Chapter 7

FINDINGS AND DISCUSSIONS

7.1 Introduction

This chapter presents the findings from the results of model and hypotheses testing. The chapter is divided into the following sections 1) Findings 2) Discussions 3) Theoretical implications 4) Practical implications 5) Limitations and 6) Directions of future research.

7.2 Findings

In project learning culture, inter-project learning has a significant relationship with demand management flexibility and new product development; Intra-project learning has a significant relationship with new product development.

Employee Behaviour and Skills couldn’t be retained as it failed in discriminant validity test. Technological Capabilities have a significant relationship with Modification Flexibility (MOD) and New Product Development (NPD).

Supply chain capability of Strategic Supplier Partnership (SSP), Information Sharing (IS) and Customer Relationship (CR) has emerged as most important predictor of operational flexibility. SSP holds a significant relationship with Demand Management Flexibility and NPD. IS has a significant relationship with the MOD and NPD. CR has a significant relationship with MOD and NPD.
Human Resource Management Practices are not visible in this industry, and that can be a reason for failure of the construct in convergent validity.

Micro (3) and Macro (3) Moderators have moderated the relation between Predictors & Operational flexibility types. Significance was not found in the relationships between Demand Fluctuations (DF) and Demand Management, DF and MOD, Rising Costs (RC) and MOD, which were macro moderators.

Out of 36 paths in the mediated model, new product development flexibility mediated twelve paths; making it the most significant of operational flexibility types followed by modification flexibility (6 paths) and finally demand management flexibility which mediated only three paths.

The coefficient of determination (R²) values of DM-0.662, Mod-0.682, NPD-0.690, CS-0.673, LE-0.712 was found to be substantial. GoF, of the final model= 0.6973. The GoF for the proposed model was 0.6973 (69%) and can be accepted at a substantial level (Chin, 1998).

7.3 Discussions

In this study, the mediating role of operational flexibility on customer satisfaction and learning exploitation is determined by testing the relationship between six constructs of capabilities or practices with operational flexibility and then to customer satisfaction and learning exploitation. The capabilities that are studied in this research are intra project learning; inter project learning, strategic supplier partnership, information sharing, customer relations and technological capabilities. Modification, new product development and demand management flexibility types of operational flexibility are being tested. When these types
are tested in a direct one to one relationship with customer satisfaction and learning exploitation, the results show that all predictors in the final model have a significant positive relationship with customer satisfaction and learning exploitation. A possible reason for failure of employee behaviour and skill construct in discriminant validity test could be that, team members send to a project site are invariably having complementary skill sets & expertise, with the nature of work itself demanding a high degree of physical, emotional and intellectual exhaustion and labour. They are moulded to a high degree of flexibility and the respondents recognize it as a must have, rather than a desirable trait.

Availability of skilled workforce is a serious concern of this industry coupled with poaching of workers by contractors, poor labour management at the site, accommodation and transportation. There are seasonal workers who are actually farmers and their seasonal engagements create additional woe of labour availability. Regional Festivals in northern states affects the labour availability in Kerala. Reworks due to poor work quality of workmanship has been reported as a cause of project delay as well as project cost variance. The Learning Exploitation happening through knowledge management in construction industry is through written documents commonly known as “work profiles” which is a record of failures and successes out of the day to day operations, discussed in a daily meeting of project team members.

7.3.1 Hypothesised relationships

Testing the research model for hypothesis one, testing project learning culture and operational flexibility, the sub hypotheses except inter project learning and modification, intra project learning and demand management, intra project learning and modification were proved. For hypothesis two testing technological capabilities and operational flexibility,
sub hypothesis except information technological capabilities and demand management were proved. For hypothesis three testing supply chain practices and operational flexibility, sub hypothesis except strategic supplier partnership and modification, customer relations and demand management, information sharing and demand management were proved.


For hypothesis five, stating the moderating role of macro environment on operational flexibility-demand fluctuations was not found to moderate modification flexibility and demand management flexibility but moderated new product development flexibility, availability of raw materials was not found to moderate modification flexibility but moderated demand management and new product development, rising cost was not found to moderate modification flexibility but moderated demand management and modification flexibility.

