CRITICAL FACTORS IN MANAGING CUSTOMER-SUPPLIER RELATIONS

Satya Jaya Aparna Pasi, M.Sc
Department of Information Technology, Lappeenranta, Finland

Abstract
This paper approaches the customer-supplier relations in tailored offshore software development projects. The objective of the study is to evaluate the critical factors that can accomplish the project lead’s task to manage the project well. The root cause of software project failures is due to the problems in customer-supplier relations. An analysis of the literature suggests that the managing customer-supplier relations in tailored offshore software development have been relatively unexplored. Therefore, a detailed investigation of the critical factors in managing customer-supplier relations in offshore software development is presented. In this study we collected qualitative data through theme-based open-ended interviews, and analyzed it through a grounded theory approach. Our analysis shows symmetrical power relations, unrealistic promises in contract negotiations, expectation management, transparency and honesty, communication as factors in managing customer-supplier relations. We claim that these factors can be considered critical in managing offshore software development projects effectively.

Keywords: Software development, customer-supplier relation, critical factors

1. Introduction
Global software development has seen offshoring as a new established business practice (King 2005). One aspect of IT offshoring is the relocation of software services abroad to either near shore or offshore (Krishna et al. 2004), often referred to as offshore software development (OSD). This form of offshoring software development was considered relatively new in 2000’s (Delmonte and McCarthy 2003), one of the main reasons for the advent of this particular business practice was the Y2K problem (Amorbieta et al. 2001). As a result, software is being developed remotely at the supplier premises without customer company interference and the development is based only on the guidelines that are provided by the customer team. Abundance of OSD project failures in terms of cost, time and quality can be found in media reports (BrrKOM 2005). Critical factors concept is gaining momentum in this era of OSD project management to facilitate successful implementation of OSD projects. King and Torkzadeh (2008) emphasized on researching the critical factors for offshore software development “as one of the most important issues for the future”.

The customer-supplier interface is of big importance in software development. As any other interface, customer-supplier interface has its own set of challenges and ways to overcome them. As a result, the management of customer-supplier relations has attracted quite much of attention (Krishna et al. 2004, Oza and Palvia 2006; Alborz et al. 2003). Increase in such interest is reflected in magnitude change in work on software failures, and on how the customer-supplier relations can be made successful (Kern and Willcocks 2000; Lonsdale and Cox 2000). Despite of this, there remains a lack of research in the management of customer-supplier relations in offshore software development. Only few studies (e.g. Lacity, 2002; Kern and Willcocks, 2000; Kishore et al. 2004) concentrate on the critical factors to manage the relationship in offshore software development. Kern and Willocks
(2000) suggest that customer-supplier relation is the area that has received least attention and that there have been numerous calls for further research.

Ensuring project success is not easy and that has been seen from many studies. For example, Ozonne (2000) reported that 20 – 25% of the relations between customer and supplier fail within 2 years, and 50% fail in 5 years. Lacity et al. (1995) claim that 70% of the customer companies whose projects are outsourced are unhappy with one or many aspects of the supplier companies. Adding to these studies few other studies prove that problems with the relationship between customer and supplier are the underlying causes for many software project failures (Foote 2004; Palvia, 1995; Prakhe, 1998; Miles and Snow, 1992).

According to Kern and Willcocks (2000) relationship can be managed if issues such as communication, information exchange and cultural convergence can be addressed. During his study on supply chain Brereton (2004) came up with mutual respect and willingness to share information transparently as other critical factors in managing relationships. Other researchers claim that level of customer satisfaction, achievement of expectation and project lastinngness are the factors that define the success of customer supplier relationship (Stratkowski and Billon 1998). In their study, Kishore et al (2003) found that mutual understanding between the customer and supplier teams plays a vital role in customer-supplier relationship success. From the above studies, it is wise to conclude that prior research study results in managing customer supplier relation factors can be interpreted differently due to the fact that they vary and are undefined.

