writing test cases, the tester executes them. They compare the expected result with an actual result to verify the system and ensure it operates correctly. Writing test cases and manually performing them is an intensive task for any organization but will succeed if executed properly.

2.6 Deployment

During this next phase, the system is deployed to a real-life (the client's) environment where actual users can begin operating the system. All data and components are present in the production environment. This phase is also called 'delivery.

2.7 Maintenance

Any necessary enhancements, corrections, and changes are made during the maintenance phase to ensure the system continues to work and remain updated to meet business goals. It is necessary to maintain and upgrade the system from time to time to adapt to future needs. The three primary activities involved in the maintenance phase are Support the system users, System maintenance and System changes and adjustment.

3. Distribution

The finished software are shipped to distribution centers and from there to retailers and customers.

4 Retailers

The Retailers mean finished software from company

5. Customer

The customer mean society who receive finished product from retailers or company. namely open source supply chain management software, Software as a service (SaaS) solutions ,Enterprise Resource Planning or other software Finally, the finished software will provide added value to the supply chain.[2],[3],[4],[5],[6],[[7],[8].[9],[10] ,[11]and [12].

Table 1: Appropriateness of main element of software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Suppliers	3.70	0.48	High
Component manufacturers	3.70	0.48	High
Distribution	3.70	0.48	High
Retailers	3.70	0.48	High
Customer	3.60	0.69	High
Total	3.65	0.56	High

Table 1.Show that ten experts agree that main element of software patterns in Thai supply chain was a high appropriate. (x = 3.65, S.D. = 0.56)

Table 2: Appropriateness of sub element of the suppliers about software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Raw material	3.70	0.48	High
Parts	3.70	0.48	High
Subassembly	3.70	0.48	High
Service	3.60	0.51	High
Total	3.67	0.53	High

Table 2. Show that ten experts agree that sub element of the suppliers about software patterns in

Thai supply chain was a high appropriate. (x = 3.67, S.D. = 0.53)

Table 3: Appropriateness of sub element of the component manufacturers about software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Development and Evaluation	3.60	0.69	High
Total	3.60	0.69	High

Table 3.Show that ten experts agree that sub element of component manufacturers about software patterns in Thai supply chain was a high appropriate. (x = 3.60, S.D. = 0.69)

Table 4: Appropriateness of sub element of the distribution about software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Finished goods	3.70	0.67	High
Total	3.70	0.67	High

Table 4.Show that ten experts agree that sub element of distribution about software patterns in Thai supply chain was a high appropriate. (x = 3.70, S.D. = 0.67)

Table 5: Appropriateness of sub element of the retailer about software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Finished software	3.60	0.51	High
Total	3.60	0.51	High

Table 5.show that ten experts agree that sub element of retailer about software patterns in Thai supply chain was a high appropriate. (x = 3.60, S.D. = 0.51)

Table 6: Appropriateness of sub element of the customer about software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
society	3.70	0.48	High
Total	3.70	0.48	High

Table 6.Show that ten experts agree that sub element of customer about software patterns in Thai supply chain was a high appropriate. (x = 3.70, S.D. = 0.48)

Table 7: Results of appropriateness evaluation of software patterns in Thai supply chain

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Main element	3.68	0.52	High
Suppliers	3.67	0.53	High
Component manufacturers	3.60	0.69	High

Table 7: Results of appropriateness evaluation of software patterns in Thai supply chain (Cont.)

Evaluation Lists	$\overline{X}$	S.D.	Assessment Result
Distribution	3.70	0.67	High
Retailers	3.60	0.51	High
Customer	3.70	0.48	High
Total	3.65	0.56	High

Table 7, that ten experts agree that software patterns in Thai supply chain is high appropriate, with the total arithmetic mean of 3.65. Also, its main element, sub-components of the suppliers component, sub-component of component manufacturers, sub-components of distribution component, and sub-components of retailers component and sub-components of customer are high appropriate, with arithmetic mean of 3.68, 3.67, 3.60 and 3.70, respectively.

5.Discussion

Developing software patterns in Thai supply chain was relevant to Chansamut and Piriyasurawong has studied supply chain and information system about educational [1],[2] In addition, with the study of Kaewngam, Chatwattans and Piriyasurawong [8] recommended that supply chain and digital quality assurance for ASEAN university network quality Assurance (AUN-QA) are supports educational also, the results are in accordance to those of chansamut [3],[4],[5],[6] and [7] who found that supply chain and information system.

6 Conclusion

According to evaluation by ten experts, software patterns in Thai supply chain. The overall evaluation result show The arithmetic mean is 3.65 and standard deviation is 0.56 in a high level and the patterns to support sustainable software production.

7. Recommendations

Developing software patterns in Thai supply chain is considered to be high appropriate thus, software patterns should be implemented in state and private organizations for develop society

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