For hypothesis six, testing the moderating role of micro environment on operational flexibility, cash flow moderated demand management, modification and new product development, scope creep didn’t moderate demand management but moderated modification and new product development, legal proceeding moderated demand management and new product development but not modification. As there is no previous research on this topic in which a comprehensive model with all flexibility capability types in relation to customer satisfaction and learning exploitation are tested at once, no comparisons with model based results can be made using previous literature.
7.3.2 Operational flexibility

May be the results of the study of this model can be explained by the fact that flexibility types are evidently promoting learning and exploitation and customer satisfaction and therefore indicate the importance of mass customization by which the customer wants a individually customized product (product modification flexibility Gerwin (1993); Koste and Malhotra (1999); Petroni and Bevilacqua (2002), delivered suitable to their purpose on the right time (demand management flexibility), Das and Narasimhan (2000); Kumar et al. (2006), based on the information given by the customer (Day 1994; Hart 1995; Feitzinger and Lee 1997; Gilmore and Pine 1997; Beach et al. 2000; Da Silveira et al. 2001; Stevenson and Spring 2007).

The reason why new product development flexibility mediated twelve paths can be because of the fact that, a new product can foresee the needs and which is only possible with a stronger relationship with customers and this is evident from the fact that new products mostly have a short time to the market and most of the projects have repeated customers (Sanchez 1995; Gunasekaran et al. 2001; Zhang and Doll, 2001). In the real estate sector, the customer appreciates new concept and themes and many like to identify themselves with its identity and uniqueness Olson et al. (1995) and therefore product variety lead to satisfied customers (Gerwin 1993; Hart 1995; Gunasekaran et al. 2001; Zhang et al. 2009).

Volume and mix flexibility are less visible and therefore were removed before the development of the final model as the customers see an end product delivered on time and not the mechanism used to achieve this target. So the customers do not see mix or volume flexibility, but it’s consequences, for instance in terms of delivery capability or demand management (De Toni and Tonchia 1998; Jack and Raturi 2002; Olhager
The customers do receive the results of demand management flexibility and therefore recognizes the consequences or results from the activities executed to achieve their demand resulting in meeting the promised dates of delivery of finished products. In short, customers do care how an order is met, as well as whether it fulfil their needs Hart (1995) and Oke (2005) i.e. a delivery in the right shape and at the right time.

According to the findings in this research to improve customer satisfaction by delivering the right product at the right time based on the information the customer had given, new product development and product modification, are important and should therefore be stimulated in the project context to reach higher customer satisfaction levels up to a trade off level.

Operational flexibility type actually exhibits the customer orientation of companies and they should invest in new product development flexibility first, then on Modification and demand management flexibility. Innovation thus contributes to effective project management in a big way. The results showed that supply chain capabilities have a positive effect on effectiveness measures of customer satisfaction and learning exploitation, resulting in project effectiveness.

Thus, if managers are looking at flexibility they often must look for a particular part of flexibility from a particular managerial situation or problem (Upton 1994; Lau 1999; Chang et al. 2007). Which flexibility type is important depends on the situation. Each time a new decision must be made on the basis of what is important under those specific circumstances. Often, flexibility itself is not the most important thing in this decision, but the results that must be obtained (Narain et al. 2000; Oke 2005). So the situation and the chosen strategy influence the adoption of the operational flexible types (Vokurka and O'Leary-Kelly 2000).
This test helped to prove that operational flexibility types are important in relation to customer satisfaction, learning and exploitation. These capabilities are tested separately with customer satisfaction, but also all together in one model. The results of the tests between every flexibility capability and customer satisfaction and learning exploitation in this thesis are all positive. This is almost the same as the outcome of different studies of flexibility in relation to customer satisfaction from Zhang et al. (2006), where the result of all flexibility types of customer satisfaction is significant and positive.

When testing all flexibility, leading capabilities in one model from a broad perspective on operational flexibility, only a few capabilities seems to be important as revealed during the literature review and from expert opinions. Again during the course of analysis of this study it got revealed that out of five flexibility types in the research model, only modification flexibility, new product development, demand management flexibility could be retained in the final model and have a significant positive impact on customer satisfaction and learning exploitation. So to satisfy a customer it is important to deliver the right modified product in the right purpose at the right time, based on the information given by the customer.