Other fields of the customer-supplier relationships researched with numerous studies when compared to that of the software industry. For example organizational (Kramer and Tyler 1996), behavioural, management (Blois 1999), and social science fields (Gambetta 2000) include a great deal of research in managing various forms of relations. Lack of information on managing customer supplier relations in software development implies the fact that the area of customer supplier relation in software development received least attention and thus it is important to address this area to fill in the gap through empirical research contributions. As a result, a deep empirical investigation into critical factors in managing customer-supplier relationships in offshore software development can be helpful to establish the best practices for tailored software development, and to reap more benefits for the customer and supplier companies. In this spirit, we chose to undertake the following research question “What are the critical factors in managing customer-supplier relations in tailored offshore software development?”

In this paper we present the results of an empirical study that has been performed in two Finnish companies comprising 8 different tailored offshore software development projects. The objective of our study is to contribute to the lack of literature in understanding and managing the customer-supplier relationships in software development, and thus to answer to the calls from the research community. At the same time this study is also beneficial to practitioners as the work will help them to know more about managing relations with their customers. This work is done exclusively on tailored software development projects. The rest of the paper is organized as follows. In Section 2 we first introduce the research methodology, and data collection and analysis techniques. In Section 3 we describe the results. Finally, in Section 4 we discuss and conclude the paper.

2. Research Methodology

Qualitative approaches are used widely in social sciences. Also engineering fields, such as software engineering have begun to use qualitative approaches when making inquiries into the activities of human organizations. This study attempts to understand customer-supplier relations in tailored offshore software development, and it is therefore also an inquiry into the human organizations in software development. The overall approach in this study is grounded theory (Strauss and Corbin 1998), where the units of analyzes are cases (Eisenhardt
1989). Data was collected through multiple interviews using theme-based interviews. Data analysis was carried out according to the principles of grounded theory (Strauss and Corbin 1998; Glaser and Strauss 1967).

The grounded theory (GT) evolves during the research process and is a product of continuous interplay between the analysis and data collection (Strauss and Corbin 1990). The GT method is useful in developing context-based descriptions and explanations of the phenomenon (Myers and Avison 2002). In selective coding data is refined and core categories selected. These categories form the main elements of the grounded theory. Due to the reason that data analysis and collection occur in interplay, coding is complete when theoretical saturation is reached. Thus, no new data appears from the data, and the concepts remain the same. In our study open coding started with identifying themes in all the transcripts. For example we identified commitment, additional values, being open from one transcript. These themes were further grouped into expectation management and transparency which represent the area of our research questions. This regrouping of themes is done in axial coding phase.

The fact that the critical factors in managing customer-supplier relationships have not received much attention in the software engineering research makes the topic well suited for qualitative research approach. It is claimed that the qualitative research approach is best suited to the areas that lack previous theories, and it has been found suitable for in-depth study in a given organizational setting (Benbasat et al 1987; Eisenhardt 1989; Yin 2003). The grounded theory approach is a well-known and respected qualitative research methodology for the data collection and analysis that uses a systematically applied set of methods to generate an inductive theory about substantive data. Seaman (1999) reports that the theory-forming grounded approach suits well for the identification of new theories and concepts. Furthermore grounded theory has been found to fit the study of software and information systems (e.g. Hansen and Kautz, 2005; Kirsch and Haney, 2006; Seaman, 1999).

In our study we used theme-based interviews to collect qualitative data. In the beginning of data collection the research plan was sent to the department managers of two large Finnish software companies, who further forwarded the plan to the company’s vice presidents. The first software company employed more than 800 people, and the second software company employed more than 400 people. Both of the software companies develop software for the forest industry. After being given the permission from both the companies to go ahead with the research we were given the list of the top managers, the middle managers, and the project managers for the interviews. The interviewees had in average an experience of 15 years in managing tailored software and information systems development projects, and they belonged to the leading positions in their departments. The data was collected using theme-based interviews during the beginning of March 2007 to April 2009. The interviews covered four themes: Background information; Customer and user participation and the factors influence on software and information system (IS) development projects and process; Phases of customer and user participation and level of following agreements; and Customer-supplier relationship management. The interviews were carried out with the upper managers, the middle managers (service manager, and department manager), and project managers. The interviews included frequent elaboration and clarification of the terms that were not understood by the interviewee. Finally the interviews were audio recorded, and transcribed to text yielding 300 pages of transcripts. Table 1 shows the demographics of the interviewees participated in this study.
<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Profile of interviewee</th>
<th>Size of the project (person years)</th>
<th>Experience of interviewee in the software industry</th>
<th>Experience of interviewee in managing customer-supplier relations in offshore software projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Upper manager</td>
<td>10</td>
<td>20 years</td>
<td>19 years</td>
</tr>
<tr>
<td>I2</td>
<td>Department manager</td>
<td>8</td>
<td>21 years</td>
<td>14 years</td>
</tr>
<tr>
<td>I3</td>
<td>Service manager</td>
<td>12</td>
<td>23 years</td>
<td>15 years</td>
</tr>
<tr>
<td>I4</td>
<td>Project manager</td>
<td>6</td>
<td>15 years</td>
<td>14 years</td>
</tr>
<tr>
<td>I5</td>
<td>Vice President</td>
<td></td>
<td>21 years</td>
<td>15 years</td>
</tr>
<tr>
<td>I6</td>
<td>Upper manager</td>
<td>10</td>
<td>19 years</td>
<td>17 years</td>
</tr>
<tr>
<td>I7</td>
<td>Department manager</td>
<td>5</td>
<td>14 years</td>
<td>12 years</td>
</tr>
<tr>
<td>I8</td>
<td>Project manager</td>
<td>9</td>
<td>15 years</td>
<td>13 years</td>
</tr>
</tbody>
</table>