These results show that in this industry, the other flexibilities such as volume, mix seems to be less important in relation to customer satisfaction. This does not mean that these flexibilities should not be part of the model or consideration at all, because they could also be needed to support and fulfil other more important flexibilities. For instance delivery flexibility can hardly be achieved without any demand management, volume and mix flexibility activities (De Toni and Tonchia 1998; Jack and Raturi 2002; Olhager and West 2002; Oke 2005; Hallgren and Olhager 2009).
same way managers need to understand that depending on their situation and their own firm’s relationship with the entire supply chain they must strive for the right selection of flexibility types, to make a good choice to reach their predetermined goal. This is important because not every flexibility types is equally related to a specific project effectiveness measure and it is meaningless to develop a flexibility strategy which increases flexibility but not reaches the goal (De Treville and Vanderhaeghe, 2003; Sánchez and Pérez, 2005) or like Golden and Powell (2000) describe it interpreting Suarez et al. (1992): “an organization can be flexible in some way and less flexible in others”.

To obtain flexibility a firm cannot buy flexibility, it must be planned, developed from within and managed according to the changing circumstances to gain its benefits (Oke, 2003; Boyle, 2006). This is only possible from a broad perspective on flexibility and when taking all important flexibility types for that particular situation together into consideration and building capabilities and practices taking time.

The study developed and tested the structural model and the final model consisted of six key predictors for achieving operational flexibility, which were specified based on the review of the literature and expert opinions. The results show that the six predictors have direct impacts on operational flexibility. Despite these findings, it is acknowledged that the models could be: further refined by: (i) considering other organizational attributes, and (ii) exploring possible relationships between them and the three flexibility types, which were not tested in this study. This limitation leads to the future research possibility. The measurement models developed in this study have considered complex constructs that are intangible, dynamic and ‘soft’ assets of a construction firm. Although the results showed an acceptable level of construct reliability and validity, it is
Findings and Discussions

acknowledged that measurement items of respective constructs should be continuously updated for improved understanding about achieving operational flexibility.

The structural model was developed based on the perception of 87 construction firms. It follows that the form and strength of the proposed relationships between constructs are likely to differ in different industry contexts. Though the findings of this study provide valuable insights into operational flexibility management in construction, its application could have limitations in countries with different cultural and economic background from India. Also, the model developed has not been further tested on Indian construction firms that had gone into liquidation during the economic downturn, due to the difficulties encountered in contacting and persuading the relevant personnel of those firms. All these limitations lead to future research possibilities. The study found that supply chain capabilities are a significant determinant of operational flexibility.

This study considered two major factors namely micro and macro moderators which composed project inherent uncertainty elements. Uncertainty is a complex construct and sub constructs under these two factors might not have captured every aspect of project inherent uncertainty. Other facets of inherent uncertainty should be investigated in future research. Finally, this study empirically analyzed the relationships between predictors, moderators, operational flexibility and project Effectiveness from a builder’s perspective. More research is needed to examine whether the contingency relationships found here also apply from a contractor or vendor perspective and to analyze the differences between vendor and builder/client perspectives.

The moderating factors should be considered of potential interest to researchers and practitioners. Moreover, the results shed some light on the
relative degrees of significance of the environmental uncertainty on a project. This result is consistent with the results in previous studies (e.g., Zacharia and Mentzer 2004; Fynes et al. 2006). According to Fynes et al. (2005), the effect of supply chain relationship quality and environmental uncertainty on supply chain effectiveness is very significant.

In contrast, for firms reporting high uncertainty, predictors do not impact project effectiveness. The findings could be explained by the following arguments. First, effective implementation of predictors like supply chain practices especially in construction industry will need the existence of commitment, shared visions among internal functions as well as suppliers and customers under stable business environment. In other words, the empirical results of this study demonstrate that obtaining favourable results in project is based on building the effective relationship with business partners under low environmental uncertainty on one side and developing operational flexibility to counter uncertainty under medium to high level of environmental uncertainty. This finding supports the work of Morris and Carter (2005), who suggest that firms should invest their resources in both reducing uncertainty and increasing cooperation in their relational exchanges.

Second, management in firms with perceived high uncertainty compared to peers are found to be more reluctant to integrate internally and externally to their business partners since those integrative practices comes from a gradual learning and experience which is uncommon in such firms. In other words, firms may emphasize their practices only on the condition of low uncertainty, but do not prepare themselves for high uncertainty condition. It is here, such firms can develop operational flexibility ahead of the learning curve and achieve effectiveness enjoyed by well experienced counterparts. The results of this study pinpoint an important implication for
practitioners by highlighting the importance of environmental uncertainty in implementing various capabilities. Although firms tend to focus on practices, they have not given enough attention to the effect of external factors such as environmental uncertainty. The results of this study demonstrate to the practitioners that to achieve high level of project effectiveness it is imperative to understand uncertainty before investing in practices. The basic concept is that the implementation of practices is not a rigid. Here, success can be attributed to the way in which various practices are combined and organized based on the uncertainty or business condition factors.