Table 1: Demographics of the interviewees.

As seen from the Table 1, all the interviewees had more than 10 years of experience in managing the customer-supplier relationships in the tailored software development. The sizes of projects varied from one to another but overall all the projects were of medium size.

2.1. Data Analysis

The data collected through qualitative interviewing was analyzed through the broad principles of grounded theory approach (Glaser and Strauss, 1967). The aim of grounded theory is to develop a theory or categories from the data rather than to gather data in order to test a theory or hypothesis (Glaser and Strauss, 1967). Grounded theory can be presented either as a well-codified set of propositions or in a running theoretical discussion, using conceptual categories and their properties (Glaser and Strauss, 1967).

A grounded theory is defined by Strauss and Corbin (1998:22) as

'A set of well-developed categories (e.g. themes, concepts) that are systematically interrelated through statements of relationship to form a theoretical framework that explains some relevant social, psychological, educational, nursing or other phenomenon'.

Coding is the central method of analysis in transforming data to theory or categories. Coding is defined as the analytic process through which data is fractured, conceptualized, and integrated to form a theory (Strauss and Corbin, 1998:3). Its aim is to develop and relate the concepts that are building blocks to theory. Categories emerge from similar concepts that have similar properties. Strauss and Corbin suggest that the categories should be grounded in the sense that they are formed from evidence in the research situation.

In this study data was collected from the interviews and the transcripts of each interview. Each transcript was coded using Strauss and Corbin’s (1998) open coding method. Using the open coding technique, data is broken into discrete parts, closely examined and compared with each for similarities and differences. Events, happenings, actions and interactions that were found to be conceptually similar in nature or related in meaning were grouped under more abstract categories. Adhering to the grounded theory approach, we analyzed each interview transcripts in relation to our research objectives, and categorized data into high level categories defined in relation to our research objectives. Our aim for data analysis was to allow understanding to emerge from a close study of the data. Specifically, we analyzed each transcript and identified the major emergent themes, and concepts to group them in order to form categories of similar nature. Our analysis, identified four factors in managing customer-supplier relations for the research question that was mentioned earlier.

3. Results

To answer the research question “What are the critical factors for managing customer-supplier relations in tailored software development?” the interviewees of the study were asked the following two questions:
• What kind of difficulties you have had in managing the relations with the customer?
• What according to you are the important factors in managing customer supplier relations?

The answers to the questions above revealed factors for managing customer-supplier relations in tailored offshore software development, which are:
1. Symmetrical power relations,
2. Contract negotiations
   a. Unrealistic promises in contract negotiations,
   b. Expectation management,
3. Transparency and honesty,

3.1. **Symmetrical power relations**

The loss of control in managing and ending the projects was the result of unbalanced power symmetry between the customer and the supplier. The power asymmetry means the imbalance that exists in between the customer and supplier. An upper manager and a project manager stated that there was a lack of control in managing and ending the projects even when the customer’s terms were followed exactly while executing the projects. The lack of control resulted from an imbalance, or a power asymmetry between the customer and supplier. The power relation in which both the customer and supplier teams have an equal say, and liberty to conclude on similar terms without any kind of pressure will lead to a balanced relation between the two teams. Achieving a balanced power relation does not happen often because of the supplier’s fear of losing the customer. The same was expressed in the words of an upper manager:

"In general, too often the customer has too much power in these deliverables. We have to follow everything what has been agreed very exactly but when it is time to discuss about for example closing the project I have a feeling that we are really without power. For instance when the projects are big and your money is lying there on the customer table and you will get it when a certain acceptance is done and the customer can prolong that acceptance as long as they want to. And we have burnt that money before hand and in my mind it is not too often a fair play."

The above mentioned customer attitude towards the supplier is causing a strain in the customer-supplier relation. Due to the fear of losing the customer, the suppliers are left with no or little power when it comes to the project ending as most of the deliverables are available to the customer, but the money matters are not yet settled between the customer and the supplier. The supplier company can face a financial crisis as the supplier team has already burnt the money even before getting it.

3.2. **Contract negotiations**

A contract is used between customer and supplier to regulate their expectations from project activities. A contract is considered as the most important tool to manage projects. Lacity and Hirschheim (1994) say that:

‘If a company decides to outsource, the contract is the only mechanism to ensure that expectations are realized’.

However, it is unlikely that the contract can cover all possible future contingencies. For example, Brynjolfsson (1994) in his work on incomplete contracts theory notes that:

‘Real world contracts are almost always incomplete, in the sense that there are inevitably some circumstances or contingencies that are left out of the contract, because they were either unforeseen or simply too expensive to enumerate in sufficient detail’.

Furthermore, Beulen and Ribbers (2002) in their work on software project contracts also claim that the opportunity to include all details in the contract is very limited. Beulen and
Ribbers relate this limitation to time pressure and the costs associated with the preparation of the outsourcing contract. For example, in some cases the company may consider it essential for certain software services to be quickly available. Therefore customer and supplier often agree on a procedure for dealing with changes that lead to situations that are not covered by the contract (Gietzmann, 1996). Contracts in software projects are almost always incomplete. It is difficult to include all relevant details in the contract. Therefore, the ‘incomplete’ nature of contracts means that a good working relationship between customer and supplier is necessary. The same nature of contracts is noted in our study as well. We reported the results regarding the contracts in two steps of unrealistic promises in contract negotiations and expectation management.

3.2.1. Unrealistic promises in contract negotiations

Another critical factor is about the unrealistic promises in contract negotiations. This ultimately results in deteriorating the customer-supplier relations. Either since the supplier team fails to meet the customer terms they have failed both schedule and budget by meeting the promises. Culprit for such failures is the unrealistic promises made by the supplier team. Hence, many of the interviewees reported that to have a proper understanding in terms of contractual issues leads to stronger customer-supplier relations in the offshore software development process. The same is reported by the upper manager and department manager:

“We are too often forced to promise some things that we most probably know that we are not able to keep. First of all that causes harm for the project and then when you have sanctions settled in the contract that you are forced to pay something back if you are not in the schedule, you try to keep the schedule in every circumstances. Then you are starting to lose the quality, target and you are starting to fool yourself even trying to deliver every way and other what you have promised to. Then we are in bad quality problems, and too often there is no place for this kind of discussion that what if we transfer the schedule and they are no sanctions. But that’s when we realize that yes we have failed with the schedule we have failed with quality and so on, and then we are coming to the problems. If we can avoid promising unrealistic outcomes then we can have a smooth relation with the customer” – Upper manager

The upper manager felt that due to the competition from other companies, they are forced to accept everything that the customer wishes and wants. The same is also applied to the contracts, where they agree to pay a “certain sum” in case of the failed schedules. This keeps pressure on the team right from the early phases of the project, and leads to many levels of compromises in both the quality and schedules. A good quality product with all the promised specifications may require more time and budget than what is in the contract. This situation escalates when the customers are not ready to listen to the supplier, and no relief, such as extra budget or time, are given to the supplier team. Having said this, interviewees felt that it is important to add supplier company’s own terms and conditions to the contract while it is being implemented. Omitting certain terms and conditions from contracts - such as extra payment fees to the customer if the supplier team fails in schedule, and giving a more flexible budget to the supplier team by the customer- can add to the project quality, which results in an end product that meets the customer expectations hence leading to a long term relation between customer-supplier companies.