7.4 Theoretical implications

This study contributes to knowledge in construction business management by developing and successfully testing the theoretical framework of operational flexibility that emphasizes the collective efforts of firms’ resources, capabilities and strategies towards achieving operational flexibility, in a business environment fuelled by macro and micro forces. The study empirically demonstrates the influence of organizational resources, capabilities and strategies towards achieving different operational flexibility types. It offers a new plausible explanation for the factors influencing operational flexibility management in construction. This, not only broaden the focus of firms’ flexibility practices but also enhances the understanding of the nature and constitution (i.e., flexibility types) of operational flexibility.

Another contribution to theory is that this study applied and tested the theories of organizational learning Cyert and March (1963) and dynamic capabilities Teece et al. (1997) on the concept of operational flexibility by examining the effects of learning culture on construction firms’ project effectiveness. First, it establishes empirical evidence to support the claim
that learning-orientation is important towards developing firms’ dynamic capabilities evident through operational flexibility; and second, this study discovered that a firm’s commitment to learning revealed through intra project and inter project learning positively influences operational flexibility, in which the latter is an important organizational asset that influences other organizational attributes.

The next contribution is that this study examined Thompson (1967) dynamic contingency theory on organizational flexibility, by exploring the moderating effects of two environmental conditions (i.e., micro and macro conditions) on the relationships between construction firms’ resources, capabilities, strategies (i.e., determinants) and operational flexibility. Significant moderating effects of micro and macro conditions were found on the relationships concerned. The findings show strong evidence concerning the direct impact of micro and macro conditions on firms’ operational flexibilities.

From another perspective, these findings may suggest that the dynamic contingency theory is sufficient to explain how Indian construction firms behave flexibly in a changing business environment, thus firms would need to engage themselves in a continuous learning process for improved responsiveness to environmental changes. This phenomenon may partly be explained in relation to the business conditions of the Indian construction industry, where construction firms had undergone five years of unprecedented economic changes following an unstable market condition during the research period, due to the increasing prices of raw materials and soaring construction demand.

Lastly, this study examined the complexity theory Prigogine and Stengers (1984) on operational flexibility, and proved that construction
firms could be seen as complex adaptive systems comprising many interrelated elements (i.e., resources, capabilities and strategies), which learn and adapt to their environment in their efforts to remain viable. Hence, further work on construction business management should consider these elements in the development of theoretical frameworks.

An overview of the flexibility theory is given describing the elements of flexibility, the perspectives on flexibility, the types of flexibility and the different aspects of flexibility. A definition of operational flexibility was stated to determine which operational flexibilities are important in relation to customer satisfaction and learning exploitation. Three customer facing flexibility types could be retained in the model that served as a testable framework to relate operational flexibility to customer satisfaction and learning exploitation.

This appears to be the first empirical research in India which integrated the unique characteristics of the Indian construction industry, ways to achieve operational flexibility and attain effective project management. This study models effective project management through operational flexibility from its predictors integrating them to a comprehensive model. Application of Structural equation in model building and testing the moderating effects by PLS approach is not very common in construction industry but use of Smart PLS 2.0 M3 for the above proved to be very useful given the exploratory nature of the study and for the model.

The empirical evidence supports the view that all measured flexibility types have a positive relationship with customer satisfaction and learning exploitation when tested one at a time. This is comparable with the results of different researches on this topic by (Zhang et al., 2006). When testing the comprehensive model all hypotheses are at least partly
confirmed, even though the not all sub hypothesis were proved. Thus only product modification flexibility, new product development flexibility and demand management flexibility have a significant positive impact on customer satisfaction. From this point of view it is extremely important that to consider which flexibility is important in a particular situation to reach a particular predetermined goal, a broad view on flexibility and a model testing approach is used.

The results showed that, project inherent uncertainty (as expressed in this study through moderators) had a direct negative effect on project operational flexibility and therefore on effectiveness. The significant path between customer relation-new product development, modification, demand management and customer satisfaction, learning and exploitation reveals that, it is not in agreement with the studies of Yetton et al. (2000) that user participation tends to increase budget variance by encouraging suggestions for changes to specifications and the empirical finding of Nidumolu (1995) that increased interaction between users and project staff does not necessarily lead to a project that converges well (i.e., improved project Effectiveness).

Customer relation is necessary for project success and participation in the requirements analysis stage can decrease the risk of final product with insufficient requirements. However, too much customer relations may have a negative effect on project success and delivery time. Clients/users will continually shift their requirements, which can result in overbudget and late project with far too many conflicts. Therefore, project managers need to be aware of the trade-offs in customer relation and project constraints.

The results of the full model with the interaction effects revealed that moderators or project inherent uncertainty can moderate the effect of
capabilities and practices on operational flexibility. More specifically, the negative path coefficient from the interaction term between capabilities/practices and operational flexibility indicated that project operational flexibility makes a smaller contribution to project effectiveness when inherent uncertainty at a very high level or we can say operational flexibility is being utilized for fighting uncertainty so that there is less left for project effectiveness, but without which project effectiveness would have been less.

Although the overall interaction effect size ($f^2$) is medium Chin et al. (2003) emphasized that a medium $f^2$ imply an important effect. Even a small interaction effect can be important under extreme moderating conditions and with beta changes also being significant, then the conditions must be taken into account.

The project management can be looked upon as system heavy on capital, expertise and skills of many different people over a definite period of time. Given the nature of the construction project, communication and coordination between team members is necessary for project success. The results of this study reveal that the moderators make different impacts on different types of operational flexibility and therefore on project effectiveness and therefore projects happening during different times will be affected by moderators in unique ways, which has important implications for practitioners. It implies that proper management strategies must be developed based on type and effectiveness criteria of projects. Customer relations can be influenced if not managed by the project manager. Project managers must take reasonable steps to ensure that they have the support and commitment needed to deliver a successful project. Accordingly, project managers require skills in relationship management, trust building, and business politics. In addition, communication and coordination between
development team members need to be strengthened, independent of the Effectiveness criterion and the level of project inherent uncertainty.

7.5 Practical implications

The empirical findings of this study have implications for managerial actions in construction firms. These are now presented.

1. The empirical findings show that, it is important for firms to foster a learning culture that emphasizes intra project learning and inter project learning; given that each of these has a varying impact on other operational flexibility. For example, firms have to foster a shared vision and continuous improvement in order to improve their operational flexibility and project effectiveness. This is consistent with Project Management Institute’s (PMI, 2004) recommendation that managers should be proactive in creating a shared vision and learning culture, improving the feelings of trust and cohesiveness among team members, in their attempts to raise productivity through greater teamwork, as learning will not happen without teamwork. Likewise, firms have to be open-minded, in terms of encouraging employees to generate new ideas and adapt freely to changes without being restrained by past practices and routines, in their project management and new product development endeavours. Nevertheless, it is necessary for them to recognize the constructive impact of their commitment to learning on business operations. It follows that firms must continually assess their commitment to learning.

2. The study found that employee’ skills and behaviour is often an overlooked predictor that could have influenced operational flexibility and effective project management. It follows that construction firms may consider seriously, implementing various human resource management
practices, in their continuous efforts to monitor, develop and nurture their employees’ skills and behaviour and thereby unleash the power of HRM making a revolutionary change in the way this industry treats its employees. Some suggested practices as highlighted by (PMI, 2004) includes managers continually monitoring and developing the skills of their team members, by implementing appropriate human resource management practices, in order to improve their competencies to complete allocated activities for better project Effectiveness. Also, firms should recognize that individual practices should be collectively considered and implemented for better realization of behaviour change and skill improvement of their employees. For example, firms may provide on-the-job training to improve employees’ skills, while conducting effectiveness appraisal to identify employees’ training need and offering career opportunities and promotion, in their efforts to improve the firms’ employees’ skills and gain behavioural commitment.

3. Firms’ supply chain capability is an important determinant of operational flexibility. Therefore, firms could place greater emphasis on building their supply chain capabilities, by: (i) providing prompt after-sales services to customers; (ii) organizing training for supply chain parties; (iii) organizing their informal gatherings and (iv) keeping constant contact with customer (e.g., end users and consultants) to keep track of their needs. An important implication is that, although the development of supply chain capabilities involves relationship building with external parties (for example, clients and contractors), this study found that firms have to consider suppliers through information sharing and more transparency along with customer intimacy initiatives.

4. Firms should learn from their counterparts who were forced out of the industry, mainly due to: (i) overlooking environmental influences and
Chapter 7

risks within their business environment; and (iii) overstretching firms’ resources and capabilities. They should be more prudent and vigilant against threats; in addition, they may place greater emphasis on their cost control endeavours, and consider it as a proactive response by establishing, monitoring and reviewing their cost control protocols regularly.

5. The findings show that product leadership initiative by new product development has a big influence on project effectiveness. It follows that firms need to recognize the risks involved in product or business development, and be ‘disciplined aggressive’ in their business ventures and learn how to stay adequately lean in managing their business in order to be flexible and responsive to changes in the environment.

   Rather than venturing into unfamiliar business areas, firms should focus on the fundamentals of their business and stick to the basics (Drucker, 1980). As such, when engaging in a cycle of building and developing their resources and capabilities within existing markets, firms should plan strategically and iteratively in line with the business environment taking into account opportunities and threats in potential markets. Upon identifying their target, they should familiarize themselves with and invest incrementally into the targeted market. To further mitigate risks, firms may consider forming partnerships with previous clients in their product development endeavours.

6. The study shows that firms’ good relationship with clients and established reputation play important roles in shaping their firms’ ability to obtain sufficient jobs to tide over an economic downturn. This is especially applicable in the private sector where the established relationships and firms’ reputation could often present firms with quick
sales of projects. Also, it is found that some firms formed partnerships with other parties with substantial landed properties to undertake residential developments, in their endeavour to keep their resources occupied and sustain business operation during a downturn. All these further imply the importance for firms to proactively and continuously engage themselves in relationship and reputation management regardless of whether times are good or bad.

7. The findings indicate that operational flexibility management in this study comprises three types (i.e., modification, new product development and demand management) in which each has unique constituents. Therefore, firms should not only include them in decision making on the development and management of operational flexibility, but also differentiate them and set specific objectives for each type. They may use the checklists as instruments, in their strategic planning for the type of resources and capabilities desired towards building and strengthening their operational flexibility potential.

8. The study found that firms should consider the effects of micro and macro conditions on their operational flexibility development. Failure to consider them may undermine the firms’ flexibility potential, which may, in turn, result in slow response and inability to react to marketplace changes.

7.6 Limitations

The study presented empirical evidence that contribute to knowledge about operational flexibility management in construction. However, the research findings need to be interpreted within the limitations of this study which is exploratory in nature; especially since some measurement items of
the respective constructs were borrowed from cross-discipline studies and then re-contextualized into construction context. The limitations of this study are now discussed.

The unit of analyses are construction firms in Kerala, India, who are members of CREDAI hence generalisability can be questioned but its practicality cannot be. The information is collected using questionnaires, which rely on the interpretation of the respondent and his/her view of the situation. During the preliminary stages enquiries were made on availability of project performance data which could substantiate the opinions of the respondents; but received a very cold response, as many of them mentioned lack of time to get into the task of retrieving informations and nonavailability of records except for few recent projects.

This is a cross sectional study taking all limitations of the inherent of the period of data collection. The questionnaire with constructs of operational flexibility along with capabilities like IT and HR practices and customer satisfaction are filled in by project managers only as they are the group who gets feedbacks and reports from other stakeholders and are in a constant interaction with those entities.

A limitation for this study might be the period this study was undertaken. The Indian market has seen a bit of everything from recessions, RBI rate changes, sluggish economic growth coupled with inflation and gradual recovery. These changes could have influenced results obtained.

The study used the key informant retrospective reporting approach (i.e., selfreporting) whereby all questions, relating to both independent and dependent variables, were assessed by one key personnel from each of the targeted group of firms. Measures were taken to minimize the possibility of
Findings and Discussions

social desirability bias and common method variance problems: (i) questions relating to independent and dependent variables were structured and arranged in the way that interviewees were not aware of the proposed relationships and (ii) assurances of anonymity were provided in the cover letter and highlighted to the interviewees during the interview surveys. Besides these, the (Harman, 1967) one factor test results and the respectable degree of reliability and validity obtained for respective constructs indicate that common method variance is not a significant problem in this study. Despite all these efforts, it is acknowledged that the results can be contaminated by common method variance, although not to a significant level. This limitation leads to the future research possibility. The sample size of this research was not as large. The completed data were obtained from 87 executives of large and medium-sized Indian firms.

7.7 Directions of future research

This study lays the groundwork for future research concerning operational flexibility management in construction. Future research could replicate the principle features of this study with a larger sample within different industries, regions or countries. Such comparative studies would be useful to test and refine the developed models, and to identify the differences in the constituents of operational flexibility and their differentiated contributions to firms’ project effectiveness. This may offer a new insight for researchers and practitioners into the effects of project learning culture and other specific factors on operational flexibility.

Non members of CREDAI were not included in this study, this however does not mean that those firms are not flexible, but rather, they may exhibit a different configuration of the organizational attributes for achieving operational flexibility. It follows that future studies could examine how those firms attain operational flexibility and then conduct a
comparative study in exploring the differences and similarities of these two groups of firms in achieving operational flexibility. Likewise, future studies could conduct a comparative study involving public listed and non public listed firms, extending the scope of the developed models and identifying the difference and similarity on the predictors of achieving operational flexibility.

Given that this study focuses on the periods from 2010 - 2014, a direction for future research is to validate and extend the empirical findings by collecting and analyzing longitudinal data. It is strongly believed that the longitudinal studies may provide a better understanding of how the predictors and operational flexibility change over time and their resultants dynamically influence firms’ project effectiveness. Indeed, the importance of longitudinal studies can be supported by the increasing level of environmental turbulence.

Although this study provides a useful insight into the functioning of firms’ resource-based predictors in attaining operational flexibility, a direction for future research might be to explore the value creation and delivery process of operational flexibility such as how to build, leverage and upgrade a firm’s operational flexibility potential with limited or minimum resources in order to realize the full potential advantages of operational flexibility. This emphasizes the dynamics of operational flexibility in response to the increasing level of environmental turbulence.

Considering the exploratory nature of this study, another possible direction for future research is a thorough exploration of how the predictors, operational flexibility and environmental conditions interact effectively among each other, and in turn determine a firm’s project effectiveness. For example, future studies could explore whether and which predictors are indispensable to achieve operational flexibility in different environmental
settings, and in turn affect a firm’s project effectiveness. Furthermore, studies may explore the weight ratio of different flexibility types corresponding to firms’ Effectiveness. This may in turn lead to the development of a single operational flexibility index for construction firms.

This study developed the structural model based on the six key resources and capabilities identified from the literature and preliminary interviews. Future studies could explore the effect of other resources and capabilities (for example, management leadership, financial resources, firms’ reputation and firms’ size) on operational flexibility.

Further research can be accomplished taking the projects as a unit of analyses instead of the firm perspective used in this study, possibly by using semi-structured interviews; using a longitudinal study to determine how it develops over time, can give more insights. The study can be repeated for small and medium sized firms; testing this model using a survey investigation of project managers and customers at the same time to prevent bias. Testing if there is a relationship between the different operational flexibility types can be another direction of future studies. Besides this it would be interesting to test the importance of service activities in customer care of construction companies, testing the model incorporating service flexibility types or test this model in service related firms.

Summary

The major findings section describes retained predictor constructs, sub constructs and their significant relationships in moderated and mediated model. Discussion part throws light on why the need for operational flexibility arises as a result of changes in the business environment within the construction industry and how this study tries to answer this need through operational flexibility types, which are critical for achieving
customer satisfaction and learning exploitation. The theoretical implication part explains how this study contributes to knowledge in construction project management by developing and successfully testing the theoretical framework of operational flexibility that emphasizes the collective efforts of firms’ resources, capabilities and strategies towards achieving operational flexibility, in a business environment fuelled by macro and micro forces. The study empirically demonstrates the influence of organizational resources, capabilities and strategies towards achieving different operational flexibility types and thereby effectiveness of projects. The limitations of this study can be attributed to geographical area under consideration. The information is collected using questionnaires, which rely on the interpretation of the respondent and his/her view of the situation can also bring weakness to this study. The practical implications of this study are many, providing reasons why there must be conscious efforts and commitment on the part of management towards learning, information sharing and more transparency with customers and suppliers alike. Monitoring and reviewing of cost control measures and efforts towards relationship and reputation management are also to be given consideration, regardless of whether times are good or bad. This study thus lays the groundwork for future research concerning operational flexibility management in construction industry.

..........* ♦ * ..........