“So with the biggest customers we have this kind of company level agreements and special terms while acting with the company. But yes they are cases when the customer is saying that this template is to be used and they are not too many benefits for us in using such templates. But if you want to deal with that customer then you have to accept. In such cases unfortunately we are doing quite much that kind of work that we don’t get any budget. It also has an affect for the schedule that there is this kind of hidden work that we are doing which is
not visible for anyone, and yeah it causes harm for all the aspects in the project and customer relations.” - Department manager

The department manager stated that sometimes even though they do not see any benefits from the contracts with certain customers, they say yes to the contract to keep up the business with them, and by doing so the supplier team is forced to do hidden work that is not seen by anyone, and is not budgeted, and this affects to the project overall. These hidden works can delay project schedules and strain the customer supplier relations.

3.2.2. Expectation management

The data showed that another critical factor reported by most of the interviewees is the expectation mismatch in the deliveries. Many interviewees felt managing the expectations from the customer side as challenging and difficult. The suppliers reported that both their team and the customer team should know what they are going to achieve from the project. In many projects, customers assume that they get a lot more than what the supplier can offer. Seldom have the both teams discussed these expectations, which may result in end product expectation mismatch. An understanding between the teams can be achieved through regular meetings and stating all the expectations clearly during requirement specification phase. Suppliers further state that all the expectations should be discussed, reported and agreed.

“Expectation mismatch is always there in the IT projects, this kind of change management in the customer organization must be done in much better way that it is done. Because if you think of a new delivery, lets say that it is totally new system or renewal for the customer. Previous system customer thinks very often that he will get all the features that were there in the previous system which was developed 25 years before and then they will get those add-ons and everything works smoothly. Really it happens in all the IT projects. Their expectations are much higher than in the beginning. It varies from company to company and we have to be very careful in what we are saying. Customer can say anything but we need to be careful. If these expectations are clear then we do not have any tensions between our teams.” – Vice president

3.3. Transparency and honesty

Suppliers identified transparency as one of the critical factors. By transparency we mean the actions and outcomes of supplier's work in terms of the communication that take place, processes followed or any other actions performed in respect to the outsourced work. Suppliers mainly highlighted the importance of transparency in their processes, demonstrating the progress of the project and communication. Particularly, transparency will increase customer’s confidence on controlling the outsourced work to the supplier. A department manager said:

“I think being open is one of the most important things. You need to be honest not to hide any mistakes that you have made. We need to respect our customers, we need to respect their wishes, and we need to be honest on that side that if you cannot deliver or you cannot do the job you need to tell it. Don’t promise more that what you can deliver or handle.” – Upper manager

In relation with the transparency, many interviewees emphasized the importance of being honest as another critical factor. By honesty we mean working honestly in tailored software development relationships. Suppliers reported that honesty required at both ends in transactions. The same is reported by the two managers.

“Honesty is really important, and we try to be very open and that we expect from the customer side, too. Every project is with cooperation and we get success only with good cooperation. Openness and trust are the key issues there.”

“We have to be professionals in these IT projects by being honest and transparent.”
3.4. Communication

Maintaining constant communication with the customers was another frequently identified critical factor. The software vendors identified various means of communication, including an email, the phone calls, conference calls, net meetings, and video conferencing as an essential part of maintaining a healthy relationship. Most of the interviewees reported that communication is important in the initial stages to establish the relationship. Additionally they also mentioned that giving the information that customer wants and giving that often will help in building the relationship. Maintaining such communication helps to carry the relationship between customer and supplier teams for a long time. A project manager reported that there should be constant communication in the beginning of the project even though they do not have much to discuss. These means of communication can help both teams to know each other well and henceforth will help in leading a long term relationship.

"Every project is with communication and cooperation and we get success only with good cooperation. Daily communication is another factor and having good relation and openness between them is important." – Service manager

"Keeping up the conversation with the customer, giving the information that customer wants and giving it frequently so that they don’t forget that you are there. Then we have frequent meetings, to keep the communication on an excellent level." – Upper manager

"The most important aspect is to have regular communication between these two teams of customer and supplier. Even if you have no clear agenda in the beginning, it is even more important to just have time to communicate in the beginning of the project and to get people to know each other. That’s really quite important and also after that to have quite regular communication between these two teams is essential for the relation to go on for a long run." – Project manager

4. Discussion and Conclusions

Our study examined the critical factors in managing the customer-supplier relations in tailored offshore software development, and the study shows a correlation between the prior work of Oza and Palvia (2006), Kern and Willocks (2000), Brereton et al. (2004), and Remus and Wiener (2009). Lacity (2002) on the basis of long term research experience in outsourcing suggests that the ability to commit to what was agreed, to fairly adapt to change, and to identify value-added services are critical. Nam et al. (1996) emphasise the technical competence of the vendor as critical in the relationship. Results of our work are correlating with critical factors identified in these studies.

The most crucial factors managing the customer-supplier relationships were symmetrical power relations, unrealistic promises in contract negotiations, expectation management, transparency and honesty, and communication. The communication mainly involved undertaking regular meetings and exchanging the information regularly with each other over the phone and emails. In our study, however, we also found out symmetrical power relations and contract negotiations as new factors adding to the list of factors in the areas current state of research. Our results thus point out the fact that these all are important factors in managing the customer-supplier relationship in tailored software development. Summary of the same results is presented in Table 2.
<table>
<thead>
<tr>
<th>Critical factors</th>
<th>Discovered in our study</th>
<th>Literature reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symmetrical power relations</td>
<td>Lack of control in project implementation</td>
<td>Discovered in our study</td>
</tr>
<tr>
<td>Unrealistic promises in contract management</td>
<td>Contracts are not done with mutual agreement and very often according to customer company views</td>
<td>Discovered in our study</td>
</tr>
<tr>
<td>Expectation management</td>
<td>Have a clear idea on what to expect, and what to not expect from the project being implemented</td>
<td>Oza and Palvia 2006; Kern and Willocks 2000; confirmed by our study</td>
</tr>
<tr>
<td>Transparency and honesty</td>
<td>Be open and clear with the customer team, even if the supplier team is at fault</td>
<td>Oza and Palvia 2006; Reimus and Weiner 2009; confirmed from our study</td>
</tr>
<tr>
<td>Communication</td>
<td>Maintain clear and constant communication for cooperation with the supplier team</td>
<td>Oza and Palvia 2006; Reimus and Weiner 2009; confirmed from our study</td>
</tr>
</tbody>
</table>

Table 2: Summary of critical factors.

This study has several practical implications. First, our empirical investigation will help the companies to understand the potential factors mentioned in our results that could be faced in managing the software development projects. Second, the emergent critical factors reported in this study can help the companies to understand the current practices needed for managing customer-supplier relationships. Third, it may be worth to explore the similar critical factors experienced in the other countries. Fourth, the research approach established in this study may also be replicated by collecting similar data from destinations other than Finland.

Though we have only used broad principles of grounded theory in this study, emergent themes of the empirical study will help us to build the basis for substantive theory in managing customer-supplier relationships. Our study however has some limitations. Data collection method, the standardized open ended interview, is limited in the sense that it reduces the extent to which individual differences and circumstances can be taken into account (Patton, 1980). Furthermore, in this study, the participating companies identified the interviewees based on our criteria. Therefore, we could not measure how the participating companies identified the interviewee, and we addressed this limitation in two ways. First, we did not release the interview questions until we conducted the interview. Thus, the participating companies did not have knowledge of the questions of the interview while selecting the interviewee. Second, during the interviewee we asked from each interviewee her/his personal background. This gave us information on their educational background, and commercial experience in the context of managing software projects, and thus customer relations and working in the software industry.

Our investigation provides a preliminary outline of the factors in managing the customer supplier-relationships. However, the information provided by the suppliers can be considered as highly reliable due to their long experience in the software industry, outsourcing business, and their senior position in the companies. Furthermore, the participating companies have been successful outsourcing software suppliers for many years with the experience of a number of successful outsourcing projects, and high maturity processes. Studying only the software projects which were in progress while collecting the data can be considered as a drawback, since the outcome of those projects are unknown. In the future studying the failed software projects could give more insight into the better ways of managing the customer-supplier relations in offshore software development. Further research in all critical factors is needed to shed more light in this area, and this study could be extended to countries other than Finland, and by doing this our study could be cross verified as well.
References: