MEASURING THE IMPACT OF SUPPLY CHAIN INTEGRATION ON ORGANIZATION PERFORMANCE: THE MODERATING ROLE OF SOCIALIZATION AND ORGANIZATION CULTURE.

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ABSTRACT

Dissertation Title: Measuring the impact of Supply Chain Integration on Organization Performance: The moderating role of Socialization and Organization Culture.

Increasing competitive markets, technological modernization, discerning customers and short product life cycles lead to the fact that now competition is between supply chains not between companies anymore. In addition to it, supply chain management is of vital importance in terms of resource dependency, strategy development and also stakeholders relationship management. This demands effective supply chain management and integration of the product flow processes both internally as well as externally for sustainable competitive advantage.

The present study aims at investigating empirically the level of internal integration and its antecedents; the relationship between internal and external integration and its impact on the supply chain performance and overall performance in the context of the Petroleum companies of Pakistan. The study also investigated the effect of Socialization and Organization Culture as a moderator of relationship between internal and external integration i.e. with customer and supplier.

A cross-sectional study design was employed utilizing a questionnaire in a non-contrived study settings. A Stratified proportionate random sample of 234 managers from Petroleum companies was used. Nineteen hypothesized relationships were tested using Structural Equation modeling technique through AMOS software (Version 20) and are accepted. Each of the antecedents of internal integration i.e. Job rotation ($r=0.40$), Interdepartmental trainings ($r=0.38$), Intraorganizational knowledge sharing ($r=0.44$), Management Commitment ($r=0.54$), Supporting Information Technologies ($r=0.37$) and Strategic Consensus ($r=0.59$) were found significantly correlated with the internal integration. Results further revealed that these integration practices have stronger effect on internal integration when they are aligned than when each of these practices are considered independently. Modeling fit as co-variation approach using SEM was used to confirm this alignment which demonstrated the importance of implementing these practices holistically i.e. integration of new practices with existing practices instead of implementing them in a piecemeal fashion.

Furthermore internal integration was found to be significantly related with external integration (i.e. Customer and Supplier integration). All three dimensions of Supply chain Integration i.e. internal, customer and supplier integration were found significantly related to supply chain performance which consequently leads to organization performance. Results further concluded that both customer and supplier integration partially mediate the relationship between internal integration and Supply chain performance. This reiterates the fact that there is not only the need to ensure the optimum level of internal integration to exploit the output of the organization but such efforts also need to be linked with integration practices with customers and suppliers as well for enhancing the output i.e. performance of the supply chain.

Using multiple-group SEM, moderating role of Socialization and Organization culture was investigated and found that organizations with better internal integration will have more external integration when the level of Supply Chain Socialization is high as well as if it possesses high levels of market and adhocracy type of organization culture.

The findings of the study offer useful insight for the management of the companies which can help them ensure optimal output by giving due importance to internal as well as external integration. Internal integration is prerequisite for external integration and the later can be achieved in a better way if company invests in socialization activities as well as extends its focus on external positioning and maintains fit with external environment. In nutshell, this study provides significant insight for integration-performance relationships.

Key words – Integration, Supply Chain, Performance, Socialization, Culture, Petroleum Companies of Pakistan
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISSERTATION AND DEFENSE APPROVAL FORM</td>
<td>II</td>
</tr>
<tr>
<td>CANDIDATE DECLARATION FORM</td>
<td>III</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>IV</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>V</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>XII</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>XV</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>XVI</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>XVII</td>
</tr>
</tbody>
</table>

1. INTRODUCTION

1.1 Background
1.2 Petroleum industry and its Supply Chain
1.3 Problem Statement
1.4 Purpose of the research
1.5 Research Questions
1.6 Research Objectives
1.7 Significance of the study
1.8 Gap in literature
1.9 Delimitation
1.10 Organization of the Thesis

2. LITERATURE REVIEW

2.1 Supply Chain Management and related definitions.
2.2 Organization Theories (Theoretical Perspective), Supply Chain Management and Supply Chain integration
2.2.1 Resource Based View Perspective 32
2.2.2 Transaction Cost Analysis 34
2.2.3 Network Analysis 35
2.2.4 Knowledge Based View 36
2.2.5 Agency Theory 36
2.2.6 Contingency Theory 37
2.2.7 System Theory 37

2.3 Integration Phenomenon 39

2.4 Supply Chain Integration 41

2.5 Internal Integration 62

2.5.1 Factors affecting the internal Integration 67

2.5.1.1 Job Rotation 71
2.5.1.2 Inter-departmental Trainings 74
2.5.1.3 Management Commitment 76
2.5.1.4 Intraorganizational Knowledge Sharing 79
2.5.1.5 Strategic Consensus 81
2.5.1.6 Supporting information technology 83

2.6 External Integration 85

2.7 Supply Chain Performance 87

2.8 Organization Performance 90

2.9 Integration approach, Supply Chain Performance and Overall Performance 91

2.10 Moderating Role of Organization Culture and Socialization 99

2.10.1 Supply Chain Socialization 99
2.10.2 Organization Culture 102
2.11 Research Model 107
2.12 Summary of Hypotheses and Theoretical Support 109

3 STUDY DESIGN AND RESEARCH METHODOLOGY 114

3.1 A Quantitative Research Approach 114

3.2 Research Design 116

3.2.1 Types of Study and Study Settings 116
3.2.2 Unit of Analysis 116
3.2.3 Target Population 117
3.2.4 Sampling Strategy/Procedure 118
3.2.5 Measurement Scale 121

3.3 Instrumentation and Operationalization 122

3.3.1 Antecedents of Internal Integration 123
3.3.1.1 Job Rotation 123
3.3.1.2 Intraorganizational Knowled Sharing 123
3.3.1.3 Management Commitment 124
3.3.1.4 Inter-departmental Trainings 124
3.3.1.5 Strategic Consensus 125
3.3.1.6 Supporting Information Technologies 125

3.3.2 Internal Integration 126

3.3.3 Customer integration and Supplier Integration 127

3.3.4 Supply Chain Performance 127

3.3.5 Organizational Culture 127

3.3.6 Supply Chain Socialization 128

3.3.7 Organization Performance 129

3.4 Precodification of the Questionnaire/Survey 130
3.5 Pilot Study, Reliability and Validity of Instrument

3.5.1 Participation detail/Profile for Pilot Study

3.5.2 Result Summary- Pilot Study

3.5.2.1 Descriptive Results analysis

3.5.3 Reliability analysis for instrument

3.5.4 Construct Validity

3.5.4.1 Content Validity

3.5.4.2 Face Validity

3.6 Data Collection Procedure

3.7 Data Examination

3.7.1 Missing Values, Outliers and Normality

3.8 Statistical Techniques and Software used

3.8.1 Descriptive Statistics

3.8.2 Structural Equation Modelling

3.8.3 AMOS & SPSS

3.9 Researcher’s Interference

3.10 Research Ethics and Ethical Consideration

3.11 Summary of the Chapter

4 SAMPLE DESCRIPTION AND DATA ANALYSIS

4.1 Data Examination-Preliminary analysis

4.2 Descriptive analysis

4.2.1 Management Position of the respondents

4.2.2 Experience

4.2.3 Department Profile of respondents

4.2.4 Qualification
4.2.5 Supply Chain Initiative Period 164
4.2.6 Descriptive analysis of variables for current study 165

4.3 Structural Equation Modeling 171

4.3.1 Measurement Parts of research model-Confirmatory 171

Factor Analysis (CFA)

4.3.1.1 CFA for Job Rotation 172
4.3.1.2 CFA for Management Commitment 173
4.3.1.3 CFA for Intraorganizational Knowledge Sharing 175
4.3.1.4 CFA for Interdepartmental Trainings 177
4.3.1.5 CFA for Supporting Information Technologies 178
4.3.1.6 CFA for Strategic Consensus 180
4.3.1.7 CFA for Customer Integration 182
4.3.1.8 CFA for Supplier Integration 185
4.3.1.9 CFA for SC Socialization 187
4.3.1.10 CFA for Adhocracy Culture 189
4.3.1.11 CFA for Market Culture 190
4.3.1.12 CFA for Organization Performance 191

4.4 Reliability Analysis 193

4.5 Construct Validity 195

4.5.1 Content Validity 195
4.5.2 Convergent Validity 195
4.5.3 Discriminant Validity 201

4.6 The Structural Modeling 204
4.6.1 Testing of Hypotheses H1-H6 204
4.6.2 Testing of Full Model 212
   4.6.2.1 Phase-1 Direct Model 212
   4.6.2.2 Phase-2 Integrated Method/Model 213
4.6.3 Model Comparison – Validating alternate Model 216
4.6.4 Testing of Hypotheses H7-H12 219
4.6.5 Testing Mediation Hypotheses H14-H15 223
4.6.6 Testing Moderation Hypotheses H16-H17 226
4.6.7 Testing of Moderation Hypotheses H18-H19 230

4.7 Chapter Summary 237

5 RESULTS AND DISCUSSIONS 239

5.1 Introduction 239
   5.1.1 Factor affecting internal integration 242
      5.1.1.1 Job rotation 242
      5.1.1.2 Interdepartmental Trainings 243
      5.1.1.3 Management Commitment 244
      5.1.1.4 Intraorganizational Knowledge Sharing 245
      5.1.1.5 Supporting Information Technologies 247
      5.1.1.6 Strategic Consensus 249
   5.1.2 Hypotheses H7-H15 252
   5.1.3 Hypotheses H16-H17 260
   5.1.4 Hypotheses H18-H19 262

6 CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS 265

6.1 Summary of research findings 265
6.2 Managerial Implications and Recommendations 271
6.3 Contribution of the present research  273

6.4 Limitation and future research  275

References  277

Appendices  325
<table>
<thead>
<tr>
<th>Table #</th>
<th>Table Description</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2-1:</td>
<td>Constructs relationships and related literature support</td>
<td>111</td>
</tr>
<tr>
<td>Table 3-1:</td>
<td>Sample distribution Breakup</td>
<td>120</td>
</tr>
<tr>
<td>Table 3-2:</td>
<td>Pre-codification of Survey Questionnaire</td>
<td>130</td>
</tr>
<tr>
<td>Table 3-3:</td>
<td>Participant’s general information-Pilot Study</td>
<td>133</td>
</tr>
<tr>
<td>Table 3-4:</td>
<td>Participant’s Means, Standard deviations and Normality statistics of constructs-Pilot Study</td>
<td>136</td>
</tr>
<tr>
<td>Table 3-5:</td>
<td>Reliability analysis Results</td>
<td>142</td>
</tr>
<tr>
<td>Table 4-1:</td>
<td>Participant’s Position Statistics-Main Study</td>
<td>159</td>
</tr>
<tr>
<td>Table 4-2:</td>
<td>Participant’s Experience Statistics</td>
<td>160</td>
</tr>
<tr>
<td>Table 4-3:</td>
<td>Participant’s department Profile</td>
<td>162</td>
</tr>
<tr>
<td>Table 4-4:</td>
<td>Participant’s Qualification</td>
<td>163</td>
</tr>
<tr>
<td>Table 4-5:</td>
<td>Company’s SC initiative Period</td>
<td>164</td>
</tr>
<tr>
<td>Table 4-6:</td>
<td>Participant’s Means, Standard deviations and Normality statistics of constructs(N=234)</td>
<td>166</td>
</tr>
<tr>
<td>Table 4-7:</td>
<td>CFA Output for Job Rotation</td>
<td>172</td>
</tr>
<tr>
<td>Table 4-8:</td>
<td>CFA Output for Management Commitment</td>
<td>173</td>
</tr>
<tr>
<td>Table 4-9:</td>
<td>CFA Output for Intraorganizational Knowledge Sharing</td>
<td>176</td>
</tr>
<tr>
<td>Table 4-10:</td>
<td>CFA Output for Interdepartmental Trainings</td>
<td>177</td>
</tr>
<tr>
<td>Table 4-11:</td>
<td>CFA Output for Supporting Information Technology</td>
<td>178</td>
</tr>
<tr>
<td>Table 4-12:</td>
<td>CFA Output for Strategic Consensus</td>
<td>180</td>
</tr>
<tr>
<td>Table 4-13:</td>
<td>CFA Output for Customer Integration</td>
<td>183</td>
</tr>
<tr>
<td>Table 4-14:</td>
<td>CFA Output for Supplier Integration</td>
<td>186</td>
</tr>
</tbody>
</table>
Table 4-15: CFA Output for Socialization
Table 4-16: CFA Output for Adhocracy Culture
Table 4-17: CFA Output for Market Culture
Table 4-18: CFA Output for Organization Performance
Table 4-19: Reliability analysis results (N=234)
Table 4-20: Convergent Validity(Factor loadings, Construct reliability and Average variance extracted), Construct reliability and Average variance extracted
Table 4-21: Discriminant analysis results
Table 4-22: H-1 : Job rotation and Internal Integration
Table 4-23: H2 : Interdepartmental trainings and Internal Integration
Table 4-24: H3 : Management Commitment and Internal Integration
Table 4-25: H4 Intraorganizational knowledge sharing and Internal Integration
Table 4-26: H5 : Supporting information Technology and Internal Integration
Table 4-27: H6 : Strategic Consensus and Internal Integration
Table 4-28: Summary of hypotheses results H1-H6
Table 4-29: Model Comparison Statistics
Table 4-30: Summary of hypotheses results H7-H12
Table 4-31: Mediator Model-Customer Integration
Table 4-32: Mediator Model –Supplier Integration
Table 4-33: Moderation Test-1: Multiple-group structural model-SC Socialization
Table 4-34: Moderation Test-2: Multiple-group structural model-SC Socialization
Table 4-35: Moderation Test-3: Multiple-group structural model-Organization Culture (Adhocracy Culture type) for Customers
Table 4-36: Moderation Test-4: Multiple-group structural model-Organization
Cult (Adhocracy Culture Type) for Supplier

Table 4-37: Moderation Test-5: Multiple-group structural model-Organization 234

Culture (Market or Rational Culture Type) for Customer

Table 4-38: Moderation Test-6: Multiple-group structural model-Organization 235

Culture (Market or Rational Culture Type) for Supplier

Table 4-39: Moderation Test-7: Multiple-group structural model-Organization 236

Culture (Organization Culture)
<table>
<thead>
<tr>
<th>Figure #</th>
<th>Description</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1-1:</td>
<td>Supply Chain Model of Petroleum Industry Pakistan</td>
<td>14</td>
</tr>
<tr>
<td>Figure 2-1:</td>
<td>Competing Value Framework Model-Organization Culture</td>
<td>105</td>
</tr>
<tr>
<td>Figure 2-2:</td>
<td>Proposed Model</td>
<td>107</td>
</tr>
<tr>
<td>Figure 4-1:</td>
<td>Measurement Model for Job Rotation</td>
<td>172</td>
</tr>
<tr>
<td>Figure 4-2:</td>
<td>Measurement Model for Management Commitment</td>
<td>174</td>
</tr>
<tr>
<td>Figure 4-3:</td>
<td>Measurement Model for Intraorganizational Knowledge Sharing</td>
<td>176</td>
</tr>
<tr>
<td>Figure 4-4:</td>
<td>Measurement Model for Interdepartmental Trainings</td>
<td>177</td>
</tr>
<tr>
<td>Figure 4-5:</td>
<td>Measurement Model for Supporting information technology</td>
<td>179</td>
</tr>
<tr>
<td>Figure 4-6:</td>
<td>Measurement Model for Strategic Consensus</td>
<td>181</td>
</tr>
<tr>
<td>Figure 4-7:</td>
<td>Measurement Model for Customer Integration</td>
<td>184</td>
</tr>
<tr>
<td>Figure 4-8:</td>
<td>Measurement Model for Supplier Integration</td>
<td>186</td>
</tr>
<tr>
<td>Figure 4-9:</td>
<td>Measurement Model for SC Socialization</td>
<td>188</td>
</tr>
<tr>
<td>Figure 4-10:</td>
<td>Measurement Model for Adhocracy Culture</td>
<td>189</td>
</tr>
<tr>
<td>Figure 4-11:</td>
<td>Measurement Model for Market Culture</td>
<td>190</td>
</tr>
<tr>
<td>Figure 4-12:</td>
<td>Measurement Model for Organization Performance</td>
<td>192</td>
</tr>
<tr>
<td>Figure 4-13:</td>
<td>Proposed Model-1</td>
<td>212</td>
</tr>
<tr>
<td>Figure 4-14:</td>
<td>Alternate Model-2</td>
<td>215</td>
</tr>
</tbody>
</table>
DEDICATION

This dissertation is dedicated to my father Mr. Talib Hussain and my mother Saleem Akhtar who sacrificed their present for the future of our whole family and whose prayers have paved the way for completion of my studies.
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“All Praise belongs to Allah, the lord of all the worlds the All-Merciful, the very Merciful”

(al-Quran:1)

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CHAPTER 1
INTRODUCTION

1.1 Background

Recently, it has been broadly accepted that competition is among supply chains, not between companies anymore. This is because of increasing competitive markets with technological modernization and globalization issue, demanding customers, short product life cycles, varying production/trading environments and vertical disintegration. Product or service availability with customization has now made a distinction if it is available at the right time, place and at optimal cost, which is an important criteria for competitiveness. Enhanced and improved customer service or satisfaction is now of paramount importance and is considered the focal point of a firm (Bovet & Sheffi, 1993; Lalonde, 1997). It, therefore, demands from the companies to pay stable concentration to be at the forefront in competitive market to better serve the end customer who is the real source of revenue (Christopher, 2005; Gunasekaran, Lai & Edwin, 2008; Swafford, Ghosh & Murthy, 2008; Wen, Li & Bai, 2007). It may be noted that in the present scenario considering the above mentioned factors, it can be safely said that a company which delivers the product faster, defect free and at the doorstep of the customer is not having a competitive edge but is just having the first step to be in the marketplace journey. Couple of decades back the competition became tough and the challenges linked with delivering the right product or services at the right time, place and importantly at lowest possible cost increased. Moreover the archetype swings towards the concept that it is the supply chain which competes instead of the companies has conferred significant
importance to SCM trend (Chen & Paulraj, 2004; Christopher, 2005). As a result, companies started to recognize the importance of the chains or network instead of working on improving the efficiency and effectiveness within the company alone or in isolation thus negating the myopic behavior. Because of the vertical disintegration, a considerable portion of value creation is carried out across the firm boundary. This pressurized the companies to develop appropriate strategies to be ahead in the competition and to ensure enhancement in the profitability and determination that supply chain management understanding and its successful practices have become essential prerequisites for achieving this goal (Bruce, Daly & Towers, 2004; Childerhouse & Towill, 2003; Green & Inman, 2005; Hult, Ketchen & Arrfelt, 2007; Ketchen & Hult, 2007; Mentzer et al, 2001; Moberg, Cutler, Gross & Speh, 2002; Montgomery & Porter, 1991; Nabi & Luthria, 2002; Porter, 1996; Power, Sohal & Rahman, 2001; Tan, Layman & Wisner, 2002; Van der Vorst, Beulens, Wit & Beek, 1998). The literature also proves the importance of effective management of logistics and supply chains and says that it leads to competitive edge over the challengers in the market (Christopher, 2011).

Now in order to deal with changes in market environment and to better serve today’s more discerning customers, companies are compelled to focus on unique skills through which they can do exceptionally well and outsource the non-core activities to the channel members who possess superior capabilities or expertise in those areas. This demands for looking beyond their companies to see how the resources of suppliers and customers can be used to create exceptional value and it calls for integrated relationship between manufacturers
and their supply chain partners. Frohlich and Westbrook (2001) favors the companies’ strategy in working together with upstream chain (i.e. suppliers) in order to get benefits of economies of scale/scope and downstream (i.e. customer) in order to develop a competitive product which meets the current and future demands. This very idea of collaboration between firms and stakeholders and their joint and synergetic role in the development of the product has been viewed as a pivotal topic in the literature in SCM and has been extensively acknowledged (Armistead & Mapes, 1993; Feng, Sung & Zhang, 2010; Fine, 1998; Handfield & Nichols, 2002; Horvath, 2001; Lambert, Robeson & Stock, 1978; Tyndall & Kamauff, 1998). In turn it helps in achieving considerable tangible and intangible benefits i.e. reduction in lead time, bullwhip effects thereby improving supply chain performance (i.e. reduction in cost, inventory levels and improvement in reliability, responsiveness and fill rate) (Davis, 1993; Holweg, Disney, Holmstrom & Smaros, 2005; Krajewski, Wei & Tang, 2005; Mason-Jones & Towill, 1997).

SCM is a management notion which was commenced in 1980 by management expert Oliver and Webber (1980) who emphasized coordinated and integrated efforts as opposed to silos mindset among the functional areas within as well as across the firm boundary i.e. customers and suppliers. Thus they termed it as system thinking approach as opposed to reductionist approach. The concept has been defined by various researchers for example Mentzer et al. (2001) defined SCM as “….the systemic and strategic coordination of traditional business functions and the tactics across these business functions within a particular organization and across businesses within supply chain as a whole”
Supply chain (SC) consists of firms in upstream (i.e. supplier, supplier’s supplier etc..) and downstream (i.e. customer, customer’s customer etc..) till the end consumer. The major theme and stress of this definition is the intra and inter-organizational coordination among all stakeholders i.e downstream and upstream for providing value for the whole chain. The purpose is to improve performance of entire SC instead of the company alone. The concept of SCM is concept of value chain which encompasses planning, effective and efficient management and control of materials, services, funds and information that flow not only internally within the company but also externally between companies thus linking/integrating customers, suppliers and other members of the supply chain (Lau & Lee, 2000; Stevens, 1989). According to Lee and Billington (1995) it covers and embraces procurement process, manufacturing process as well as distribution process. SCM, thereby, aims at achieving integration and developing partnership among members for achieving competitive edge through reduction in cost and with no compromise on satisfaction of the customer (Mentzer et al., 2001). Thus the overall performance of the business could be obtained through integration of company’s internal functions and efficiently and effectively linking with suppliers and customers. This in turn proves to be beneficial in reducing cost, enhancing profitability and achieving competitive edge (Christopher, 2000; Kim, 2006; Ragatz, Handfield & Scannell, 1997).

All this is gained through integrated management of material, financial and informational flow in the whole chain. Managing the business cycle independently is rather unimaginable in this era of competitive environment calling for a dire need of integration between the companies (suppliers and buyers) there by the main challenge for competitiveness among the
companies (Feng, Sung & Zhang, 2010; Handfield & Nichols, 2002; Kannan & Tan, 2005; Ragatz et al., 1997). The term “Integration” may refer here to internal cross-functional integration (internal integration); backward and forward integration among the suppliers and customers (external integration) respectively (Fawcett & Magnan, 2002).

Previous research acknowledged and advocated the role of SCI in SCM and favor the fact that it not only that the whole of idea of the SCM revolves around integration but also is a source of value creation (Horvath, 2001; Pagell, 2004). For ensuring appropriate level of forward and backward integration, capability, firm’s initiative approach, and preparedness or readiness of the firm is extremely important. This demands the need of internal integration first, which is achieved through enhancing communication and collaboration i.e. removing silos mentality, information sharing, readiness and use of cross-functional teams and possessing appropriate absorption ability and desired competency along with readiness as well as maintaining a fit with prevailing environment. Internal integration is essential and is the first stage before it moves forward to achieve integration with external partners (i.e. suppliers and customers) or supply chain integration (Biemans, 19991; Rosenzweig, Roth & Dean, 2003; Stevens, 1989; Takeishi, 2001). Hillebrand & Biemans (2004) conducted empirical study for investigating the relationship between internal and external cooperation and concluded that cooperation internal to the organization is a source of expertise/capability to establish effective cooperation with external partner. Moreover this is a source of capability to learn from external partner. Thus higher the absorptive competency the organization exhibits, the more the organization will understand the business and working of customers and
suppliers or the external environment, consequently helping in better external integration and maintains fit with external environment. The experience and information gained from the external entities must be disseminated among the internal functions to arrive at an agreement representing an internal integration. Thus successful supply chain management, integration between functional areas within the organization and across the boundary of organization (i.e. customers and suppliers) that constitute supply chain is highlighted (Lambert, 2006).

The process coordination (i.e. supplier’s involvement etc.) mechanism and information sharing throughout the supply chain are the major themes of collaboration or integration throughout the supply chain. The degree to which a firm manages and collaborates strategically both inter and intra organizational processes for achieving effective and efficient flow of information, goods/services and funds are termed as supply chain integration (SCI) (Bowersox ,Closs & Stank,1999 ; Flynn, Huo & Zhao, 2010 ; Frohlich & Westbrook 2001 ; Zhao ,Huo, Flynn & Yeung, 2008).The SCI is a crucial element of SCM phenomenon and theorizes from the Porter’s value chain model (Porter,1985) and deals with the linkages of all business processes as well as functions internally and externally to the focal firm (CSCMP,2000).

Different studies conceptualized the SCI phenomenon in different dimensions i.e. some described it as a single dimension(e.g. Bagchi , Skjoett-Larsen & Soerensen ,2005 ; Marquez , Bianchi ,& Gupta ,2004 ; Rosenweig et al.,2003) vs. multidimensional (Droge , Jayaram& Vickery, 2004 ; Flynn et al.,2010 ; Gemenez & Ventura,2003 ; Kerfterous ,Vonderembse, & Jayaram,2005 ; Narasimhan & Kim,2002 ; Stank, Keller, & Closs ,2001).Wherease majority of
others conceptualize it into internal and external dimensions i.e. internal, suppliers and customer integration (Flynn et al., 2010; Frohlich & Westbrook, 2001; Gimenez & Ventutura, 2005; Morash & Clinton, 1998; Stank et al., 2001; Zailani & Rajagopal, 2005). An overlap exists in each dimension i.e. single, double or multiple thus representing important part of SCI phenomenon. There is still no consensus about the definitions and conceptualization as well as an appropriate criteria to measures the components of the SCI phenomenon and furthermore the relationships among different dimensions of SCI & performance is described in literature inconsistently (Chen & Paulraj, 2004; Croom, Romano, & Giannakis, 2000; Febbe-Costes & Jahre, 2007, 2008; Das, Narasimhan, & Talluri, 2006; Devaraj, Krajewski & Wei, 2007; Flynn et al., 2010, 11; Forslund & Jonsson, 2009; Frohlich & Westbrook, 2001; Fynes, Voss, & Burca, 2005; Giannakis, Croom, & Slack, 2004; Germain & Layer, 2006; Handfield & Nichlos, 1998; Huo, 2012; Ho, Au & Newton, 2002; Kulp, Lee, & Ofek, 2004; Roth, Schroeder, Huang, & Kristal, 2008; Scannell, Vickery & Droge, 2000; Stank et al., 2001; Tan, 2001; Van der Vaart & Van Donk, 2008; Vickery et al., 2003). So the literature so far has been unable to conclude as to how the phenomenon of supply chain integration affects the performance measure and what dimensions the SCI constitutes. For a lot of companies the unclear delineation of SCI concept and effectual implementation of this phenomenon both internally and externally is still a mystery though some previous literature (e.g. Lee, Kwon & Severance, 2007) provided the positive outcomes of this phenomenon (SCI) and highlighted certain benefits in terms of cost reduction, reduced lead times, reduced bullwhip effects etc. Most recently the same issue has been investigated
through meta analysis by Leuschner, Rogers and Charvet, (2013) concluded that the resultant said relationship is due to misclassification of SCI concept as well as contexts and the measurement errors. The study further concluded the positive link between SCI and performance. Moreover the literature has also given a clear indication that internal integration is a prerequisite for integration with the external partners, however literature regarding the antecedents of integration is still lacking (Bowerox et al., 1990, 2000; Fawcett & Magnan, 2002; Stank, Daugherty & Ellinger, 1999; Gimenez & Ventura, 2003; Pagell, 2004; Stevens, 1989). Furthermore there is also limited evidence regarding the relationship between internal and external integration. While some studies (Morash & Clinton, 1998; Stevens, 1989, 1990) conceptually described the relationship between internal and external integration, there is still limited evidence on this relationship (Hillebrand & Biemans, 2004). Furthermore findings about the relationship between internal and external integration on performance particularly supplier integration and performance from previous studies were inconsistent (Flynn et al., 2010; Frohlich & Westbrook, 2001; Koufteros et al., 2005; Gimenez & Ventura, 2003; Stank et al., 2001). In spite of the fact that internal integration (Int_I) is crucial there is still a scarce research on this area and also on how to achieve internal integration (Int_I) (Basnet & Wisner, 2012; Gemenez & Ventura, 2003; Pagell, 2004). Very few studies investigated the factors enhancing integration within the organization i.e. internal integration (e.g. Basnet & Wisner, 2012; Pagell, 2004).

The concept of SCI is in evolutionary phase and existing research is scarce coupled with inconsistent findings related to its relationships with performance.
(Chen & Paulraj, 2004; Fabbe-Coste & Jahre, 2007; Flynn et al., 2010; Leuschner, Rogers & Charvet, 2013; Swink, Narasimhan & Wang, 2007; Van der Vaart & Van Donk, 2008; Vickery et al., 2003). Previous researchers in their empirical findings hold lack of proper conceptualization of SCI construct and different contexts in which those studies were conducted as well as the factors that may hinder SCI implementation and contextual factors (e.g. environmental uncertainty) that may influence the SCI-performance relationships responsible for inconsistent findings (Van de Vaart & van Donk, 2008; Wong, Boon-itt, Wong, 2011; Zhao, Huo, Sun, & Zhao, 2013). A most recent study by Zhang and Huo (2013) contributed to the extant literature through establishing the relation that building a trust with external partners (i.e. suppliers and customers) as well as properly handling dependence is fruitful for enhances SCI. The study concluded with signifying the role of trust for establishment of relationships on long term basis which further helps in better managing order fulfilment process in a supply chain and business performance. A meta analysis by Fabbe-Coste & Jahre (2008) concluded that looking at the back of the debate at integration is always best, it has been shown that evidence can not be taken for granted, is not completely reliable and there is a lot of room for more research particularly regarding the impact of inter-organizational SCI (extended form) on supply chain performance. Gimenez, Van der Vart and van Donk (2012) concluded in their empirical investigation that the relationship between SCI and performance has no influence on low supply complexity as compared to high complexity.

These inconsistent findings call for further empirical research that investigates the link between supply chain integration dimensions and
performance as well as link between internal and external integration and most importantly as to what antecedents that influence internal integration. Most recent studies (Flynn et al., 2010; Zhao, Huo, Selen & Yeung, 2011) were conducted in China about the relationship between three SCI dimensions (supplier integration, customer integration, and internal integration) and performance but researchers were not sure whether these relationships would be same in other countries. Previous research has also questioned that though the literature has shown positive outcomes of integrating with customers and suppliers and its performance then why firms do not integrate with external partners (Frohlich & Westbrook, 2001). This suggested further research for factors that may influence the degree of customer, suppliers and internal integration and create environment for such integration (Flynn et al., 2010). A very recent study by Hauang,Yen and Liu (2014) which investigated the role of uncertainties (i.e. demand and technology) in SCI and performance and concluded that contextual factor does make significant change. The study’s results discovered that uncertainty in technology reinforces the said relationship whereas in case of demand uncertainty relationship was found to be weak. Similarly few other studies by Gimenez et al., (2012) and Wong, et al., (2011) also explored the moderation of factors like (environmental uncertainty i.e. both high versus low and supply complexity) and concluded that these factors does play a role in establishing such relationship of SCI and performance.

The other factors may include factors such as competitive environment, relationship commitment, trust, organizational characteristics, national culture and dependence. These are enablers of external integration. In addition to it
Vaart and Donk (2008) also highlighted that this inconsistency in the SCI and performance relationship may be because of varying research contexts.

As all these studies were conducted in developed countries in Western culture except China. Therefore this study intends not only to empirically determine and assess the level of internal integration (along with the role for its antecedents intra-organizational knowledge sharing, job rotation, inter-departmental training, management commitment, strategic consensus, and supporting information technologies that may influence) which is prerequisite for external integration as suggested by literature but also aims at investigating its impact on the external integration (i.e. with customers and suppliers) and its mediating effects. It also aims at determining the moderating effects of enablers for example SC socialization and organizational culture between internal and external integration for enhancing the process of external integration.
1.2 Petroleum industry of Pakistan and its Supply chain

The petroleum sector of Pakistan with its exceptional growth since the creation of Pakistan has been playing a crucial role in the economic development of the nation with average production of crude oil and gas with 65000 barrel and 4063 cubic feet (average) per day thus meeting approximately 53% of energy requirement from indigenous resources as per petroleum exploration and production policy 2012 (Ministry of Petroleum & Natural Resources policy). Moreover country’s economic growth is heavily relying on the petroleum products consumption (Aqeel & Butt, 2001) and petroleum sector plays significantly role in the energy sector of Pakistan and which is vital for economic growth of the country (Siddiqui, 2004). Due to its importance in country’s growth and development, the supply chain of petroleum and its management has become very vital. The petroleum industry which is a process oriented supply chain (linking upstream & downstream activities) due to its complex nature i.e. network, inflexible operations at the upstream level as compared to downstream, lead time issues and uncertainty as well as the political issues require the management of supply chain effectively and efficiently. It may be noted that the downstream sector possesses more flexibility and previous research highlighted that logistics at this level i.e. downstream possesses responsiveness and is a source of cost reduction (Jenkins & wright, 1998). Furthermore the complex nature of the petroleum supply chain along with multicultural complexity as described by Muhammad (2008) demands the effective management of its supply chain along with the increasing exploration & production capabilities. Chima (2007) highlighted the importance of efficiently managing the supply chain of this sector and suggest the
coordination among all the stakeholders in the chain while reducing the opportunistic mind set and improving information visibility processes as well as delivery mechanisms for better serving the customers. He further highlighted the need for reduction in cost and lead times, improvement in the quality frontiers and efficiently managing demand and supply uncertainties. Relationship management with suppliers and customers is vital for managing effectively the supply chain of this sector.

The petroleum industry activities are broadly classified into the upstream (i.e. exploration and production of crude oil) and downstream (which broadly includes refineries where crude oil is transformed into different products). Upstream further includes seismic analysis and involves the processes of exploration/production, forecast and managing the logistics for transportation of oil from fields to the refineries. Refineries further manufacture different products and deliver these products to the customers (i.e. power plants, wholesale, petrochemical, shipping and airlines companies, marketing companies etc.).

The supply chain of petroleum starts with upstream (i.e. exploration/production) which is moved to the second stage at the refineries for refining to multiple products i.e. petrol, diesel, power, petrochemical, jet fuels etc. which ultimately move through different transportation modes to bulk storages (i.e. \( S_1, S_2, \ldots, S_n \) as displayed in Figure-1) and ultimate customers.

The archetypal supply chain of Pakistan Petroleum sector is shown below (Figure-1). In this supply chain, refineries which are in downstream sector, purchase crude oil from local suppliers (exploration and production companies)
as well as import from abroad for fulfilling the requirements of local furnace oil, jet fuel, power plants, marketing oil companies and industry customers. Oil marketing companies, for example, further transport the products to the petrol pumps for the end users. This constitutes the local consumption of the petroleum product. The refineries export some of the products like Naphtha for overseas consumption.

Figure-1.1: Supply Chain Model of Petroleum Industry Pakistan

Source: Author
1.3 Problem Statement

As described earlier that nowadays the competition is between supply chains not between companies anymore. As a result firm’s supply chain needs to be effective and efficient for the seamless flow of product/services and information to the end customer. The seamless flow of product or service demands coordinated efforts and integration among all the stakeholders or partners of the supply chain which is of paramount importance for gaining the competitive edge. Organizations which maintain integration within the company and possess good absorptive capacity as well as competency and readiness with prevailing environment find themselves easy to maintain coordination with their external partners in the supply chain. The organizations need to adopt the practices which enhance the harmony within internal functional units (i.e. internal supply chain) as working cross purposes will have detrimental effects on the effectiveness of overall supply chain. Organizations still find it difficult which appropriate practices should be adopted that not only help in enhancing integration within the firms but also help in improving information sharing and coordination among the supply chain partners. Petroleum sector of Pakistan is striving hard to meet not only the energy crisis but also contributing significantly to its overall economy. In Pakistan the present surge in demand for petroleum products due to falling petroleum product prices in 2014-2015 as well as the shortage of CNG supply and political as well as management issues lead to high spike in the demand of petroleum products results in inventory losses along with bullwhip effects which consequently disturb the whole supply chain. Coordination among the petroleum companies is of paramount importance for meeting the demands as well as efficient management of inventory i.e. stock maintenance, demand information and better forecast through information sharing as well
coordination in the whole supply chain. The literature has highlighted the positive role of integration and coordination among all the stakeholders in the supply chain (Cristopher, 2011; Lambert & Cooper, 2000; Mentzer et al., 2001). The literature has also highlighted the role of internal integration (i.e. removing the silos mind set among functional areas within the organization) first as it is not only beneficial but also served as prerequisite for establishing integration or successful relationship with external partners.

Furthermore there is also a little research on integration practices at the organizational and employee level for enhancing internal integration (Basnet & Wisner, 2012; Pagell, 2004) as well as the factors that enhance or strengthen the external integration i.e. with customers and suppliers once internal integration exists. This calls for theoretical as well as empirical evidence to investigate the practices or the factors which foster integration within the company i.e. internal integration and as well as the factors that help in further strengthening the integration of the company with its customers and suppliers which consequently enhance the organization performance.
1.4 Purpose of the Study

Though by now the importance of the concept of supply chain integration has been universally acknowledged yet there are still many question marks regarding integration of companies (i.e. SCI) for establishing relationships with external partners and its impact on performance. Literature reveals that a lot of research has been conducted in developed countries but has culminated in mixed results. Thus it can be safely said that this concept of SCI is still in its infancy stage and calls for further empirical evidence in other cultural settings. However, no empirical research work to the best of researcher’s knowledge has been conducted in Pakistan in the area of SCI (though a few researches were conducted focusing SCM practices in Small and Medium (SME) sector of Pakistan (Bhutta, Rana & Asad, 2007; Surat, Faizullah, & Zhang, 2010) and reverse logistics in Pharmaceutical sector by (Asma & Subzwari, 2009)). So the present study focuses on investigating the level of internal integration and its potential antecedents; external integration and its impact on supply chain performance and overall performance in the petroleum companies of Pakistan. The framework also includes the moderating role of socialization and organizational culture to internal and external integration.

This study will achieve following purposes: Firstly, to identify the areas that can be improved to achieve internal integration capabilities within organizations and how they will be helpful in enhancing the external integration with customers and suppliers. Secondly, how the supply chain performance on cost, reliability and flexibility dimensions is influenced by the three dimensions of supply chain integration (i.e. internal, customer and supplier). Thirdly, how external integration mediates between internal integration and external
integration. Lastly, this study also intends to measure the moderating role of supply chain socialization and organizational culture (based on market and development dimensions of competing value framework (CVT)) between internal and external integration.

1.5 Research Questions

1. To what degree/level are the organizations internally as well as externally integrated i.e. with customers and suppliers?

2. What factors (antecedents) influence internal integration practices within the Organization?

3. What is the influence of internal integration on external integration, supply chain performance, and its contribution to overall performance?

4. What is the impact of internal integration on performance mediated by external integration?

5. What is the moderating role of the enablers of external integration i.e. supply chain socialization and organizational culture?

1.6 Research Objectives

The objectives of the study are:

1. To analyze the extent to which the organizations are internally as well as externally integrated.

2. To determine the influence of the factors (i.e. job rotation, Interdepartmental Trainings, Management Commitment, Intraorganizational Knowledge Sharing, Supportring information technologies and Strategic Consensus) on
internal integration within the organization.

3. To determine whether internal integration influences external integration, supply chain performance and its contribution to overall performance.

4. To determine whether the impact of internal integration on performance is mediated by external integration i.e. customer and supplier integration.

5. To determine the moderating role of the enablers of external integration i.e. supply chain socialization and organizational culture.

1.7 Significance of the study

As the previous research regarding SCI has not been able to lead to some final conclusion about SCI and its impact on performance thus there is a gap in the literature, and there is a desperate need to identify the exact mechanism through which integration can be reached and can subsequently flourish i.e. what are the organizations’ drivers (characteristics) for integration and what the organizations need to do to integrate internally and externally. According to the research conducted by Zhao et. al. (2011) the internal integration forms the foundation upon which customer and supplier integration builds. This highlights the need for establishing internal integration first and investigating the antecedents that foster this aspect and there exists a research gap to explore the organizational characteristics (drivers) of integration particularly w.r.t. forming external integration. Secondly, previous studies greatly focused on seeking integration performance relationships, however there is a very limited and perhaps no research to the best of the researcher’s knowledge about the steps or factors that strengthen the relationships between the firm and its external
partners. For this study the researcher intends to find the moderating role of organizational culture (through Competing Value Framework) and supply chain socialization. Thirdly all the previous studies regarding SCI were conducted in developed countries and no study has been conducted so far in a developing country like Pakistan. So this study perhaps will be the first step to assess not only the level of internal integration and its antecedents but also empirically investigating the relationship between dimensions of integration and performance particularly in petroleum companies of Pakistan. The petroleum sector of Pakistan is deeply concerned with the economic contribution to the country and this sector is fighting against the present energy crises of Pakistan and due to the lack of resources of CNG, this sector again is in much demand and requires Exploration/Production, Marketing Companies and Refineries to efficiently meet the customers’ demands with efficient supply chain. The petroleum companies due to their complex supply chain network tied with high inventory costs, lead time issues, fluctuations in price, political uncertainties and other factors ultimately contribute to the bullwhip effect and deficit in terms of cost and affect the management of entire SC (Anderson, 2003; Hussain, Assavapokee & Khumawala, 2006). This indicates the lack of integration practices within the chain which contributes to the lack of optimal inventory and cost reduction. This requires coordinated efforts between all players (i.e. crude exploration/production companies, refineries, marketing companies etc.) in the supply network in order to fulfill the demands of the customer efficiently. According to Hussain et al. (2006) who demonstrated that integrated processes are required to be put into operation throughout the entire supply chain i.e. from the stage of procurement of crude till the delivery to the
final consumer as efficiency at any individual stage did not lead to competitive advantage. Integration efforts facilitate the information sharing and visibility for efficient execution of the operations throughout the chain because over production levels, less visibility and incorrect demand information lead to larger stocks and inventory costs. So this study aims at assessing state of internal integration which exists in the petroleum companies as well as the measures and characteristics an organization should possesses which can help in establishing better integration with customer and suppliers. It also aims to focus the areas that need to be improved and will also increase awareness and managerial guidelines for practicing managers to decide how to devote their efforts and resources in different areas of SCI (internal and external) and empirically explore and add new knowledge with special reference to Pakistan.

1.8 Gap in Literature
The scarce research on the internal integration which is prerequisite for establishing better external integration as highlighted by the literature (Basnet & Wisner, 2012; Bowerox et al., 1990, 2000; Brauncheidel & Suresh, 2009; Fawcett & Magnan, 2002; Stevens, 1989; Gemenez & Ventura, 2003, 205; Handfield & Nichols, 1999; Huo, 2012; Luque, Garcia & Lopez, 2014; Pagell, 2004; Rosenzweig et al., 2003; Stank, Daugherty & Ellinger, 1999; Yu, Jacobs, Salisbury & Enns, 2013; Zhao et al., 2011) as well as the inconclusive literature findings regarding integration-performance relationships due to varying conceptualizations of supply chain integration construct and different contexts in which the studies were conducted so far (Chen & Paulraj, 2004; Febbe-Costes & Jähre, 2007, 2008; Flynn et al., 2010, 11; Leuschner, Rogers & Charvet, 2013; Swink,
Narasimhan & Wang, 2007; Van der Vaart & Van Donk, 2008; Terjesen et al., 2012; Van der Vaart & Van Donk, 2008; Vickery et al., 2003) demands further investigation in other cultural settings. Furthermore, the literature has also highlighted the role of the factors which needs to be investigated (e.g. trust, organization characteristics, culture, uncertainties in demand, environment and IT, dependence etc.) that may influence the relationships between the company and its partners (Flynn et al., 2010; Gimenez et al., 2012; Huang, Yen & Liu, 2014; Wong, et al., 2011; Braunscheidel, Suresh & Boisnier, 2010; Ke, Liu & Wei, 2010; McDermott & Stock, 1999; Zammuto & O’Connor, 1992).

Keeping in view, the current study developed a comprehensive model to fill the above gap as well as within Pakistani context which includes both the internal integration and its antecedents, internal integration and its relationship with external integration (i.e. with customers and supplier) and performance. The current study also considered the role of organization culture (internal/external dimension of competing value framework which is relevant to supply chain relations) and SC socialization as moderating factors that may influence the relationship between the company and its partners.
1.9 Delimitation

The petroleum industry (i.e. oil, gas and Petrochemicals) is quite large and thus cannot be encompassed completely due to factors like time constraints, geographical limitations and resources. Thus the main focus of this thesis is on the assessment of supply chain integration in the Oil and gas industry alone, thereby restricting the researcher to carry out research related to only a set of petroleum companies of Pakistan. Secondly the study is delimited to analyze the opinions of managers (supply chain, logistics, operations, inventory, procurement … etc.) of Petroleum Companies of Pakistan, about the level of supply chain integration practices undertaken in these organizations.

1.10 Organization of the Thesis

The present thesis comprises six chapters in order to achieve current study objectives. The chapters are structured as explained below.

Chapter-1 serves as an introduction to the study .This chapter encompasses the background to the research study, the petroleum industry of Pakistan and its supply chain, purpose of the study, research questions, and significance of the study. It also highlights the delimitations.

Chapter two reviews the literature and provides theoretical support for the variables under study. Beginning with focus on the concept of SCM, it further discusses the organizational theories relevant to the SCM (i.e. Resource based Perspective, Transaction Cost analysis, Network theory, Agency theory, Knowledge based perspective, System and Contingency theory). These theories were concluded to better understand the phenomenon of SCM and Supply Chain integration. It ,then,
goes on discussing the integration phenomenon, internal integration and its antecedents (i.e. intra-organizational knowledge sharing, job rotation, interdepartmental training, strategic consensus, management commitment and supporting information technologies). Relationships of internal integration with external partners and supply chain performance as well as overall organizational performance is briefly discussed along with the moderating role of supply chain socialization and organizational culture. Hypotheses were developed in the light of literature review. At the end of the chapter comprehensive research framework is presented through figure along with importance of the model and summary of hypotheses and literature pertaining to proposed/hypothesized hypotheses.

Chapter 3 deals with the explanation of data the data and methodology used in the study for the purpose of analysis. A detailed explanation of research approaches along with reasons for selecting the research approach and design, sampling strategy, research instrumentations and process of questionnaire development, reliability and validity of the instrument and data analysis procedures is a part of this chapter. Furthermore multivariate analysis tool i.e. SEM (Structural equation modeling) was briefly described along with its superiority over the other techniques. In addition to it, ethical considerations have also been highlighted.

In chapter four, sample description and empirical data analysis has been demonstrated. Chapter briefly comprises of complete description of attributes of sample along with analysis of stated hypotheses. Reliability, validity, measurement models, structural models, model comparison and model fitness were also described.
Chapter five briefly discussed the results of the study. Chapter six, concluded and summarize the research findings. The managerial implications and recommendations of the study are also highlighted. At the end study’s limitations and offers suggestions for future research avenues are also presented in this chapter.
CHAPTER 2
LITERATURE REVIEW

2. Literature Review

This segment of study contributed to the theoretical support of variables under study, their conceptual definitions and relationships between constructs. Supporting literature review is described briefly.

2.1 Supply Chain Management and related definitions.

The phrase “Supply chain management” was coined by Oliver and Webber (1982), the management consultants previously in eighties for removing myopic nature of internal functions of the organization and emphasizing the potential benefits of information sharing and coordination internally and externally thus considering it a holistic phenomenon. Today this concept is considered as the most momentous archetype of business management and is deemed precondition as well as the source of competitive advantage (Jones, 1989; Lalonde, 1997; Lambert & Cooper, 2000; Monczka, Trent & Handfield, 1998; Ross, 1998; Tan, Layman & Wisner, 2002).

Earlier than this concept in 1950s, manufacturers were emphasizing on mass production, relying exclusively on internal resources and capabilities for cost reduction and for enhancing productivity. It thus offered inflexible and low product variety in the internal chain. Later on in 1970s and 1980s the concepts of material requirement planning systems, JIT, buyer-supplier alliance i.e. keiretsu system and TQM were utilized for reduction in inventory and storage cost while improving quality, delivery
performance, customer service and manufacturing efficiency. According to LaLonde (1997) power structure has been shifted towards the customer and company’s existence depends on the customers because customers are scarce and understanding customer values and requirements is vital thus demanding efficient planning for, acquiring and maintaining customers (Ellram & Cooper, 1990; Kotler, 1997; Tyndall et al., 1998). This shifting of pointer towards customers requires the efficient management of the complex chain which is attributed to the delivery of the product because discrepancy at any stage of the chain will be a source of serious hindrance in achieving an edge over the chain of their competitors and will effects overall performance of the chain.

So organizations must be quick and agile enough to capture the customers from the markets as customer demands customization with high level of service, availability and low cost (Bovet & Sheffi, 1998). To accomplish this, inter firms coordination need to be critical to satisfy the market in charge i.e. customer for providing the product or service at the right place and time at the lowest possible cost (LaLonde, 1997). According to the Pine (1993) mass customization can only be achieved through coordination among all the stakeholders’ i.e. raw material and component manufacturer/producer, wholesalers, distribution and transportation companies. This alignment of these stakeholders for bringing the product/services to the market is termed as supply chain or network as these pass materials forward towards the end consumer in the chain for value addition, and customer service and achieving profitability (Lalonde & Masters, 1994; Lambert, Stock & Ellram, 1998; Stock & Boyer, 2009; Webster, 1992). Thus the ultimate goal is to fulfill the demands of the end user and all the activities involved in executing this is termed as supply chain. These
activities include flow of information, funds and goods from extraction or raw material stage to the final stage to the end users/consumers. Supply chain management phenomenon is associated with managing, integrating and coordinating all the activities among the stakeholders internally and externally effectively for enhancing performance at the chain level as a whole (Bowersox & Closs, 1996; Chopra & Meindl, 2001; Greene, 1991). Moreover SCM is a process of synchronization and managing information, material and relationships for providing economic value and superior customer value/service (LaLonde, 1997).

Putting it in another way, it involves all activities as well as processes i.e. procurement processes, transformation process and management of logistics which requires the organization to plan and manage these regorously along with coordination as well as collaboration with all stakeholders i.e.suppliers, customers, intermediaries etc (CSCMP, 2000). Handfield and Nichols (1999) described it as the transformational process of the goods/services from the initial stage i.e. (raw form) to the end stage (i.e. product/service) and all associated activities, processes, flows (i.e. information as well as product/service flow).

According to the Christopher (1998) who described supply chain management as upstream as well as downstream network of linkages which is involved in providing the product/service for the end customers. Scott and Westbrook (1991) termed it as chain which creates a link among every activity in the value chain from raw material stage to the end product stage for the end customer. It means that SCM is an integrative philosophy from supplier to the end user for managing the ultimate flow of funds, information and material (Cooper & Ellram, 1997) thus emphasizing the importance of integration among the all stakeholders in the chain.
According to Mentzer et al. (2001) “the supply chain management is systematic and strategic coordination of traditional business functions and the tactics across these business functions within a particular organization and across businesses within a supply chain as a whole”, (p.18). Mentzer’s definition provides structure for supply chain management and depicts the supply chain phenomenon as a pipeline with six flows (i.e. products and services flows, financial and informational flows, finally demand and forecasts) that are managed by the traditional functions of the organization (i.e. purchasing, production, research and development, logistics, marketing, sales, information systems etc…). Moreover this definition also explains the role of inter-functional and inter-corporate coordination among all stakeholders (i.e. tiers of suppliers and tiers of customers) for meeting the demands and providing value to the end customer from one end of the supply chain i.e. suppliers to the ender end for attaining the competitive edge at the chain level.

Thus SCM is on integrating and let them coordinating all the stakeholders (i.e. suppliers, manufacturer, distributors, customers etc.) for efficient flow of product/service at the right place, quantity and lowest possible cost for the whole chain in order to satisfy the end consumer requests.

In a nutshell, both functional and organizational scope of SCM aim at enhancing profitability, customer service, availability of stock/inventory and reducing cost, bullwhip effects, cycle time thus leads to overall efficiency and effectiveness at the chain level.
2.2 Organizational Theories (Organizational Theoretical Perspective), Supply Chain management and Supply Chain integration

Previously in the last two decades, the literature is repeatedly discussing the definitions instead of the theoretical support pertaining to supply chain management concept and concluded with the lack of theoretical support for explaining, evaluating and executing the said phenomenon thus in fact at the infancy stage. However inspite of the fact that still no concrete answer to the very important question, few researchers in the area have contributed in highlighting this concern and tried to provide some evidences or theoretical support and concluded that organizational theories offers direction and insights for better understanding the supply chain management relationships and concluded that the logistic or supply chain research is greatly persuaded by behavioral, economic and strategic or organizational theories (Akkermans, Bogerd, & Doremalen, 2004; Brush, 1997; Flynn, Sakakibara, Bates & Flynn, 1990; Halldorsson et al, 2003; Halldorsson, Kotzab, Mikkola, & Skjett-Larsen, 2007; Handfield & Melnyk, 1998; Ketchen & Hult, 2007; Mears-Young & Jakson, 1997; Mentzer & Kahn, 1995; New, 1995; Seuring, 2003; Skjoett-Larsen, 1999; Stock, 1997; Storey et al. 2006).

Scientific theories are classified into three levels i.e. grand, middle-range and small scale theories (Arlbjoern & Halldorsson, 2002; Maaloe, 1997). Grand theories for example represent philosophy of science or meticulous discipline of science whereas social economic theories are known to be found practical in different managerial/administrative disciplines are termed as middle range theories and finally small scale represents propositions or statements (see Halldorsson et al. 2007). Further Halldorsson et al. (2007) have developed middle range theoretical framework based on agency theory, transaction cost theory and resource based perspective to explain and
recognize the existence and boundaries of the phenomenon of supply chain management.

In addition, few other authors (Coas, 1937; Croom, 2001; Eisenhardt, 1989; Halldorsson et al., 2007; Hitt, 2011; Ketchen & Hult, 2007; Ketchen & Giunipero, 2004; Williamson, 1985, 1999) proposed the theoretical perspective in order to understand the phenomenon. These theoretical perspectives comprise, for example Resource-based view (Halldorsson et al., 2007; Hitt, 2011; Ketchen & Nichols, 2002; McKone-Sweet & Lee, 2009), knowledge-based view (Grant, 1996), Strategic choice theory, game theory (Axelrod, 1984), agency theory (Halldorsson & Skjott-Larsen, 2006; Logan, 20000; Stock, 1997), institutional theory (DiMaggio & Powell, 1983), network theory, contingency theories and system theory. As suggested by Halldorsson et al. (2003) all the above theories are discussed briefly as they complement each other and provide better insight to the said phenomenon of SCM instead of discussing one or two of the theories only. These approaches help in analyzing the concept of supply chain management in strategic, economic, sociological, etc. perspectives. The next section describes these theories and thus providing the theoretical support in order to understand the concept of supply chain phenomenon. These theories which have been briefly discussed below highlight the importance of integration as well as collaborative relationships for acquisition and exploitation of resources (as highlighted by Resource-based theory), through establishing trust (an invisible asset between the firm and its suppliers) is source of reducing opportunistic behavior (as highlighted by the Transaction cost theory) along with the alignment and goal congruency (as highlighted by the agency theory), organizational learning (Knowledge based view), coordination and understanding personal chemistry (as highlighted by network theory) among all the stakeholders which are involved in product and information flow processes of the chain.
The major theme behind discussion of these theories is to better understand the phenomenon of SCM and supply chain integration from the perspective of existing organizational theories and their combinations.

2.2.1 Resource Based View Perspective

According to barney (1991) resource based view (Cornner & Prahalad, 1996; Foss, 1997; Miller & Shamsie, 1996) or theory (barney, 2001) scrutinizes assets and capabilities of the firm which set underpinning for competitive advantage and higher performance thus representing the core competencies. Moreover this theoretical perspective tries to predict and explain how companies can get this competitive edge while controlling over and acquiring these resources (human, financial, technology, physical, good will etc.) which are helpful in manufacturing and delivery of products (tangible or intangible) (Foss & Knudsen, 1996; Grant, 1991; Panrose, 1959; Peteraf, 1993; Wernerfelt, 1984). Barney (1991) also classify these resources as valuable, improperly mobile, rare, imitable and non-substitutable thus strategic in nature. These key inputs (the resources) and the organization mechanisms (capabilities or dynamic capabilities), an organization may apply for efficient delivery of the products is a source of competitive advantage, creation and sustainability (Kor & Mahoney, 2004; Sirmon et al., 2007; Sirmon, Hitt, Ireland & Gilbert, 2011).

According to Rungtusanatham, Salvador, Forza, & Choi (2003) linkage with customers and suppliers in a supply chain is a resource and capability which preserver VRINN (i.e. valuable (Value adding), rare (Scarce), non-tradable (imperfectly mobile or transferability is limited), non-imitable and non-substitutable) characteristics is a source
of competitive advantage. He further argued that this VRINN resource in the form of both explicit and tacit knowledge facilitates in effective and efficient management of goods and services. Skjoett-Larsen (1999) termed the trust between the supplier and the company as invisible asset which is a source of competitive edge as it is difficult to imitate and traded by any one in the competition. Much of the research emphasis the buyer and supplier relation as source of mutual benefit to both the firms as well as the entire supply chain (Corner & Prahalad, 1996; Dyer & Singh, 1998; Galunic & Rodan, 1998; Grant, 1996; Hall, 1992; Lorenzoni & Lipparini, 1999; Winter, 1995). According to Amit and Schoemaker (1993), the strategic assets or core competencies represents the capabilities and resources which are rare, valuable and hard to imitate (Prahalad & Hamel, 1990). These may include buyer and seller relationships, short lead time and cycle time, access to distribution channels etc. Core competencies according to RBV stipulate the firm for enhancing the existing abilities according the market environment and the relationships with the customers and suppliers provides the platform for improving this learning curve and provides opportunities to get benefits from the core competencies of the other firm (Haakansson et al., 1999; Halldorsson et al., 2007). Another resource in the supply chain context is the culture termed as cultural competitiveness (difference between what customer want and what is provided to him) by Hult et al. (2002) as cited in Ketchen & Giunipero (2004) that indicates that RBV provides the deeper look at the chain level because resources subsist at the chain level and this chain provides inimitable edge. Thus this perspective of resource based provides an insight in the context of supply chain that firms needs to understand that their competitiveness is enhanced as they moved to the integrated supply chain through coordination and sharing of the important information. This is so because that the complementary capabilities of both the firm and its partners...
are the real source to stay competitive. Thus this theory highlights the importance of exploitation of all types of resources which are either present inside or across the boundary of the organization through establishing and forming integration or collaborative relationships with all the stakeholders.

2.2.2 Transaction Cost Analysis Perspective

The transaction cost theory was introduced originally by the Coase (1937) in order to elucidate why firms exist and further this idea was developed with two behavioral assumptions i.e. opportunism and bounded rationality by Williamson (1975, 1985, 1996). According to Williamson (1985) this theory is based on the make (Hierarchies) and buy (market) decisions i.e. whether a firm should buy or make. Hierarchies or making is useful when there is high asset specificity, uncertainty and transaction frequency. This decision improves supply guarantee and predictability but limit suppleness and requiring large investment to be made. On other hand buying or market decisions require less investment thus providing more suppleness and high risk of supplier’s opportunistic behavior and uncertainty.

According to Williamson (1991), transaction costs are economic exchange and consist of searching, contracting, monitoring and enforcement costs. Sometimes if an activity is internalized these cost can be reduced while in some cases buying decision is the optimal. Managers in a supply chain must create a balance and make appropriate decisions in order to minimize these costs and reduce the probability of opportunistic behaviors. This can be done by establishing cooperative relationships between the partners based on the mutual trust, long term contracts, joint investment and appropriate safeguard measures (Andersson, 1997; Halldorsson, 2002; Williamson 1996).
Transaction cost analysis provides a framework to understand the supply chain as core of this theory is making or buy (outsourcing) alternatives. Supply chain integration i.e. building a long term relationships with the suppliers which as a result helps the firm in reducing the costs associated in market decision (Bensaou, 1999; Mikkola, 2003; Stuart & McCutcheon, 1996).

2.2.3 Network Theory

Unlike the transaction cost analysis which focuses on the economic perspective, the network theory based on the describing social (information, technical, logistics, products, manufacturing processes etc.) and personal dynamics and credible commitments and build on the notion that firms depends on the other firms resources thus executing the effectual utilization of these resources in a supply chain/network (Johanson & Lar-gunnar, 1987; Thorelli, 1986; Williamson 1996). Through these ties/bonds (technical, administrative, legal) partners in a chain/network not only develop and strength the mutual commitments but also establishes long lasting relationships for efficacious utilization of resources in a chain (Haakansson & Johanson, 1990). Network theory in a supply chain provides structure of inter-organizational relations in a supply chain network and emphasis on coordination and utilization of resources, understanding personal chemistry, building trust through on going relationships between buyer/supplier and exchange processes to gain competitive edge (Delfmann et al., 2002; Gadde & Haakansson, 2001; Hakansson & Snehota, 1995; Halldorsson, 2002; Harland & Knight, 2001; Johanson & Mattsson, 1987; Koster, 2002; Moller & Wilson, 1995; Robert & Mackay, 1998). It may be worth describing here that on combining these three theories as described previously so far i.e. RBV, TCA and Network theory collectively helps in forming collaborative relationships in a supply
chain which consequently helps in plummeting opportunistic type behavior, improve trust deficit and better process development and competitive edge.

2.2.4 Knowledge based view

Knowledge based view after the technological advancement has emerged as a only resource having prolonged existence for staying competitive in the market and thought to be a offspring of RBV (Acedo, Barroso & Galan, 2006; Grant, 1996). The knowledge based theory whose existence was traced back to the organizational learning providing implications in the form of coordination and knowledge sharing/dissemination among internal functional units and externally consequently enhances integration in a supply chain (Das & Narasimhan, 2000; Grant, 1996; Lane & Lubatkin, 1998; Szulanski, 1996).

2.2.5 Agency theory

According to this perspective, agency problems arise due to self interest, goal conflict, information asymmetry, outcome uncertainty and risk aversion, price increase, technological advancement between two partners, when a one partner (say agent) delegates work/authority to the other partner (may be the principle) (Eisenhardt, 1989; Lassar & Kerr, 1996). This is so because that the agent usually acts in a way to get benefit instead of principal thus raising the agency problem. The major theme of this theory is to formulate a strategy and establish a contract in the supply chain (i.e. one company delegating some authority to another for example a purchasing firm and its supplier) as supply chain demands alignment and congruency in the interests of all the stakeholders. This may be done through the inclusion of penalties and reward structure in the contract, aligning incentives mechanism, investment in relationship-specific assets, outcome and behavior management techniques etc. between the parties for sharing risk which can
lessen goal incongruity, bull whip effect and reduce the opportunistic behavior (Baiman & Rajan, 2002; Das & Teng, 1998; Min et al., 2005; Narayanan & Raman, 2004; Zsidisin & Ellram, 2003)

2.2.6 Contingency theory

Contingency theory, a management perspective center on adapting a management behavior for particular circumstances and suggests no best way suited or applicable to all circumstances for an organization and corresponding course of action that suits best depends on the internal and external environment (i.e. customer and suppliers) (Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Scott & Cole, 2000; Thompson, 1967; Woodward, 1965; Wren, 1994). So in order to maximize the output, organizations create a fit between the internal processes and hyper nature of the external environment. Much of the research concluded that for supply chain management, contingency approach reveals that none of the most suitable way to achieve excellence (e.g. lean or responsive SC) and depends on some contextual factors, product type (i.e. functional or innovative) may vary with respect to prevailing situation (Bowersox & LaHowchic, 2008; Buttermann et al., 2008; Chow et al., 1995; Cigolini at al., 2004; Fisher, 1997; Ketokivi, 2006; Lee, 2002; Stonebraker & Afifi, 2004;).

2.2.7 System theory

According to the system theory perspective, organizations are open system and are influenced by the environment (both internal and external to the organization) and consequently applicable to the supply chain (i.e. internal and external) context (Bertalanffy, 1968; Miller, 1978). According to Mentzer et al. (2001) who emphasizes the system approach i.e. holistic view as opposed to the reductionism view for the
supply chain and is a source of long term performance and competitive edge and a quite extent of literature is speaking the application of the system theory in supply chain/logistic research (Caddy & Helou, 1999; Christopher, 1971; Katz & Kahn, 1978; Miller, 1978; Peck, 2005; Yourdon, 1989).

In a nutshell the brief description of the theories from other areas/disciplines (e.g. strategic management) explaining the comprehensive view of phenomena of supply chain in terms of structure as well as managerial issues pertaining to SCM are provided above. For example theory of transaction cost stresses the significance of plummeting the opportunistic behavior exhibited by the external supply chain partner. This theory helps the company to develop a better relationship with its partners which reduces cost of inventory, opportunistic behavior and improved information sharing. Similarly the other theories e.g. resource based, network perspective and transaction cost analysis once combined helps in reduction in cost and is a source of long term relationship based on mutual trust among partners for inter-organizational processes development in a supply chain and its competitive edge. Furthermore resource based and network perspective extends the role from firm to dyadic relationships and further to the complete supply chain. However there is still dearth of empirical evidence in proving these theories of supply chain management except the study of Ketchen & Hult (2007).

The theories discussed above provide the significance of the fact that inter-firm relationships are crucial and firms can get the maximum (as resources exist outside the boundary of firm also) benefits through establishment of long term relationships based on trust, by alignment and congruency in the interests of all stakeholders which will ultimately be a source of competitive edge for the whole chain. This is possible only
through integration within the firm as well as integration with others partners in the chain.

The succeeding section briefly discusses the integration, supply chain integration phenomenon and its different conceptualization in previous literature as well as its relationships with performance.

2.3 Integration Phenomenon

Choreographing of business activities within an organization as opposed to silos approach is vital to obtain the superior performance is not in doubt thus emphasizing integration among value chain partners involved in product or service through information sharing, collaboration and coordination (Pagell, 2004; Hayes & Wheelwright, 1984; Koufteros et. al., 2005).

The concept of integration can be connected to the French management consultant, industrialist and father of classical management, Henri Fayol (1949) concept of Esprit de Corps, a management principle. However previous literature is replete with different definitions indicating the lack of consensus about the construct (Pagell, 2004). However there is general agreement in literature that in majority favors the Kahn and Mentzer (1998) conceptualization. According to Kahn and Mentzer (1998) integration is defined as “process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization” (p.9). This indicates the interconnectedness among functional areas. The major theme of this definition is interaction and collaboration i.e. structured and unstructured approach for achieving integration respectively thus requires mutual efforts and is prerequisite for attaining mutual goal as functional areas operating in isolation are inefficient (Ahmed & Rafiq, 2003; Lawrence & Lorsch, 1967). Interaction refers to the coordinated activities which are formally takes place among different functional units within the company which
broadly comprises of standard documentations and its flow within a company, planned meetings, teleconferencing, memoranda and other related activities etc. Whereas collaboration aspect of integration refers to existence of mutual processes among functional units which focuses on mutual understanding, shared vision and resources and strive towards achieving collective goals of the company.

The activities or processes which were previously taking place individualistically that have been later brought under an integrated, unified and in cohesive manner is termed as integration (Webster, 1996). Similar theme for integration was given as “unity of effort” and extent to which different functional areas coordinate their resources and information for product or service success (Barki & Pinsonneault, 2005; Gupta et al., 1986; Lawrence & Lorsch, 1969).

Some other stream of researchers termed integration phenomenon as informal and formal contacts, practice of interaction or a form of collaboration among functional areas for increasing cohesiveness (Dougherty, 1992; Gimenez & Ventura, 2005; Griffin & Hauser, 1996; Menon et al., 1997; Pinto, Pinto, & Prescott, 1993).
2.4 Supply Chain Integration

The phenomenon of supply chain management predicated to the integration of key business processes across the chain and which in turn have significant impact on the cost, responsiveness, value creation, customer service and is prerequisite for attaining superior business performance and competitiveness (Christopher, 2011; Lambert, Cooper & Pagh, 1998; Lee, 2000; Narasimhan, Jayaram, & Carter, 2001; Pagell, 2004; Power, 2005). Literature has expansively favored the significance of integration or synergetic activities in the SC and regarded as important source for having competitiveness which might be not get otherwise (Lambert & Cooper, 2000). In order to achieve this integration organization need not only to seamlessly integrate internal activities but also extend efforts for integration towards other stakeholders i.e. immediate customers and suppliers for optimized performance. Thus for successful implementation of SCM practices for staying in present aggressive market milieu demands maintaining working relationships based on longevity and closeness for solving mutual issues as well as planning for the future because the performance of the chain depend on reciprocity relationships among all the stakeholders which in turn will be constructive in cost minimization, efficient utilizations of complementary/shared resources, and perk delivery, quality performance and productivity (Cao, 2007; Swaminathan et al., 1998). The degree of collaboration of manufacturer that is intended to maintain with supply chain partners and collaboratively managing inter-organizational as well as intra-organizational processes is termed as SCI (Flynn et al., 2010) and define SCI as “the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes. The goal is to achieve and efficient flows of products and
services, information, money and decisions to provide maximum value to the customer” (p.59).

As per the definition described above, the definition clearly describes the SCI phenomenon around two themes i.e. information sharing practices between firm and its partners and process coordination which aims at establishing the strategic relationships between the firms and its partners. For example if a firm share information with for example with its suppliers i.e. information regarding inventory, production plans and demand etc. that will helps the focal firm to lessens the negative outcomes of bullwhip effects. Similarly establishing a relationships with supplier helps both the company and its partners to better understand the market demand and environment which will help them effectively respond to it.

Thus the SCI aims at establishing integration or linkages within the internal functional units of the company but also with the external partners i.e. customer and suppliers (CSCMP, 2000).

The ultimate aim is to provide products, services, information and money efficiently and effectively to end customer through streamlining the value addition process among all the stakeholders up stream, down stream and internally to the organization (Mentzer et al., 2001; Schoenherr & Swink, 2012 ; Zhao et al., 2011). Close association, teamwork between all the stakeholders i.e. suppliers as well as customers is paramount requirement to maximize the performance collectively to better serve the customer as well as creating, transforming and distribution the product/service to the ultimate user in the link (National Research Council, 2000). The focus is on sharing and coordination of resources/activities on a continuous basis among the partners of the chain for maintaining sustainable relationships and optimization of the performance of the chain as a whole and removing all the obstacles for seamless flow of information, material,
money and services (Naylor et al., 1999). Thus the concept of integration follows the system approach i.e. overall process efficiency as opposed to the reductionist approach because involving upstream and downstream partners is important for performance optimization of the overall supply chain due to the increased outsourcing, customer demands complexity and confiscating the potential barriers (Ackoff, 1990; Handfield & Nichlos, 2002; Van Donk & Van der Varrt, 2005). The literature is replete with consensus towards the significance of integrating with the external partners (i.e. suppliers and customers) and has been considered as strategic importance because it provides an opportunity to all the chain members to create such an effective and coordinated supply chain which can not be replicated by any of its competitors (Anderson & Katz, 1998; Childerhouse & Towill, 2002; Lambert & Cooper, 2000; Lummus et al., 1998; Ragatz et al., 1997).

According to Stevens (1989) the processes of supply chain integration is incremental and it evolves through a following stages i.e. first of all, functional integration focusing on intra-functional and here each functional area is working in silos or executing fragmented operations. At the second stage this is followed by internal integration (Int-I) i.e. integration of various functional areas within the organization i.e. inter-functional integration and thirdly this integration which is achieved in second stage is extended to the customers and suppliers i.e. inter-firms or upstream and downstream. This means that it is somewhat mandatory to have internal integration before going for external integration and external integration will not be fruitful unless organization is well integrated internally (Newman et al., 2009; Stevens, 1990). Furthermore according to Kahn and Mentzer (1996) integration both internally and externally produces better results in the form of forecast accuracy, inventory management, customer service
respectively. Thus organizations should optimize and focus on the strategic exploitation of horizontal linkages within the firm value chain and vertical linkages i.e. the value chains of its external partners (customers and suppliers) (Porter, 1985; Vickery et al., 2003).

Integration phenomenon has also been categorized in to six types by Bowersox, Closs and Stank (2002). These types of integration as described by the this framework includes internal, customer, material & service, technological & planning, relationship and finally measurement integration.

Similarly Fawcett and Magnan (2002) also put forwarded following levels/types of integration i.e. the integration of processes and activities of functional areas within the boundary of firm (internal integration), forward and backward integration with immediate customers and suppliers and finally complete forward and backward integration which constitutes the external integration with supply chain partners. The study signifying the fact that in the present dynamic and competitive markets, globalization and presence of discerning customers, the companies needs to shifts their focus towards better understanding the SCM and its practice along with obstacles. The empirical findings of the study revealed that theoretically and practically the application of supply chain do not match thus revealing that the majority of the firms are at the infancy or initial stage of integration theoretically in USA whereas some of the firms were found to have establishing integration external partners.

According to Ajmera and Cook (2009) who conceptualize the integration/collaboration concept through three dimensions i.e. integration within the functional areas, across the functional areas and between the firms. The author emphasizes the sharing, joint
decision making, planning among the stakeholders in chain and conceptualizes the integration to occur through four stages (i.e. moving towards full organization synchronization) thus helping the decision/policy makers to select the appropriate SCI tactics that proved to be best suited to their firms. The shift towards full synchronization begins with some degree of information sharing between the stakeholders through vigilant conciliation process (i.e. zero stage). At this stage minimal joint decision making takes place; however some information regarding inventory status, lead times are also shared frequently. The next stage of transition look at more structured move towards the collaboration with critical stakeholders/partners in the chain thus removing myopic mentality which lend a hand in true exploitation of shared resources, facilities and equipments. In the third stage, cooperation is sought through the process of harmonization among the chain members as identified in previous stage. This is attained through supplier base reduction for streamlining and making more efficient operational activities for enhancing chain’s overall value and productivity. The last stage served as institutionalizing the previous stages through creation of shared vision in the SC, risk distribution, joint accountability regarding the approving or adverse consequences, exploitation of common capabilities thus acting as a unit.

Further Fabbe-Costes and Jahre (2008) identified that supply chain integration concept can be classified into three dimensions in terms of layers of integration, scope of integration and degrees of integration The layers of integration (i.e. funds flow, material flow and information flow integration; processes integration; integration of activities and processes; technological & systems integration and finally structures and organizations integration). Secondly the numbers of organization involved in integration termed as scope of integration i.e.
- Limited dyadic-downstream i.e. integration of focal firm and its customers
- Limited dyadic-upstream i.e. integration of focal company and its suppliers
- Limited dyadic-both upstream and downstream but, separately
- Limited Triadic. i.e. integration of suppliers, focal company and customers
- Finally extended i.e. integration among more than three parties in the supply chain i.e. supplier’s supplier and customer’s customers etc.

The last dimension is degree i.e. whether supply chain integration is a multi-dimensional or uni-dimensional concept.

The authors were not successful due to fragmented previous results to provide an evidence from the meta analysis of previous studies regarding the relationship between the performance and SCI. The integration phenomenon was measured and investigated in different but limited ways with little consensus and still remained unreciprocated as well as lacks accurately investigating the said association i.e. SCI and performance (Febbe-Costes & Jahre, 2007, 2008; Forslund & Jonsson, 2009; Ho, Au & Newton, 2002). Moreover the authors suggested that for exploring more benefits of integration more research is required and supported the multi-dimensional framework of SCI (Fabbe-Costes & Jahre, 2008).

The previous research is replete with investigating the impact of supply chain integration phenomenon on the performance but found inconclusive and incomplete and varying conceptualization and definitions (Boon-itt & Paul, 2006; Chen & Paulraj, 2004; Das et al., 2006; Devaraj et al., 2007; Fabbe-Coste & Jahre, 2007; Flynn et al.,
Previous research on supply chain integration construct has been measured through different dimensions. For example, some classified it as customer integration, material and service integration, internal integration (Int-I), technology and planning integration, relationship integration and measurement integration (Bowersox, Closs & Stank, 1999). The study highlighted the need for developing such an effective supply chain which will not only be responsive but also helps in reducing all the associated costs.

For example, the study conducted by Rosenzweig et al. (2003) conceptualizes the supply chain integration as a single dimension through Stevens (1989) concept i.e. external integration with raw material suppliers and with end consumers, internal integration (cross-functional), and finally integration with retailers and distributors. The sample was the manufactures of the major industrial sectors including consumers products, pharmaceutical and chemical products etc. in the North American region and found significant relationships between the SCI strategies and competitive capabilities thus further enhancing the organization performance. The study concluded that higher the levels of integration better the competitive capabilities among the consumers industries in North American region (Latin America, North America, Asia-Pacific and Europe). However this study does not provide the relationships between integration intensity and sales growth and customer satisfaction.

Devaraj et al. (2007) conducted a study on SCI and considered customer(s) and supplier(s) integration as two dimensions of SCI and its impact on the operational
performance and concludes that organizations with internet and related technologies have more customers as well as suppliers integration which consequently improves performance. Additionally the study contributes to the fact that interaction effect of customer and supplier integration is more on the operation performance than individual effects or taken separtetely. Moreover the study also concludes that firms having customers and suppliers integration equips with e-business technologies have completive edge in the market.Furthermore the study established that internet and associated technologies are proved to be vital for establishing integration with suppliers.

Vickery et al. (2003) conducted a study among first-tier suppliers in automotive industry in North American region. The study primarily investigated the influence of integrative SC strategy (which was measured through integrative IT facilities and SCI as a single dimension) on the customer service as well as on the financial performance of the companies in the automotive suppliers industry. The SCI construct was conceptualized through closer customer relationships, suppliers partnering and cross-functional teams (i.e. internal integration).The study concludes that better the integrative IT facilities the more SCI which further leads to better customer service. Moreover SCI did not find to have direct relationship with performance however through mediation of customer service construct, the relation between the two becomes significant.

Another study conducted by Frohlich and Westbrook (2001) among 322 manufacturing firms concluded that manufacturers typically intended to adopt different strategies of SCI based on the direction (or arc) and extent or (the degree of integration) toward both
the upstream and downstream thus investigated the relationship between performance and SCI. The SCI was measured through firms integration of activities in terms of access to planning, joint EDI, production plans sharing, common use of logistics etc. The strategic position is represented by the arc or a segment and direction of that segment represent firm’s inclination towards the customer or supplier. The author classified the SCI strategies into five different groups known as “arcs of integration” with respect to the firm’s strategy towards customer or supplier’s direction. These are classified as customer and supplier facing, periphery-facing and finally inward & outward facing strategies means that whether the firms decide to go for narrow or broader arc of integration. Here narrow means little integration with up stream or downstream as opposed to broader or intensive integration with suppliers and customers. The study concludes that firms engage in broader arcs of integration both upstream and downstream proved to be source of improvement in the overall performance. These results were consistent with previous studies (e.g. Handfield & Nichols, 1999; Tan et al., 1998).Further the study failed to provide enough evidence regarding the relationship between performance and arc(s) of integration.

The study conducted by Lee et al.(2007) between the dimensions of supply chain integration (i.e. supply chain linkages among stakeholders which includes customer, suppliers and internal integration) through a survey in the US manufacturing organizations in Midwest region which were practicing the SCM as a tool for business operations within their organizations under study. The dependent variable was supply chain performance which was further divided into factors (i.e. performance reliability and cost containment respectively) .The result indicated that internal integration($Int_I$) through integrated data bases for all the functional areas i.e. inventory access, computer
based planning system etc. contributed well to the cost containment dimension of the supply chain performance. Whereas the integration with suppliers through involving suppliers in product development, production planning, inventory planning and information exchange through digital technologies has impact on the performance reliability dimension of the performance. Another notable finding that cost containment strategy found was fruitful with electronic ordering system in the supply chain with the customers.

A study conducted by Kim (2009) conceptualizes SCI into internal and external integration dimensions. The study intended to measure casual relationships among SCM practices, level of SCI, competitive capabilities and performance thus linking SCI strategy with competitive strategy among Japanese and Korean manufacturing firms. SCI was found related with the performance and proved to be critical for SCM competitiveness in Korean firms.

Morash and Clinton (1998) investigates the role of different forms of SCI (i.e. intra-organizational process integration, inter organizational collaborative and operational integration) among Korea, Japan, United States and Australia. Findings indicated that Korean companies emphasized internal integration (Int_I) over external integration. Japanese firms emphasized the operational SC integration. United States and Australian firms have shown more integration with both suppliers and customers as compared to Korean and Japan. Moreover integrative practices were found correlated with the cost reduction as well as differentiation strategy among these firms. This study reiterated the fact that functional units within the company should be integrated instead of acting as
Narasimhan and Kim (2002) considered the two dimensions of SCI i.e. internal as well as external integration. External integration includes integration with customers and suppliers thus examined the impact of SCI on the diversification and performance of the firm. Results of the study indicated that use of diversification strategies and SCI strategies have shown significant contribution to the performance of the firm in general and the relationship between performance and diversification gets modified in the presence of SCI strategy (both internal as well as external) in particular.

Dimensions of SCI as classified by Lee (2000) are described by firstly through information integration, secondly organizational relationships and thirdly by coordination and resource sharing. Here knowledge and information sharing in the supply chain constitutes information integration through production plans, inventory status, and sales forecast etc. The study highlighted the vital role of this integration or coordination through information dissemination / sharing, linkages in order to improve responsiveness and the services rendered to the customers and reduction in all the associated costs as well as asystemetries of information etc. in the netweork.

Flynn et al. (2010) conceptualize the SCI phenomenon into three dimensions (i.e. internal integration, customer integration (Cust_I) and supplier integration (Suppl_I). The sample of the study was the manufacturing companies in five cities of the China. The study used both contingency as well as configuration approach concluded that SCI and performance was related. Moreover the findings further concluded that supplier
integration did not improve performance as compared to the significant contribution of internal and customer integration to the business performance.

The study conducted by Danese and Romano (2011) investigated the two dimensions of SCI (i.e. customer, suppliers integration), their interaction effects and its impact on efficiency performance of the firms under investigation. Data was collected from two hundred manufacturing units from nine different countries i.e. US, Germany, Korea etc. and hierarchical regression was used to test the study hypothesized hypotheses. The results concluded that customer integration aspect do not positively contributes to efficiency dimension however supplier integration has shown to be found moderating the relationship between efficiency and customer integration. Findings further revealed that in order to improve performance /efficiency of the organization, firms’ needs to practice concurrently integration strategy externally. The prominent findings of the study revealed that organization first put all efforts towards maintaining relationships with suppliers instead with customers , as establishing this first helps in maintaining or establishing integration with customers. It means that fruitful results of customer integration in terms of reduction in costs etc. can not be attained if organization lacks in integration on other frontier i.e. with suppliers. Integration on this frontier i.e. suppliers were found to be helpful in mitigating such associated costs.

Kim (2006) concluded that supply chain integration contributes to performance improvement aspect. The author recommended the implementation of SCI systematically in the firms by implementing SCI strategies first followed by the focus on the SCM practices and competitive capabilities respectively. It means that SCM practices will only be fruitful for enhancing company’s performance provided SCI is
present. This study measured SCI through cross-functional integration within a company and company’s integration with customers and suppliers and found positive contribution to the performance aspects of the firm. The study conducted in Korean and Japanese manufacturing companies (668) has established that SCI and SC practices positively contribute to the performance. The study also highlighted the essential role of size of the company in establishing the integration mechanism and inferred that the integration practices in firms with large size can easily be implemented as compared with the smaller one as former may utilize/allocate the additional resources which further helps in achieving better performance.

Han, Omta & Trienekens (2007) investigated the quality management practices, SCI practices and their impact on the performance among Chinese slaughterhouses of Pork. The SCI practices include internal integration (Int_I), Buyer-supplier coordination, external integration and integrated IT and logistics. These all dimensions were found unsuccessfully related with the performance of the firms in this industry thus indicating that this industry is in infancy stage with respect to integration practices.

Bowersox (1989) emphasized the importance of SCI (i.e. customer, supplier and internal integration) and has established that it should stem from internal integration first followed by external integration practices i.e. with suppliers and customers. Here integration with internal functions can be achieved through the standardization approach as well as automation of the activities and processes among all the functional area whereas information sharing and strategic linkages are the key sources for establishing effective external integration. He further established through the findings
that integration can also be achieved through formalized form of organizational structure as well as technological changes.

Zailani and Rajagopal (2005) conceptualized the SCI as the arcs (narrow or broad) of integration with direction representing whether the firm is either customer or supplier focus (little or more) and the extent of integration. The study examined the relationship between SCI and performance among US and East Asian companies. The variables investigated in this study were information sharing, internal integration and external integration with suppliers and customers. Results of the study revealed that majority of the firms follow broader arcs of integration with external partners (i.e. customer and suppliers) and were found to have more improved performance. The results of this study were found consistent with the study conducted by Frohlich and Westbrook (2001). Like all other studies, this study has also reiterated the vital role of SC integration phenomenon and its significance both strategically as well as operationally which as a result improve business results. Authors of the study through the findings has established and further highlighted that in order to deal with competitive market environment today, organizations are required to have proper alignment and integration of its activities.

The study of Kannan and Tan (2010) examined the span of SCI (narrow vs. broader span) and its impact on relationship-based performance outcomes. The study examined supply chain patterns and practices among those firms with narrow span (i.e. integration of firm with immediate external partners) and broader span (i.e. firms extended integration with customer’s customers and supplier’s suppliers etc.) of integration. The results of cluster analysis revealed that firms with broader span of integration with
external partners put strong emphasis on establishing inter-organizational relationships than those which focus on narrow span of integration. From the study it can be inferred that competitive edge as well as exploitation of resources and opportunities can be achieved through effectively managing SC by integrating all the stakeholders in the chain i.e. within the company as well as across the boundary span in the broader spectrum instead of narrowly focused. The study provided the useful insight to understand integration as well as avenues for exploring the phenomenon of SCI which is consequently a source of superior performance.

Droge et al. (2004) consider the dimensions of SCI broadly into external (Strategic Design integration-Customer & Suppliers) and internal (Design process integration) and explored the impact of integration practices on the performance. Results revealed internal integration (Int_I) as well as external integration significantly linked to the time based performance (i.e. time to product, responsiveness and time to market). Moreover the interaction of integration practices both internal and external significantly related to the overall performance and have synergetic value. Moreover the findings revealed that integration is the direct route to attain the time-based performance and subsequently to the overall performance. The study further added that the company should give due importance at the strategic level to external partners to maintain integration as they act as catalysts to effectively manage the product development processes.

Bagchi et al (2005) operationally defined the phenomenon of SCI through a single dimension of integration i.e. inter-organizational collaboration with key customers and suppliers. The study examined SCI, the extent of information sharing and the role of IT in SCI among 149 companies in Nordic as well as UK, Australia, Netherlands and
Germany. Results revealed that SCI does impinge on cost as well as efficiency frontier. Moreover results has also indicated that integration with customers and suppliers were found beneficial in terms of better inventory management, better sales forecasts and management, supply chain design, R&D, lead time as well production management. The study further has established a notable conclusion that the better integration leads to have better competitive edge.

The dimensions of SCI as operationalized by Boon-Itt and Wong (2011) are classified into internal integration, customer and supplier integration. This study was conducted on the sample of first tier supplier(s) among automotive industry in Thailand and its supply chain. The study examined the relationship between SCI and delivery performance with moderating role of factors i.e. demand and technology uncertainties. Findings of the study revealed that internal and suppliers integration were found significant and positively related to the dependent variable (i.e. delivery performance). This indicated the significance and importance of information sharing and cooperative behavior among the functional areas within the particular organization and with the suppliers thus proved to be beneficial in enhancing the delivery performance. Moreover integrative behavior between the focal firm and its suppliers proved to mitigate the detrimental consequences of technology uncertainty through their mutual understanding and working technological innovation process. However customer integration did not associated with dependent variable. Additionally demand and technology uncertainty factors moderate the examined relationships.

Koufteros, Vonderembse and Jayaram (2005) classified SCI in to three dimensions i.e. customer integration, internal integration (i.e. concurrent engineering practices) and
supplier integration. The sample of the study was 244 firms which participated for testing whether internal and external integration affect the performance dimensions (i.e. product, profitability and quality performance). Finding of the study revealed that internal integration significantly affects the external integration and proved to be enablers of external integration (i.e. both customer as well as suppliers) and consequently enhances the performance. It means that those firms which have successfully abolished the internal myopic nature among functional areas through concurrent engineering practices also easily maintained integration practices with external partners along the boundary span of the organization. Thus internal integration or concurrent engineering practices assist the integration practices with the external partners and external integration without integration among internal functional areas is futile as well as ineffective. The study also examined the moderating role of the contextual factors/variables (i.e. platform strategy, uncertainty, equivocality etc.). The results further revealed that the factors equivocality was found to moderates the examined relationships between the performance and integration dimensions whereas other two variables (i.e. platform strategy and uncertainty factor) did not prove to have any moderating effects.

Wong, Boon-itt and Wong (2011) operationalized SCI dimensions into internal and external integration (i.e. three dimensions). Further the study explored the moderating role of different environmental uncertainty on operational performance and SCI dimensions. The results provided the evidence for positive impact of integration practices (internal as well as external) on the operational performance which in turn contributed to reduced cost, and improving quality, flexibility dimension thus buttressing the importance of removing the myopic nature prevailing among the units within the firm as well as across the boundaries of the organization (with external
Additionally the moderating role of environmental uncertainty variable was found to fortify the existing relationship between the SCI each dimension and operational performance under high intensity as compared to the low intensity of uncertainty behavior. The sample of the study was the 155 automotive manufacturing industries in Thailand.

Baharanchi (2009) addresses three aspects of integration i.e. internal, supply and external integration and its impact on product features (i.e. innovation and quality aspects) . Findings revealed the significant positive impact of integration practices on the product features the study investigated. The study also reiterated the positive contribution of information visibility and relationship based on collaboration with suppliers as well as customers towards the achievement of better business results (i.e. innovation and quality aspects of the products).

Gemenez, Vaart and Donk (2012) investigated the effectiveness of supply chain complexity (low vs. high) or business conditions with respect to the relationship between performance and SCI. The findings revealed that SCI enhances performance in case of high supply complexity as opposed to little complexity. Contextual factor complexity here includes higher varieties of products, innovation and increased demand fluctuation etc. Moreover SCI refers SC patterns i.e. communication modes, SC attitudes (e.g. trust) and SC practices (e.g. integrated planning, VMI, delivery synchronization, EDI). This research highlights the importance of contextual factors and their moderating role in understanding different context under which integration takes place which consequently improves performance. The sample of this was the manufacturing companies in Spain and Netherland. The study’s findings suggested that
integration with partners is only fruitful or effective provided there exists high complexity environment. It further provided useful insight that the study not only reexamining the vital SCI and performance relationships but also facilitates in understanding the context in SC management in general and SCI in particular.

A study conducted by Huo (2012) to explore the relationship between three dimensions of SCI on performance from organizational capability perspective. Chinese manufacturing firms (n= 617) were included in the study and findings divulge that internal integration (Int_I) within a company is a prerequisite for integration with external partners and both dimensions improve performance dimensions directly and indirectly. This study also reaffirmed the notion that internal integration (Int_I) is required in order to achieve external integration because if the companies internal functions works in silos and does not share information and work together internally, external integration cannot be maintained effectively.

Another study by Childerhouse, Deakins, Bohme, Towill, Disney and Banomyong (2011) provided useful insights by investigating the SCI maturity in international perspective among 72 value streams among Thailand, UK and New Zealand using Quick Scan approach indicating that bulk of the companies are in still in delusion and in high difficulty for turning the concept of SCI in to reality. The international firms under study were found poorly integrated on an average and clearly signifying considerable fissure in rhetoric and practice of SC. A study conducted by Teixeira, Koufterous and Peng(2012) proposed a framework to establish a relationship between organization structure (an antecedent) and integration dimensions and made a proposition that firms that have hindrance related to organization structure may find difficult to form or establish integration both internally as well as externally. However their model is still subject to empirical testing and confirmation of stated propositions.
As described previously, the different studies conceptualized the SCI in different dimensions i.e. single (e.g. Bagchi et al. 2005; Marquez et al., 2004; Rosenzweig et al., 2003) vs. multidimensional (Droge et al., 2004; Flynn et al., 2010; Koufteros et al., 2005; Stank et al., 2001; Gemenez & Ventura, 2003; Huo, 2012; Narasimhan & Kim, 2002) and majority of other conceptualize into internal and external dimensions i.e. internal, suppliers and customer integration (Wong, Boon-itt & Wong, 2011; Morash & Clinton, 1998; Zailani & Rajagopal; Stank et al., 2001; Gimenez & Ventura, 2005; Frohlich & Westbrook, 2001; Flynn et al., 2010). Although there is overlap exists in each dimension i.e. single, double or multiple thus representing important part of SCI phenomenon. Moreover there is still no consensus about the definitions and conceptualization as well as appropriate criteria to measures the components of the SCI phenomenon and the relationships among different dimensions of SCI are described inconsistently in literature (Croom et al., 2000; Flynn et al., 2010, 11; Fynes et al., 2005; Huo, 2012; Roth et al., 2008; Febbe-Costes & Jahre, 2007, 2008; Forslund & Jonsson, 2009; Frohlich & Westbrook, 2001; Giannakis et al., 2004; Ho, Au & Newton, 2002; Chen & Paulraj, 2004; Das et al., 2006; Devaraj et al., 2007; Germain & Layer, 2006; Fabbe-Coste & Jahre, 2007; Flynn et al., 2010; Handfield & Nichlos, 1998; Kulp et al., 2004; Stank et al., 2001a; Scannell et al., 2000; Van der Vaart & Van Donk, 2008; Vickery et al., 2003; Tan, 2001). So the literature so for seems unable to conclude to determine that how the phenomenon of supply chain integration affects the performance measure and what are the dimensions of SCI. For a lot of companies the unclear delineation of SCI concept and effectual implementation of this phenomenon both internally and externally is still a mystery though some previous literature provided the positive outcomes of this phenomenon (SCI) in terms of cost reduction, reduced lead times, reduced bullwhip effects etc. Few studies which
explored the moderation of contextual factors (environmental uncertainty i.e. both high versus low and supply complexity) between the dimensions of SCI and performance and concluded that these factors do play a role in establishing SCI-Performance relation (Gimenez et al., 2012; Wong, et al., 2011). A most recent study conducted by Huang, Yen and Liu (2014) has investigated the role of technology and demand uncertainties and found that technological uncertainties reinforces the relation between SCI and performance whereas the demand uncertainties weakens this relationship.

Moreover the literature has also given a clear indication that internal integration (Int_I) is a prerequisite for integration with the external partners, however literature regarding the antecedents of integration is still lacking (Basnet & Wisner, 2012; Bowerox, Closs & Stank, 1990, 2000; Fawcett & Magnan, 2002; Daugherty & Ellinger, 1999; Gimenez & Ventura, 2003; Pagell, 2004, Stevens, 1989). The current study not only focuses on the antecedents of internal integration (Int_I) but also the moderating role of factors which may moderate the existing relationship and its impact on the performance. This study has focused on three dimensions of SCI phenomenon i.e. internal and external (i.e. customer and suppliers) integration. According to the study conducted by Schoenherr and Swink (2012) these three components of SCI termed as dimensional triad because these two dimensions (internal and external integration) are intimately related and should be discussed together when examining SCI phenomenon (Chen, Daughrty & Landry, 2009; Stank & Lynch, 2004; Stank, Keller & Closs, 2001).

The subsequent section briefly discusses the dimensions of SCI i.e. internal integration and its antecedents and external integration.
2.5 Internal Integration

A well stream of previous literature has speaks of no disbelief about the significance of the internal integration (cross functional) and demonstrated that those firms which embraces the coordination aspect among the different functional areas within the organization are successful in developing or creating a new and innovative product as well as exploitation of information & knowledge which resides within the boundaries of organization which consequently leads towards enhanced performance (Anderson & Narous, 1990; Hayes & Wheelwright, 1984; Griffin & Hauser, 1992; Morash et al., 1997; Narasimhan & Das, 2001; Olsen et al., 2001; Song, Montoya-Weiss & Schmidt, 1997; Reukert & Walker, 1987; Watts et al., 1992). Though the importance of integration among internal functional units cannot be neglected but clear definition is still lacking. This concept has been ignored intentionally or unintentionally by the previous researches (e.g. Frohlich & Westbrook, 2001; Rosenzweig et al., 2003) although its importance is widely acknowledged as described above. Internal integration (Int\_I) refers to coordinated or synchronized management of operations and activities within the particular firm which stresses coordination among functional units and is equal to collaboration aspect which ultimately aimed at providing superior customer service (Chen et al., 2009; Chen & Paulraj, 2004). It studies operations within firms through exploitation of resources available in terms of information availability within the company and intended to eradicate myopic nature of functions and calls for better coordination among functional areas as a whole (Barratt, 2004; Song, Montoya-Weiss & Schmidt, 1997). According to Stock, Greis Kasarda (2000), it measures how well the logistic activities and other functional units are integrated. It refers to the degree to which a firm can organize its procedures, behaviors and organizational practices into a collaborative, synchronized and manageable process thus meeting the customer
requirements (Cespedes, 1996; Chen & Paulraj, 2004; Kahn & Mentzer, 1996; Zhao et al., 2006b; Zhao et al., 2011).

In order to better serve the end consumer and for ensuring seamless working environment as well as acquisition of the information and knowledge which resides within functional unit and in creating product or services needs to be well integrated and further demands coordination and collaborative demeanor across functions/departments. Much of the research has attributed to integration of functional areas (e.g. marketing & R&D, marketing & Logistics, marketing-Engineering, marketing-manufacturing, marketing-purchasing; R&D-manufacturing; purchasing & manufacturing; HR & manufacturing; Production, Logistics and Marketing). These integration practices among above functional units one way or the other consequently leads to better performance in terms of customer service and cycle time reduction and competitiveness while lack of integration and silos mentality leads to lower performance (Cespedes, 1994; Ellinger, 2000; Fisher, Maltz & Jaworski, 1997; Fawcett & Magnan, 2002; Gemenez & Ventura, 2005; Griffin & Hauser, 1996; Hise et al., 1990; Kahn & Mentzer, 1994; Kahn, 1996; Lancaster, 1993; Narasimhan & Das, 2001; Pagell, 2000; Souder, 1987; Souder, 1977; Susman & Dean, 1992; Topolsek et al., 2010; William et al., 1994; Wheelwright & Clark, 1992; Youndt et al., 1996). For example logistics and marketing departments largely falls in customer service domain and their coordination/integration is very much vital to respond optimally in order to meet customer’s desires otherwise working on cross purposes leads to conflict (Ellinger, 2000; Schramm-Klein & Morschett, 2006). Another study for example Pagell (2004) explored that performance of the plant is improved when manufacturing and human resource decisions are aligned. The study also investigated number of factors
that enable or hinder integration process among purchasing, operations and logistics (internal supply chain functions) through using a case study method.

Previous streams of literature described integration/internal integration/interdepartmental integration as interaction, communication and collaboration, cross functional teams (i.e. concurrent engineering), collaboration & coordination, cooperation & collaboration, information sharing through the conduction of interdepartmental meetings as well as real time information sharing among internal functions within the company (Basnet, 2013; Brown & Eisenhardt, 1995; Fawcett & Magnan, 2002; Flynn et al., 2010; Gimenez, 2006; Griffin & Hauser, 1996; Khan & Mentzer, 1998; Koufteros et al., 2005; Lawrence & Lorsch, 1967; Moenaert et al., 1994; Narasimhan & Kim, 2002; Pagell, 2004; Van de Ven & Ferry, 1980). For example one stream of literature which labeled integration as interaction aspect which emphasizes that meetings and more information flows among functional areas is a source of integration or unity, providing mechanism for interconnection and portrayed as interaction (communication or transaction) philosophy (Griffin & Hauser, 1992; Kahn, 19964; Rinehart, Cooper & Wagenheim, 1989). Exchange of information through documentation, telephone conversations, teleconferencing, routine meetings (i.e. explicit and verbal) among interdepartmental activities falls in this communication approach (tangible) for enhancing relationships, integration and reducing misunderstandings/misconceptions among functional units, as submitted by the previous literature (Griffin & Hauser, 1996; Jaworski and Kohli, 1993; Van de Ven & Ferry, 1980). Second stream of research labels it as collaboration philosophy which emphasizes shared resources, mutual understanding, team work and establishment of joint or collective objectives/goals among functional units thus establishing strategic
alignment (Kahn, 1996; Lawrence & Lorsch, 1967; Lorsch, 1965; Tjosvold, 1988). Collaboration aspect represents activities that are intangible in nature and requires joint efforts based on trust as well as functional areas should work together happily/willingly (Kahn, 1996) thus emphasizes *esprit de corps* and continuous relationships as opposed to just transaction among functional units. Collaboration is defined as “An affective and volitional process where departments work together with mutual understanding, common vision, and shared resources to achieve collective goals” (Kahn & Mentzer, 1998, p. 55). Another stream favors composite view which declares integration encompasses both interaction and collaboration (Gupta, Raj & Wilemon, 1985; Song & Parry, 1992). Authors of this view agreed on the fact that integration which was measured through this composite measure helps the management in building integration among the functional units in a better way.

Ellinger (2000) in his seminal study addresses performance benefits linked with interdepartmental integration between marketing & logistics harmonized relations and concluded that firms evaluations and reward system for example ensures cooperation and teamwork for improving collaboration are vital which consequently leads to better distribution performance. Furthermore it was established through findings and highlighted that using teams comprising of different functional units as a coordination mechanism as well as possessing high customer responsiveness is vital to attain the competitive edge. The study also opens avenues for research in future to further explore the benefits associated with collaborative attitude between marketing & logistics.

Kahn and Mentzer (1998) did empirical investigation among manufacturing, marketing and R&D functional units from 514 manufacturing companies and concluded that
collaboration aspect of integration is important for establishing harmony among functional units. The study further favored and suggested that there should be more emphasis on collaboration aspect to measure integration as compared to interaction as it is helpful in overcoming pessimistic behaviors. The study notably differentiated and discriminated between the two important components of integration i.e. interaction & collaboration aspects.

Few other researchers described internal integration philosophy as concurrent engineering which draws attention to the use and early involvement of cross functional teams in the product development process (Johnson & Filippini, 2009; Koufteros et al., 2005). The use of cross functional teams was proved to be advantageous for dipping the conflict among functional units and enhancing performance (i.e. time, innovation, quality etc.) (Brown & Eisenhardt, 1995; Clark & Wheelright, 1992; Maltz & Kohli, 2000; Tessarolo, 2007). Cross functional teams are proved to be beneficial for plummeting the potential conflicts among functional units (Maltz & Kohli, 2000). Most recently Basnet (2013) developed an instrument/tool for measuring internal integration with three dimensions namely coordination, communication and affective relationships. In nutshell, though internal integration concept was largely ignored previously and clear definition still lacks, however extant literature as described above measures this phenomenon through interaction, collaboration, cross functional teams, coordination, communication and affective relationships among different functional units of the firm (Basnet, 2013; Frohlich & Westbrook, 2001; Kahn & Mentzer, 1998; Pagell, 2004; Van de Ven Ferry, 1992).
2.5.1 Factors affecting the internal integration

Previous literature is quite replete with the positive outcome of internal integration or cross-functional integration and comes up with the conclusion that by removing the silos mentality or myopia among the functional areas within the organization not only be beneficial but also served as prerequisite for successful relationships with the external partners i.e. customers and suppliers in the chain (Flynn et al., 2010; Dougherty, 1992; Gimenez, 2006; Song, Montoya-Weiss & Schmidt, 1997). In spite of the fact that internal integration is crucial there is still a scarce research on this area as well as how to achieve internal integration (Basnet & Wisner, 2012; Gemenez & Ventura, 2003; Pagell, 2004). Very few studies have investigated the factors that enhance integration. For example a recent study by Basnet and Wisner (2012) investigated empirically the antecedents or interventions at the organizational level for enhancing internal integration among the functional areas of the organization. These includes interventions at functional level (e.g. joint accountability, incentives for managers, positive attitudes among functional areas; at management level (i.e. top management support for integration and working together; consensus on strategy and use of ERP; and at employees level (Proximity; job rotation; training regarding of other departments; incentives and informal interaction). Findings revealed that the factors job rotation, co-location, consensus on strategy and line managers role towards integration were found to fosters the internal integration whereas employees training, management support for working together and enhancing integration were found moderately or have little role in enhancing the internal (Int_I) integration. Other factors did not provide enough evidence to support for
improving integration among departments within the organization. Another most famous exploratory study on internal integration (Int_I) by Pagell (2004) which was intended to explore the factors which served as facilitators and hinderer to the integration among internal functions of the organization. The internal functions under study in Pagell (2004) were operations, purchasing and logistics. Results concluded that the aspects which were effecting integration inculdes facility layout (proximity), structure, cross functional teams, job rotation, technology, culture, strategic consensus, communication and reward systems. The study concluded that effective flow of material (i.e. structure), openness culture and communication through the use of cross functional teams and rotation of people among functional areas, close proximity etc. are crucial for promoting the integration among functional areas.

Many previous researches and literatures replete with seeking the benefits of integration, emphasized the use of IT, cross-functional teams, personnel movements across departments, structure/communication and management support, goal congruence and reward systems for fostering or creating coordination and integration (Allen,1986; Basent & Wisner,2012; Cohen &Levinthal,1990; Clark & Fujimoto,1987; Dougherty,1992; Eng,2006; Ettlie & Stoll, 1990; Ganeshan, 2002; Jansen et al.,2005; Kahn,1996; Kahn & Mentzer,1994; Narasimhan & Kim, 2001; Smeltzer, 2001; Wheelwright &Clark, 1992; Pinto et al.,1993; Shouder & Sherman,1993). A study conducted by the Calantone, Droge and Vickery (2002) examined the relationships between the marketers and manufactures and tested the knowledge and communication as an antecedents to the integration because if marketing department personnel has knowledge of manufacturing and vice versa, the
harmony prevails, forging links and is a source of integration between these functional areas. This is so because that the two functional areas have diverse perspective and domains so prone to the possible conflict of interest which may create a difficulty in establishing an effective interface. In this situation communication and knowledge transfer between these departments is crucial and are the drivers of integration and consequently enhances performance of the business (Hill, 1989; Husman, Montgomery & Roth, 2002). The authors also suggested possible means to enhance this harmony through job rotation mechanism, interdepartmental education and analytical tools e.g. ABC (Activity based costing) and QFD for enhancing knowledge and relevant education for promoting cross-functional synchronization.

Another empirical evidence provided by Mollenkopf, Gibson & Ozanne (2000) in his cross-sectional survey among New Zealand firms regarding factors establishing integration between marketing and logistic functional areas. The proposed model discusses inter-functional, organizational as well as strategic factors. The study maintained that providing cross-departmental training facilities, technologies, structure (e.g. decentralization stimulate coordination) and accommodating behavior helps in creating linkages, connectivity, coordination and information sharing connectivity. This in turn leads to reduction in cost and consequently improves profitability and customer service. The study echoed that the more the organization exhibits and possesses collaborative behaviours and attitudes, the more it has the connectivity and goal alignment or congruency among functional units.
Keeping in view the importance of the internal integration aspect as well as the dearth of research on how to achieve this as highlighted in the previous research (e.g. Basnet & Wisner, 2013; Germain & Ventura, 2003; Pagell, 2004), the present study focuses first on the factors influencing internal integration. These factors include job rotation, intra-organizational knowledge sharing, inter-departmental training, management commitment, supporting technologies and strategic consensus. The succeeding section briefly described each of these factors and formulated the corresponding hypotheses based on the review of the literature.
2.5.1.1 Job rotation

Lateral transfer or movement of employee/staff from one job to another or between jobs is termed as job rotation (JR) (Campion, Cheraskin & Stevens, 1994; Edward, 2005; Malinski, 2002). JR is a career development tool or strategy for employees which aims for rotation as well as training regarding different jobs or functional units thus preparing them as a journalist (Campion, Cheraskin & Stevens, 1994). JR enhances employees motivation (i.e. decreases in boredom), employer learning about his employees (which helps in allocating an appropriate job/task etc) as well as employee knowledge (human capital), interdepartmental cooperation and organization overview (Campion, Cheraskin & Stevens, 1994; Cosgel & Miceli, 1999; Eriksson & Ortega, 2004; Ortega, 2001; Rohr, 2000). JR is a source of employee orientation, socialization, succession planning, employee satisfaction and useful for breaking functional myopic behaviour i.e. silos mentality because employees who are rotated possesses better knowledge of functional areas (as they have opportunity to have communication with personnel with diverse expertise), organization’s goals, mission and customer requirements (Beatty, Schneier & McEvoy, 1987; Davis & Taylor, 1989; Dougherty, 2000; Rothwell & Kazanas, 1994; Schein, 1978; Zeira, 1974). A comprehensive study on Japanese management theories by Keys and Miller (1984) concluded that Japan uses the practice of JR as a tool to broaden the knowledge/awareness of the firm and emphasizes the cohesiveness as well as developing the human resources (Hatvany & Pucik, 1981).
The study conducted by Kusunoki & Numagami (1998) found that JR is a useful method to achieve cross-functional harmony. JR increases problem solving skills, organizational relationships, encourage cooperation, coordination, goal congruency, collaboration, alignment and understanding of processes and procedures of the organization which consequently leads to interfunctional integration and harmony (Cohen & Levinthal, 1990; Griffin & Hauser, 1996; Jansen et al., 2005; Martinez & Perez, 2003a; Moorman et al., 2007; Noe & Ford, 1992; Parry & Song, 1993; Souder, 1987). Genzi & Troilo (2006) also favors the role of job rotation in enhancing collaboration.

A notable study of Basnet and Wisner (2012) which investigated the role employees level intervention undertaken by the company e.g. job rotation for heightening integration among internal functional units. The study’s sampling frame was the manufacturing firms of New Zealand. The results divulge the positive association between job rotation and coordination among functional units i.e. internal integration.

The study conducted by Xie, Song & Stringfellow (2003) explored the facilitative and motivational factors that support the shared goal congruency including the job rotation and proximity for enhancing integration among functional areas i.e. manufacturing, R&D and Marketing units/department. The findings of the study concluded that job rotation and rewards are communally helpful in decreasing incongruencies in shared goals/objectives and enhances the likelihood of establishing mutual understanding or shared vision among functional units in five samples i.e. Japan, UK, US, Hong Kong and Britain thus proving inverse relation of JR with goal in-congruency.
Another study by Song, Xie and Dyer (2000) tested a model of conflict behavior and its influence on the cross functional harmony/integration. JR is studied as an antecedent of conflicting behavior. JR was found insignificant relationship with conflicting behavior style in China, UK, US. However the JR is significantly related with avoiding dimension of the conflict management behavior among firms in Japan. The results of the study echoed that the organization should promote conflict resolution measures or strategies to establish and enhance integration which consequently facilitates in enhancing business results.

Previous research is replete with the notion that job rotation is a source of integration or harmony within the functional units and knowledge regarding other functional areas (Basnet & Wisner, 2012; Griffin & Hauser, 1996; Keys & Miller, 1984; Parry & Song, 1993; Lenders & Wierenga, 2002; Pagell, 2004). Based on the above discussion and importance of the JR, it is proposed/hypothesized as

**H1.** Rotating employees among internal functions improves internal integration.
2.5.1.2 Inter-departmental training

Interdepartmental training (IDT) refers to the education or formally designed training of employees regarding other functional units within the organization. The purpose of IDT is to create awareness and knowledge of other functional units e.g. marketing personnel knowledge of manufacturing and vice versa. Previous research has concluded that IDT provides learning opportunities about functional units and enhances interaction, communication and integration/collaboration and reduction in potential conflict of interests (Aggarwal & Singh, 2004; Basnet & Wisner, 2012; Daugerty et al., 1996; Meyers & Wilemon, 1989). The communication gap and lack of awareness of other functional units of the organization e.g. lack of marketing people knowledge of engineering and vice versa is found to be a barrier to integration or harmony due to the conflict of interest and this can be reduced only through the education or training regarding other functional units (Gupta et al., 1986; Mollenkopf, Gibson & Ozanne, 2000; Morgan & Piercy, 1998; Shaw & Shaw, 1998). Basnet and Wisner (2012) favoured the employees trainings and education of own and other departments as it helps in boosting the harmony among internal functional units. The study further established through findings that education or trainings of other functional units resulted in more harmony or integration in companies with relatively larger sizes. Interdepartmental training/education programs were considered as a sources for encouraging and boosting interdepartmental cohesiveness or integration as suggested by the seminal work of Aggarwal and Singh (2004) in a study of Indian firms.
The study concluded by Mollenkopf et al. (2000) suggested that in order to induce the cooperative behaviors and attitudes between functional units, managers should put emphasis on the cross education and training prospects/mechanisms for fostering connectivity among employees in marketing & logistics units. The departments within a manufacturing company can enhance cooperation and goal congruency through cross functional trainings and job rotation (Montgomery & Hausman, 1985). Based on the above discussion, it is proposed /hypothesized as

**H2.** Inter-departmental training enhances internal integration.
2.5.1.3 Management Commitment

The spirit of an organization is truly a leadership and leadership role is vital in maneuvering the organization focus towards the actual vision and make it a reality as desired. Cohesiveness in an organization can be possible through the top management support/commitment as it enhances communication, interaction, collaboration among functional units and is source of productivity, efficiency, communal vision, product success and diminishing the interdepartmental adversarial relations (Basnet & Wisner, 2012; Griffin & Hauser, 1996; Kahn, 1996; Loonam & McDonagh, 2005; McDonald & Eastlack, 1971; Mollenkopf et al., 2000; Thompson & James, 1999; Ragunathan et al., 2003; Ravichandran & Arun, 2000; Maidique, Modesto & Zergir, B., 1984; Piercy, 2006; Olson & Viswanath, 1992; Song et al., 1997; Souder, 1987; Van de Ven, 1986). Management commitment (MC) refers here the degree to which the management is committed in providing an environment and resources for teams work, cooperation and collaboration among internal functions of the organization (Song, Xie & Dyer, 2000). Previous research concluded that positive attitude of management towards integration in the organization is an important source of improving interaction, cooperation, collaboration, innovation and goal congruity among internal units of the organization (Ford & Randolph, 1992; Van de Ven, 1986).

Pagell (2004) in his case study emphasizes the importance of management commitment towards fostering integration between logistics and purchasing and argued that if organization lacks this factor, integration would have been
difficult. Similarly as highlighted by Basnet and Wisner (2012) the management attitude towards fostering and emphasizing harmony and integration is vital as it diminishes the myopic mindset or behavior.

So the management of the organization should put rigorous efforts in establishing internal integration (e.g. providing delegation in authority or suitable working environment and ensuring the knowledge of clear goals and objectives of the organization) as emphasized by the previous researches (Daugherty, Ellinger & Gustin., 1996; Fawcett et al., 2006; Ford & Randolph, 1992; Mollenkpf et al., 2000; Van de Ven, Andrew, 1986). Xie, Song and Anee (2003) also concluded the inverse relationships between the management support for integration with goal incongruity in 1083 Japanese, British and USA firms. The data was collected from R&D, Marketing and manufacturing departments in these three countries.

Daugherty et al. (1996) in their noteworthy study on logistic integration among firms in US in which executives from logistics (295) have participated. Through the findings it has been established that the role of top management for establishing integration (48% of the executive responded in favour) is vital as management of this level possesses convincing, influential abilities for promoting harmony or integration among functional units. The study further suggested that top management should vigorously participate or jointly work for integration efforts and bringing all the stakeholders under a single platform to be benefitted from the fruitfulness of integration instead of working cross purposes that leads to channel inefficiency thus diminishing the success chances.
Parry, Ferrin, Gonzalez and Song (2010) in their study on Spanish firms (134) through establishing the role of cross functional integration concluded that the more is the management support for integration and the more the integration. The study also concluded that there is an inverse relationship between the integration and goal incongruency. Based on the above review regarding the role of management commitment (i.e. management role for fostering/supporting integration, it is proposed / hypothesized as

**H3.** Management commitment towards emphasizing integration enhances internal integration.
2.5.1.4 Intra-organizational Knowledge Sharing

This phenomenon (IoKS) aims at highlighting the collective beliefs or behavioral patterns embedded within an organizational units and sharing of experiences and learning from the past through knowledge sharing among different units within an organization (Moorman & Miner, 1998; Zaltman, Duncan & Holbek, 1973). Intra-organizational knowledge sharing includes review of the information accumulated, sharing of experience, mistakes / faults, and lesson learned extensively communicated across different functional units within the particular organization (Calantone, Cavusgil & Zhao, 2002; Hult & Ferrell, 1997). Organizational capabilities can be augmented by coordination of different functional units within an organization through the sharing of knowledge, experiences and information gathered from the diverse sources which ultimately keep alive every thing and useful for future planning and fulfilling the discerning customer needs (Kogut & Zander, 1992; Lukas, Hult & Ferrell, 1996; Moorman & Miner, 1998). This can be better understandable for example marketing department which has direct connection with the customers and has better awareness and knowledge of the market trends, consumers attitudes and requirements and this will only be fruitful provided these experiences are shared with other departments e.g. research and development, production etc. to better fulfill the customer requirements and product success. A study conducted by Eng (2006) concluded that intra-organizational knowledge sharing is significantly associated with increased cross-functional coordination and plays an important role in supporting cross-functional coordination. UK’s high tech companies were the sample for this study which investigated the role of organizational norms (e.g. intraorganizational knowledge sharing, cooperative and participative culture etc.) for boosting the
coordination among functional units. Based on the above discussion regarding the role of intraorganizational knowledge sharing, it is proposed/hypothesized as

**H4.** Intra-organizational knowledge sharing enhances internal integration.
2.5.1.5 Strategic Consensus

Previous research is replete with the significance of strategic consensus (SCon) or organizational members commitment towards shared organizational goals internally because of its effect on performance of the organization, customer service whereas lack of consensus regarding firm strategic priorities leads to conflict or less integration among functional units and impede the system thinking behavior (Ansoff, 1965; Amason, 1996; Bouyer & Mc Dermott, 1999; Bourgeois, 1980; Dess, 1987; Deutsch, 1980; Hrebiniak & Snow; Des & Origer, 1987; Kopelman, Brief & Guzzon, 1990; Locke & Latham, 1990; O’Leary-Kelly, Anne, Martocchio, Joseph & Frink, 1994; Walker & Ruekert, 1987). Inculcating consensus on the goals or strategic objectives within a company leads to collective vision and internal integration therefore organizations needs to adopt trade offs among internal functions within the organization for establishing true consensus on strategic aims (Akkermans, 1995; Pagell, 2004; Senge, 1990). Strategic consensus refers to level of shared perception, mutual understanding of strategic objectives among different management levels within the firm and agreement towards overall strategy (Bowman & Ambrosini, 1997; Floyd & Wooldridge, 1989, 1990, 1992; Grinyer & Norburn, 1977). Taking measures towards establishing the consensus on strategy of the company helps in improving the integration among internal functions (Basnet & Wisner, 2012). The lack of agreement towards strategic objectives is major barrier to integration and do not intensify the interaction and collaboration process and requires management to emphasis in ensuring consensus on firm strategy for enhancing communication, commitment, unity of efforts and unified direction (Basnet & Wisner, 2012; Dess & Priem, 1995;
Based on the above discussion regarding the role of strategic consensus, it is proposed /hypothesized as

**H5.** The more the strategic consensus the more is the internal integration among functional units.
2.5.1.6 Supporting Information Technology

Successful SCM practices calls for information visibility throughout the
chain and to capture and communicate this information within and outside
organization requires the use of information technologies. Previous research
concluded that integration /coordination within the organization, better decision
making, management of an organization, relationships, information collection,
dissemination and retrieval (Knowledge management) with less processing costs
e tc. can be achieved through the use of information technologies e.g. ERP,
intranet video conferencing e-mail etc. (Alsen, 1990; Alsene, 2007; Bettis &
Hitt, 1995; Clesmons, Reddi & Row, 1993; Desanctis & Jackson, 1994; Fawcett
& Cooper, 2001; Harrington, 1973; Hine & Goul, 1998; Gurbaxani &
Whang, 1991; Narasimhan & Kim, 2001; Sudrajat, 2007; Merchant, 1961;
Teece, 2001). Supporting information technologies (SIT) refers here
technologies (e.g. email, video conferencing, intranet, ERP etc.) which facilitate
communication, collaboration or integration and make available the
information for all internal business functions (Alsene, 2007; Davenport, 1998;
Gallupe et al., 1992; Hernandez, 1997; Huber, 1990; Laudon & Laudon, 2004;
Murgolo-poore, Pitt & Ewing, 2002; Teece, 2001; Silver, 2000). For example
ERP provides information integration and make information accessible among
all functional units of the organizations (inventory, manufacturing, marketing
etc.) and is a source of company’s integration as opposed to previously legacy
systems which are outdated presently (Abu-alganam & Adaileh, 2010; Alsene,
2007; Davenport, 2000; Daugherty et al., 1996; Gattiker et al., 1997; Gupta,
2000; Hsu & Chen, 2004; Lemaire, 2003; Tarn et al., 2002). It acts as
coordination mechanism that facilitate integration between marketing and manufacturing interface (Hsu & Chen, 2004; Gattiker, 2007).

Aggarwal and Singh (2004) has established through their findings that the use of “telematics” i.e. intranet, mail etc. and other measures are considered as a sources for encouraging and boosting interdepartmental cohesiveness or integration in a study among firm in India.

Similarly the use of other technologies e.g. intranet, video conferencing etc. facilitate collaboration, improve communication, dissemination and information consistency, internal communication team work and innovation within the enterprise (Andersen, 2001; Baptista, Backhouse & Canhoto, 2006; Curry & Stancich, 2000; Gallupe et al., 1992; Leow & Maclennan, 2000; Murgolo-poore, Pitt & Ewing, 2002; Murgolo-poore, Pitt & Berthon, Prendegast, 2003; Teece, 2001; Sproull & Kiesler, 1986; Ward, 2002; Wright, 2001). Based on the above discussion regarding the role of information technology, it is proposed /hypothesized as

**H6.** Supporting information technology fosters the level of internal integration.
2.6 External Integration

The existing literature has stressed and provided enough evidence that integration across boundary span by leveraging the core competencies for supporting the development and design activities of the products effectively through coordination and network relationships with both upstream and downstream. This would help in reducing bullwhip effects and effectively managing market uncertainty which consequently enhances performance (Febbe-Costes & Jahre, 2008; Droge, Jayaram & Vickery, 2004; Lee et al., 2007; Stock, Greis & Kasarda, 1998; Vickery et al., 2003). Frohlich and Westbrook (2001) validated the importance of integration with upstream and downstream (i.e. broader arc) and associated benefits for example performance improvement as described above. This upstream and downstream integration can be classified as external integration i.e. customer integration and supplier integration. It encompasses upstream and downstream movement of material as well as information and related coordination activities and practices (Braunschweidel, Suresh & Boisnier, 2009). An organization which intends to better serve the customer requirements not only establishes the collaborative relations with its partners i.e. customers and suppliers but also organizes and synchronizes its strategies and processes in an appropriate manner to achieve its goals is termed as external integration (Stank et al., 2001).

This form of integration highlighted the need of communication, information exchange, mutual understanding, involvement in the product development, process coordination; problem solving with external partners i.e. suppliers and customers (Droge et al., 2004; Flynn et al., 2010; Petersen, Handfield & Ragatz, 2005; Stank et al., 2007). For example the involvement of supplier is
important in getting the benefits of competencies of suppliers by incorporating their ideas, improving operational efficiencies, reducing the project time and fixing the problems at the early stage of the product development through information and process coordination. The information sharing and process coordination includes sharing of inventory status, production plans, demand status with suppliers and involving in the internal processes of the organization respectively (Droge, Jayaram & Vickery, 2000; Stank et al., 2001; Zhao et al., 2006). Similarly focal firm’s integration practices with customer includes information exchange with customers.
2.7 Supply Chain performance

Measuring performance of the supply chain is multidimensional phenomenon which quantifies it on the efficiency and effectiveness frontiers for analyzing the performance (Beamon, 1999; Chase et al., 1963; Holmberg, 2000; Li et al., 2006; Neely et al., 1995; Tan et al., 1998). Efficiency termed as an internal performance indicator which refers to how optimal resource utilization is carried out and putting it simply “doing things right” whereas external performance measures which indicates the level of fulfilling end consumers’ expectations is termed as effectiveness or more simply “doing right things” (Gleason & Barum, 1986; Neely et al., 1995; Pfeffer & Salancik, 1978). Previous research lacks the balanced/comprehensive mechanism due to less focus to holistic i.e. on system thinking approach, less strategic alignment as well as less focus external to the organization. Moreover lack of consensus for measuring performance of supply chain is also highlighted by the previous literature. The phenomenon is frequently classified in literature into quantitative/non quantitative measures, cost/non cost measures, financial vs. non financial measures etc. (Beamon, 1999; Beamon & Balcik, 2008; Chan, 2003; Gunasekaran et al., 2001). Moreover some suggested different mechanisms e.g. Activity based costing, PRTM, supply-chain operation reference model-SCOR and other models for measuring SCP (Beamon, 1999; Chan & Qi, 2003; Stewart, 1997). Chan (2003) measured the performance through qualitative measures including quality (e.g. response time, on time delivery, customer satisfaction and so on), flexibility, innovativeness (for example technology initiative), Trust and visibility in terms of accuracy and time. Quantitative measures include costs (for example costs related to inventory, distribution, warehousing, manufacturing etc.) and resource utilization (e.g. energy, capacity, labor and
equipment related). Another measures which previous literature is replete with is SC Operations reference model (SCOR) an industry standard for SCM developed by SC council which descend into four components i.e. cost and assets an internal facing whereas flexibility and reliability (i.e. responsiveness and delivery) an customer facing measure. A framework developed by Gunasekaran et al (2001) which focuses on the measurement of SC performance at strategic, operational and at technical level. Beamon (1999) framework classified the supply chain performance into resources (i.e. optimal resource exploitation, output (external focus for example time, responsiveness, fill rates, lead time etc.) and flexibility measures (e.g. delivery, flexibility in volume etc.). Flexibility refers to ability of firm that how it effectively acts in response to uncertainty as well how it is adaptive to change (Beamon, 1999; Gupta & Nehra, 2002; Vickery, Calantone & Droge, 1999). Moreover Vickery et al., (1999) categorized flexibility into product flexibility (i.e. organization’s ability to meet customized customer requirements), distribution flexibility (providing extensive access to products), responsiveness and volume flexibility (i.e. capacity adjustment according to customer demands). According to Kim and Narasimhan (2002) notable research which classified the supply chain performance into financial (i.e. cost related to operations, warehouse, sales, purchasing and sales) and non financial (which includes innovation at product/process level, reduction in product return, response time, after sales service, on time delivery etc.).

According to Lee et al. (2007), cost-containment and performance reliability are two important constructs for measuring supply chain performance (SCP). Former includes reducing costs for inbound and outbound activities, inventory-holding
cost (Angerhofer & Angerlides, 2006; Chan, 2003; Piplani & Fu, 2005; Ramdas & Spekman, 2000), warehousing costs (Chan & Qi, 2003) and increasing asset turnover while later includes order fulfillment rate (Beamon, 1999; Chan & Qi, 2003), safety stocks, inventory turns (Frohlich & Westbrook, 2001; Ramdas & Spekman, 2000), number of product warranty claims (SCOR) and inventory obsolesces (Beamon, 1990).
2.8 Organizational Performance

Organization initiatives which also include SCM ought to improve organizational performance (OP) which ultimately is useful in knowing and evaluating position of the organization. Measuring the organizational performance is vital for the accomplishment of financial goals as well as market-oriented goals which are not only the sources of organization’s existence but are also considered as major themes of OP (organization performance) (Kaplan & Norton, 1996; Yamin, Gunasekraun & Mavondo, 1999).

Market oriented goals i.e. increase in sales and market share in comparison with its competitors is an ability of an organization that is termed as market performance whereas the financial goals which reflect the financial performance of the organization include return on investment ,profitability of organization etc. with respect to its competitors (Green & Inman, 2005).

Enhancement in productivity ,decrease in inventory and cycle time are the short-term, while increase market share and profits for all members of supply chain are long term objectives of SCM (Tan, Kannan & Handfield,1998).Measures for business performance in the SCM milieu includes return on investment(ROI),market share, profit margin on sales, the growth of ROI(Young & O’Byrne,2001), the growth of sales (Matsuno, Mentzer & Ozsomer,2002; Young & O’Byrne,2001), the growth of market share, and overall competitive position(Brown & Blackmon,2005; Matsuno, Mentzer & Ozsomer,2002 ; Mohrman, Tenkasi, Lawler & Ledford,1995; Stock,Greis & Kasarda,2000 ;Tan,Kannan & Handfield,1999 ; Vickery, Calantone & Droge,1999 ; Venkatraman & Ramanujan,1987).
2.9 Integration approach, Supply chain performance and overall performance

Firm’s integration approach among internal functional units i.e. internally as well as across the firms resulted in the form of enhanced forecast accuracy, inventory management, and customer service respectively thus leads to the notion that internal integration (Int_I) is as equally vital as external integration (Kahn & Mentzer, 1996; Pagell, 2004). Moreover internal integration (Int_I) is considered as prerequisite in establishing external integration and are positively related (Brauncheidel & Suresh, 2009; Gimenez & Ventura, 2005; Handfield & Nichols, 1999; Huo, 2012; Pagell, 2004; Vickery et al., 2003; Rosenzweig et al., 2003; Morash & Clinton, 1998; Yu, Jacobs, Salisbury & Enns, 2013; Zhao et al., 2011). The same was highlighted in a most recent study by Luque, Garcia and Lopez (2014) which reaffirmed that in order to achieve better external integration, management of the company first focus on internal integration as this will in turn help in achieving overall integration benefits. This is so because any organization which has equipped with internal integration practices internally easily transfers those across the boundary span of the organization which make it quite easy in establishing external relationships with customers and suppliers. For example according to Stank et al. (2001), marketing and purchasing department within the organization are more critical and their coordination and information sharing is constructive for establishing integration with external partners because usually marketing department has contact with demand side (i.e. customers) whereas the purchase department has with supply side (i.e. suppliers). As a result tangible and intangible performance benefits in terms of flexibility, cost, sale growth and improvement in market share are a few that are positive consequences of integrating with customers and suppliers (Wong et al., 2011). Flynn et al. (2010) favors the argument empirically that internal integration is required for establishing customer
integration. Similar argument regarding positive relationships between internal integration and customer integration; internal integration and supplier integration was demonstrated by Branscheidel and Suresh (2009). The same was concluded by the Childerhouse et al.,(2011) notable study which found in an international comparison that though the bulk of the companies are still in delusion and are in high difficulty for turning the concept of SCI in to reality however if organization takes initiatives towards internal integration first ,they inturn will get competitive edge. The study highlighted that if the supply chain of a company is not properly organized and managed it creates a serious issue for the management as a whole. The above notable evidence was made while investigating the 72 chains in diversed contries i.e. UK ,Thailand  and New Zealand. In such a scinerio, the study has established a view point that although in reality SCI is difficult to achieve however if organizations are successful to get internal integration atleast that is somewhat enough to stay competitive.

The results of Flynn et al. (2010) study regarding relation between supplier integration and operational performance were not proved to be positive. The study concludes positively with relationships between internal integration and performance (operational as well as business performance). Previous research concluded with an irrefutable fact that there is not only the need to ensure the optimum level of internal integration (as it is prerequisite for external integration as discussed above) to maximize the output of the organization but such efforts have to be linked with integration practices with external partners as well for enhancing the output or performance of the supply chain (Vickery et al., 2003; Woehner, Darknow & Kaiser, 2009). A study by Bagchi et al (2005) which emphasized the positive outcomes of establishing integration with customers and suppliers as this does impinge on cost as well as efficiency frontier and
were found to beneficial in better inventory management, better sales forecasts and management, supply chain design, R&D as well production management. The similar conclusion was made by the Ragatz et al. (1997) that establishing collaborative relationships with external partners i.e. customers and suppliers will be source of improvement in operational performance as well helps in attaining an edge over the competitors. The manufacturer or the company find itself comfortable and better in managing demand forecasts and distribute or deliver its products/services as per the requirements of the customers in a flexible, cost effective manner provided it has established customer integration practices (Flynn et al., 2010).

Woehner, Darknow and Kaiser (2009) confirm the relationships between internal integration and external integration separately (i.e. customer and supplier). The study also investigated the mediating effects of external integration on performance and internal integration. Findings revealed that customer integration mediates the said relation whereas supplier integration did not and study suggested for establishing customer integration for enhancing performance of the firm. Thus the study concluded the insignificant relationship between supplier integration and operation performance and further concluded that supplier integration fails to mediate the relation between internal integration and operational performance. Previous studies also found such insignificance relationship (e.g. Flynn et al., 2010). Frohlich and Westbrook (2001) found that that there is not only the need to ensure the optimum level if internal integration to maximize the output of the organization but such efforts have to be linked with integration practices with suppliers as well for enhancing the output or performance of the supply chain.
Many previous studies have highlighted the need for cultivation of business related relations with customers and adopting appropriate strategies in fulfilling their requirements for enhancing performance (Droge et al., 2004; Flyn et al., 2010; Frohlich & Westbrook, 2001; Koufterous et al., 2005; Narasimhan & Kim, 2002; Stank et al., 2001). This is because every organization is operating in a highly rigorous competitive milieu and firm has to deal with the discerning customer requirements and if organization do not have absorptive capability and learning from external environment and effective coordination mechanism i.e. communication, exchange of information and integrative practices inside the organization, will ultimately face serious challenge in establishing alliance with customers and unsuccessful in conveying the exact needs of the company in the mind of the suppliers. It therefore demands close working relationships as well as planning for future with partners because the performance of the chain depends upon reciprocity relationships among all the stakeholders which in turn will be constructive in cost minimization, efficient utilizations of complementary/shared resources, inventory management and delivery, quality performance and productivity (Bagchi et al., 2005; Cao, 2007; Swaminathan et al., 1998).

Internal integration (Int_I) found to be resulted in enhanced performance of the supply chain in terms of cost and inventory reduction, improved flexibility and delivery (Swink et al., 2005; Boon-itt & Wong, 2011). Feng et al. (2013) in their most latest study reiterated the fact that internal integration leads to operational performance and conclude with useful insight regarding the role of external partners for improving performance of the company. Furthermore, the findings also highlighted the essential role of internal integration first. Boon-itt and Wong (2011) also reaffirm through their findings that removing the silos mentality and emphasizing on the collaboration and
information sharing among functional units does substantiating significant influence towards better and improved performance. Likewise Sabath (1995) too favours the integration among internal functions as it diminishes myopic mentality and improve information visibility and coordination which ultimately lead to enhance performance. Wong et al (2011) reinforce the emphasis on breaking myopic mindset as it place barriers or difficulties in operation performance.

Previous research is replete with positive conclusion between integration with external partners (i.e. customers & suppliers) and operational performance (Cousins & Menguc, 2006; Feng, Li, Sun & Wang, 2013; Frohlich & Westbrook, 2001; Flynn et al., 2010; Koufteros et al., 2005; Lee et al., 2007; Salvador et al., 2001). Sofyahoglu and Ozturk (2012) concluded in a meta analysis with a positive note on relationship between customer integration and operation performance. For example integration with customer is a source of obtaining efficiency frontier (Lee et al., 2000; Zhao et al., 1999) however Danese and Ramano (2011) speaks negative about this relationship in their seminal work. Supplier involvement in the product design stage reduces the deficiency whereas establishing interactions with customers helps in diminishing bullwhip effects, information exchange, understanding focal company needs and better inventory management as well as enhanced customer service (Carter & Ellram, 1994; Flynn et al., 2010; Kalwani & Narayandas, 1995). Zhang and Huo (2013) favored the role of external integration in enhancing the business performance. Further this study contributed to the extant literature through establishing the fact that building a trust with external partners (i.e. suppliers and customers) enhances SCI. Competitive edge as well as better exploitation of resources and opportunities can be achieved through effectively managing SC by integrating within the company as well as across the boundary span in the broader spectrum (Kannan & Tan, 2010). Droge et al. (2004) explored the impact of
integration practices (external i.e. Strategic Design integration-Customer & Suppliers) and internal i.e. Design process integration)) on the performance. Results revealed internal integration (Int_I) as well as external integration (both customer and suppliers) significantly to the time based performance (i.e. time to product, responsiveness and time to market) and overall performance in terms of final performance and market share.

Regarding the relationship between internal integration and performance, the previous literature has highlighted about the importance of internal integration and positive effects on performance as better internal integration will not only give rise to synergetic effect but also helps in better and optimal utilization of resources (Griffin & Hauser, 1996; Olsen et al., 1995; Pagell, 2004; Troy et al., 2008; Wong et al., 2011). Thus an organization with better absorptive capacity is in a better position to exploit the resources internally and externally which consequently improves performance. Moreover recent previous research by Feng et al. (2013) has also concluded that both the customer and supplier integration leads to the better organization performance.

The extant literature regarding integration-performance relationship concluded that extended integration strategy resulted in positive in the overall performance of the organization (Frohlich & Westbrook, 2001; Handfield & Nichols, 1999; Tan et al., 1998). A meta analysis conducted by Sofyahoglu and Ozturk (2012) reiterated that internal integration and business performance are positively related. Previous research demonstrated empirically that an organization which values collaboration, teamwork and removes soils mentality through information sharing and coordination is in a better position to manage demands through less demand amplification and bullwhip effect which consequently helps in having rise in market share and in attainment of the
competitive edge (Narasimhan & Kim, 2002; Rosenzweig et al., 2003). The similar findings as concluded by Flynn et al. (2010) reiterated the fact that internal integration which not only diminishes the myopic mind set but also enables the company to better serve the consumers which consequently lead to performance benefits. Furthermore an organization which value integration among internal function and opposes myopic behavior of the units will ultimately better utilize the internal resources and competencies which are the major sources in enhancing the organization performance (Droge et al., 2004; Ittner & Larcker, 1997; Pagell, 2004). Research is also replete with positive association with supply chain performance and organization performance i.e. if the supply chain has contained cost and is reliable, flexible and responsive then overall organization performance is improved (Chen, Paulraj & Lado, 2004; Qrunfleh & Tarafdar, 2013; Vickery et al., 2003). Based on the above discussion and review of literature, following are hypothesized.

**H7.** Internal integration (Int_I) is positively related to the external integration i.e. with customers

**H8.** Internal integration (Int_I) is positively related to the external integration i.e. with Suppliers.

**H9.** A higher internal integration enhances supply chain performance (i.e. cost-containment, flexibility and reliability performance).

**H10.** A higher Customer integration enhances supply chain performance (i.e. cost-containment, flexibility and reliability performance).

**H11.** A higher Supplier integration enhances supply chain performance (i.e. in cost-containment, flexibility and reliability performance).
**H12.** A higher internal integration enhances the overall organization performance

**H13.** The supply chain performance positively influences organizational performance.

**H14.** Customer integration mediates the influence of internal integration on Supply chain performance.

**H15.** Supplier integration mediates the influence of internal integration on Supply chain performance
2.10 Moderating Role of Organization culture and SC socialization.

2.10.1 Supply chain Socialization

Mass customization, lean manufacturing and other paradigm shifts in present market turbulent environment raises many challenges for companies and forced them to look beyond firm boundaries to acquire strategic resources which also exists beyond the firm boundary. This emphasizes to form and maintain closer relationships in the network in order to acquire such resources (Cooray & Ratnatunga, 2001; Das & Teng, 2000; Ireland et al., 2000; Mathews, 2003).

The previous research has acknowledged the concept of socialization for enhancing buyer-suppliers relationships and acts as control mechanism and means of facilitating exchange of knowledge, knowledge of each other and is a strategic resource that facilitates communication among firms (Chalos & O’Connor, 2004; Chung, Singh & Lee, 2000; Cousins & Menguc, 2006; Gupta & Govindarajan, 2000; Lee, 2000; O’Donnell, 2000).

Socialization concept has been thoroughly explored in organization behavior and strategic literature and its impact on the joint-ventures. This concept alludes to the degree of communication and interaction among stakeholders in supply chain that paves the way towards improved communication, problem solving, trust and personal intimacy, open communication thereby ensuring better inter-organizational relationships (Chung et al., 2000; Daft & Lengel, 1986; Edstrom & Galbraith, 1977; Gupta & Govindarajan, 2000; Van Mannen & Schein, 1979).

It further strengthens the ties leading to culture of mutual commitment. Socialization employs techniques like kaizen workshops, onsite visits, social
events, casual meals, team building exercises and supplier conferences which benefits not only in the form of physical assets such as product improvement but also in the form of intellectual or process assets through the exchange of information and ideas (Chung et al., 2000; Chalos & O’Connor, 1998; Gupta & Govindarajan, 2000; O’Donnell, 2000). These provides the buyer and suppliers an opportunity to get well aware of issues relating to each other and provides a way to how to proceed further on different on going and upcoming projects and enhancing their mutual ties. Cousine and Mengus (2006) study has depicted positive effects of socialization on supplier communication and its operational performance and clearly validated the socialization (supplier conferences, site visits and social events etc.) process as a method for supporting and enhancing integration process between supplier and buyer thus it is worth investing in socialization when the firm want to get the maximum benefits of SCI. In the light of which they established that organization should devote its efforts towards investing in a socialization activities. The study through its notable findings has established that once integration between the firm and its partner is achieved then socialization practices are vital and crucial to fully enjoy the fruitfulness of integration as well as it is a facilitative factor for enhancing this integration. Industrial units of diversified sector with 520 participants of manager level from UK was the sample of this study. Another study concluded the constructive role of socialization (both formal and informal) in enhancing knowledge sharing and buyer-supplier relations (Lawson, Petersen, Cousins & Handfield, 2009). In nutshell the concept of socialization aims at enhancing and sustaining the buyer-supplier relationships. So based on the above discussion it can be proposed that

H17. Supply chain socialization strategy moderates the relationship between firm and its suppliers.
2.10.2 Organization Culture

As discussed previously, in present dynamic and turbulent environment firms do not compete individually as focus is now shifted towards integration approach with other stakeholders across the boundary span of organization. This demands the organizations to look for organizational culture that well suited for balancing an equation to fit well in the hyper competitive environment. The concept of organizational culture has been broadly discussed in all disciplines in social sciences however there is still a little evidence in operations management area and supply chain in particular (Braunscheidel, Suresh & Boisnier, 2010; Ke, Liu & Wei, 2010; McDermott & Stock, 1999; Zammuto & O’Connor, 1992).

Organization culture represents the strongly held set of values, beliefs, artifacts, norms and shared understanding among all the members of the organization, (Braunscheidel, Suresh & Boisnier, 2010; Deshpande & Webster, 1989; McDermott & Stock, 1999; Quinn & Rohrbaugh, 1983; Robbin, 2001; Zammuto & O’Connor, 1992). Another definition that is widely addressed and followed according to Barney (1986, p.656) is defined as “a complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts its business”.

Different models of organization cultures are studied in literature (e.g. Quinn & Rohrbaugh(1983), Cameron & Quinn (1999), Fey & Denison(2003), Goffee & Jones(1998), Denison & Mishra(1995), Denison & Spreitzer(1991) and Denison & Young(1999) etc. However this study adopts the framework for
organizational culture by Quinn and Rohrbaugh (1983) known as competing value framework which classifies the organization culture into two dimensions forming four clusters of matrix as it helps in assessing as well as profiling and identifying cultural dynamics of an organization. The first dimension includes and termed as flexibility /dynamism-stability/order/control whereas second dimension includes and termed as internal focus/integration-external focus/differentiation. The first dimension elucidates that some organizations values and emphasizes learning, organic processes and change whereas some others are focusing on mechanistic processes, stability, efficiency and predictability for achieving effectiveness. The second dimension elucidates that some organizations value cohesiveness, unity of effort among internal processes, efficiency and healthiness of employees. While some focus on market, external positioning and competition thus striving for organizational fit with the external environment (i.e. customers, suppliers and competitors etc.).

The framework divides the organizational culture characteristics in to four clusters i.e. clan, hierarchy (control), market (rational/compete) and developmental (adhocracy). The originations with clan and hierarchy culture characteristics deals value cohesion, human development, standardization, stability and control for achieving effectiveness. These two culture characteristics are inward or internally focused. Whereas the culture characteristics of Market and Adhocracy are externally focused. The internal/external dimension which is the focus of present study and is relevant to the supply chain studies/relationships i.e. buyers and sellers and previously discussed in the literature (Balakrishnan & Birger, 1986; Hewett, Money &
Sharma, 2002). The Market culture value differentiation, goal setting and relationships or transactions with external partners i.e. customers and suppliers etc. for achieving effectiveness, productivity and competitive edge. Organizations with these characteristics and for attaining a competitive edge and outstanding performance in the market hunt for establishing integration with the external partners (Braunscheidel et al., 2010). The Developmental (or adhocracy) culture is also externally focused and value adaptability and adaptation to external environment, flexibility, innovation, dynamic, creativity, growth, resource acquisition and readiness to change.

Previous research related the positive role in enhancing growth of an organization that is adaptable and flexible and the firm which exhibit the culture type of adhocracy (or developmental) is positively associated in establishing external integration (i.e. with customers and suppliers) as well as delivery performance (Braunscheidel et al., 2010; Dension & Mishra, 1995). Externally focused firms outperform and value their organization and its overall competitiveness more than those which are internally focused (i.e. clan and Hierarchies) (Deshpande et al. 1993; Quinn & Rohrbaugh, 1983). This is so because the organizations which exhibits rational or developmental culture characteristics are having an attitude of open mindedness towards outside environment as opposed to the organizations which exhibits clan or hierarchical i.e. internally focused (Balakrishnan & Birger, 1986). Deshpande et al. (1993) also have concluded the similar findings with respect to the performance of company. The study of Hewett et al. (2002) concluded that corporate culture of the company does effects the relationships between relationship quality and
repurchase intentions. The study concluded that companies with external focused culture i.e. market or developmental have shown different relationship intensity as opposed to internal culture. Moreover organization always look forward to change its way to better serve the customers and maintain the collaborative relationships with suppliers as well. This demands the culture of the organization to be entrepreneurial, dynamic and flexible in nature (i.e. adhocracy) and possesses excellent absorptive capability.

Whereas the organization which emphasizes formalization, stability, myopic nature of functional efficiency; top down communication, stability hinders integration with external partners are hierarchical in nature (Braunscheidel et al., 2010). The four cultural types and dimensions of CVF is shown in figure-4.

**Figure 2-1:** Competing Value Framework Model-Organization Culture.

**Source:** Adapted from Denison and Spreitzer (1991); Quinn (1988); Kalliath, Bluedorn and Gillespie (1999).
For this study, external focus i.e. market and adhocracy culture type is focused and the current study propose that the relationships between internal integration and external integration (i.e. both with supplier and customer) would be moderated by an externally focused organization culture (low vs. high). It is postulated as

**H18.** An organizational culture (i.e. Market and Adhocracy) positively moderates the relationships between firm and its customers

**H19.** An organizational culture (Market and Adhocracy) positively moderates the relationships between firm and its suppliers.
2.11 Research Model

This section describes the proposed model and summary of the hypotheses.

![Proposed Model Diagram]

Figure 2-2: Proposed Model
As depicted and visualized from the proposed model in Figure 2-4, the purpose of this study is to provide a more comprehensive framework with wider scope which includes both antecedents of internal integration as well as internal integration and its relationships with external integration (both suppliers and customers) and performance (short term and long term). In addition to this, the model investigates the moderating role of organizational culture (external focus) and supply chain socialization between internal integration and external integration practices. Such a model altogether has never been tested in literature to the best of the researcher’s knowledge and especially in the context of Pakistan. The motivation behind the current study and proposing such a model was the inconsistent findings in previous literature regarding SCI-Performance relationship (See e.g. Flynn et al., 2010) and the factors that may strengthen the relationship between the firm and its partners as well as the dearth of research on internal integration and the factors that may contribute in influencing/enhancing internal integration (e.g. Basnet & Wisner, 2012).
2.12 Summary of Hypotheses and Theoretical support

Following is the summary of the hypotheses based on the literature review described above.

**H1.** Rotating employees among internal functions improves internal integration.

**H2.** Inter-departmental training enhances internal integration.

**H3.** Management commitment towards integration enhances internal integration

**H4.** Intra-organizational knowledge sharing enhances internal integration.

**H5.** The more the strategic consensus the more is the internal integration among functional units.

**H6.** Supporting information technology foster the level of internal integration

**H7.** Internal Integration (Int_I) is positively related to the external integration i.e. with customers

**H8.** Internal Integration (Int_I) is positively related to the external integration i.e. with Suppliers.

**H9.** A higher internal integration enhances supply chain performance (i.e. cost-containment, flexibility and reliability performance).

**H10.** A higher Customer integration enhances supply chain performance (i.e. cost-containment, flexibility and reliability performance).

**H11.** A higher Supplier integration enhances supply chain performance (i.e. cost-containment flexibility and reliability performance).
H12. A higher internal integration enhances the overall organization performance.


H14. Customer integration mediates the influence of internal Integration on Supply chain performance

H15. Supplier integration mediates the influence of internal Integration on Supply chain performance


H17. Supply chain socialization strategy moderates the relationship between firm and its suppliers.

H18. An organizational culture (market and Adhocracy) positively moderates the relationships between firm and its customers.

H19. An organizational culture (market and Adhocracy) positively moderates the relationships between firm and its suppliers.
Table 2-1 below summarizes the Constructs relationships in the proposed model and the relevant studies/supports in the literature

Table 2-1

*Constructs relationships and related literature support*

<table>
<thead>
<tr>
<th>Constructs relationships</th>
<th>Literature support Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: JR→ Int_I</td>
<td>Beatty, Schneier &amp; McEvoy (1987); Campion, Cheraskin &amp; Stevens (1994); Cosgel &amp; Miceli (1999); Cohen &amp; Levinthal (1990); Davis &amp; Taylor (1989); Dougherty (2000); Eriksson &amp; Ortega (2004); Genzi &amp; Troilo (2006); Griffin &amp; Hauser (1996); Keys &amp; Miller (1984); Kusunoki &amp; Numagami (1998); Ortega (2001); Rohr (2000); Rothwell &amp; Kazanas (1994); Schein (1978); Perry &amp; Song (1993); Xie, Song &amp; Stringfellow (2003); Xie, Song and &amp; Dyer (2003); Zeira (1974).</td>
</tr>
<tr>
<td>H3: MC→ Int_I</td>
<td>Basnet &amp; Wisner (2012); Dougherty et al., (1996); Fawcett et al., (2006); Ford &amp; Randolph, (1992); Gupta, Abbie Hauser &amp; John (1996); Kahn (1996); Loonam &amp; McDonagh, (2005); Mollenkopf et al., (2000); Maidique, Modesto &amp; Zergir, B., (1984); McDonald &amp; Eastlack (1971); Olson &amp; Viswanath (1992); Pagell (2004); Piercy (2006); Ravichandran &amp; Arun (2000); Ragunathan et al., (2003); Song</td>
</tr>
</tbody>
</table>
et al. (1997); Van de Ven, Andrew (1986); Souder, (1987); Song, Xie & Dyer, (2000); Thompson & James (1999); Van de Ven, Andrew (1986); Xie, Song & Anee (2003).

**H4: IoKS → Int-I** Calantone, Cavusgil & Zhao (2003); Eng (2006); Hult & Ferrell (1997).

**H5 SCon → Int-I** Akkermans (1995); Basnet & Wisner (2012); Dess & Priem (1995); Dooley et al. (2000); Pagell (2004); Senge (1990).

**H6 SIT → Int-I** Alsene (1990); Alsene (2007); Andersen (2001); Bettis & Hitt (1995); Clesmons et al. (1993); Curry & Stancich, 2000; Davenport (1998); Desanctis & Jackson (1994); Fawcett & Cooper (2001); Gallupe et al. (1992); Gattiker (2007); Gurbaxani & Whang (1991); Harrington (1973); Hernandez (1997); Huber (1990); Hsu & Chen (2004); Hine & Goul (1998); Kim (2001); Laudon & Laudon (2004); Merchant (1961); Murgolo-pore, Pitt & Ewing (2002); Narasimhan & Sudrajat (2007); Teece (2001); Silver (2000).

**H7: Int-I → Cust-I** Brauncheidel & Suresh (2009); Gimenez & Ventura (2005); Huo (2012); Handfield & Nichols (1999); Luque et al. (2014); Morash & Clinton (1998); Pagell (2004); Rosenzweig et al. (2003); Singh & Power (2009); Stank et al. (2001); Vickery et al. (2003); Woehner, Darknow & Kaiser (2009); Yu et al. (2013); Zhao et al. (2011)

**H8: Int-I → Suppl-I** Brauncheidel & Suresh (2009); Droge et al., 2004; Gimenez & Ventura (2005); Handfield & Nichols (1999); Huo (2012); Leuschner et al. (2013); Morash & Clinton (1998);
H9: \( \text{Int}_I \rightarrow \text{SCP} \)  Boon-itt & Wong, (2011); Lee et al., (2007); Swink et al., (2005)

H10: \( \text{Cust}_I \rightarrow \text{SCP} \)  Carter & Ellram, (1994); Cousins & Menguc, (2006); Droge et al., (2004); Flynn et al., (2010); Frohlich & Westbrook, (2001); Kalwani & Narayandas, (1995); Koufteros et al., (2005); Lee et al., (2007); Narasimhan & Kim, (2002); Salvador et al., (2001); Stank et al., (2001)


H15: \( \text{SCP} \rightarrow \text{Org Perf} \)  Vickery et al., (1997); Woehner, Darknow & Kaiser, (2009)

\textbf{Note.} JR=Job rotation, IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS=Intraorganizational Knowledge Sharing, STT=Supporting information technologies, SCon=Strategic Consensus, \( \text{Int}_I \)=Internal Integration, SCP=SCP Performance, \( \text{Cust}_I \)=Customer Integration, \( \text{Suppl}_I \)=Supplier Integration, \( \text{Org Perf} \)=Organization Performance.
CHAPTER 3

STUDY DESIGN AND RESEARCH METHODOLOGY

This chapter aims at presenting the plan as per avowed objectives of this research. The plan comprises of quantitative research approach, research design, description of population and sample characteristics. It further describes the data collection process / procedure, instrumentation measures for the variables under study, reliability and validity issues and finally the statistical methods for analysis.

3.1 A quantitative research approach

In social science we broadly split research methods in to two groups qualitative (i.e. subjective) and quantitative (realist) methods. Quantitative research approach employs the statistical analysis to answer the hypotheses formulated and empirically verifying through numerical data collected (Dematteo & Festinger; Smith, 1988). According to quantitative approaches which assume positivist ontologism, are best suited when researcher is interested in precise measurement, subjectivity of the judgment minimization and achievement of higher reliability is desired and best suited/adopted in management science disciplines (Bernard & Bernard, 2012; Cooper & Schindler, 2003; Kealey & Protheroe, 1996; Matveev, 2002). On other hand the qualitative research approach (i.e. interpretive) that is subjective in nature is defined by the Cooper and Schindler (2003) includes “array of interpretive techniques which seeks to describe, decode, translate, and otherwise come to terms with meaning, not the frequency, of certain or more or less naturally occurring phenomenon in the social world”. (p. 196).
This study investigates the antecedents of internal integration and its impact on external integration and performance. In addition to it, study also investigate the moderating role of organization culture as well as SC socialization. All the formulated hypotheses will be tested empirically through the use of statistical methods. So for this purpose a quantitative research approach is adopted in this study. It may be further added here that current study utilizes positivist approach which is best suited when theory is already available and needs further clarification through building causal relations for generalizability of results as highlighted by Saunder, Lewis and Thornhill (2007). As described above the motivation behind the current study was the inconsistent findings regarding integration-performance relationships. Perhaps this study will provide useful insights to test the proposed relationships not only addressing the factors that contributes to internal integration as well as the integration and performance relationships but also investigate the moderating role of factors like SC socialization and organization culture. All this is in accordance with the positivistic approach.
3.2 Research Design

According to Kumar (2005), research design answers to how you undertake your research study and what procedure is going to be adopted in answering the research questions has set and once researcher has decided what he wants to study about. It is the blueprint or procedural plan for carrying out the study i.e. identify methods and processes involved in collection and analysis of the required information. It may include sample selection, operationalization and instrumentation, data collection, hypothesis testing and analysis of the results (Thyer, 1993; Zikmund, 2002). The research method selected for measuring the perceptions of the respondents towards the constructs in the current study is survey technique. This technique is aimed at collecting information through questionnaire from the defined sample and considered as best approach for conducting research (Cooper & Emory, 1995). Following below are the component parts of the research designed discussed in this study.

3.2.1 Type of Study and Study Setting

The present study is co-relational and non-contrived in nature and data has been collected in natural environment as opposed to the controlled one. Furthermore cross sectional methodology for the current study was implemented for data collection because of the limited time constraints.

3.2.2 Unit of Analysis

The unit of analysis is considered as the noteworthy factor in the conduction of research study and refers to “level of aggregation of the data collected during the subsequent data analysis stage” Sekaran (2006, p.132). Individuals, dyads, groups, industry and divisions could be the unit of analysis depending on the
purpose of the study under consideration. Managers working in different functional units of petroleum companies of Pakistan were considered as unit of analysis for the current study.

3.2.3 Target Population

Population refers to “complete group of entities that share common set of characteristics” (Zikmund, 2003, p.369)

Keeping in view the above definition, the current study comprised of all the managers working at different managerial positions in Petroleum companies both upstream (i.e. E & P) and downstream (i.e. refineries and marketing companies). Respondents were the managers working in different functional units/departments as managers in any organization are supposed to symbolize the opinion of the members of the functional unit/department (Philips, 1981).

The benefits attributed to the use of multiple informants are widely discussed in previous studies (Bruggen, Van Lilien & Kacker, 2002; Philips, 1981; John & Reve, 1982). A total of 60 companies which are petroleum exploration and production, refineries and marketing companies (Oil and Gas) (DGPC, 2013) have been selected. According to PPEPCA (i.e. Pakistan Petroleum exploration and production companies association), 25 listed organizations are involved in exploration and productions (i.e. E &P). Furthermore as per the official list obtained from the Director General Petroleum Concession (DG Oil), list of 16 companies includes five refineries and 11 marketing companies (Oil). Similarly an official list of Director General Gas containing list of 14 companies are involved in Gas Sector. The petroleum sector was selected for the reason that this sector is not only fulfilling
the energy needs of different sectors of the country but is also a revenue generating sector for the economic growth of the country.

3.2.4 Sampling Strategy/Procedure

The upstream and downstream are two major subgroups of the population of the current study which are further subdivided into three strata i.e. Exploration, Production (E&P), refineries and marketing companies. For this purpose the sampling technique used was Stratified Random sampling. This sampling practice not only splits the overall population into subgroups but also makes certain the representation of each subgroup in a sample (Burns & Bush, 2001; Vockell, 1983).

There is little agreement on the appropriate sample size for any research study; however Sekaran (2003) proposed that between 30 and 500 sample sizes are appropriate. He further recommended that for any multivariate research study, for each variable in the study there should be at least 10 respondents or more. For structural equation modeling (SEM) the same ratio is recommended (Miller & Kunce, 1973; Reisinger & Mavondo, 2007; Schreiber et al., 2006). Hair et al. (2006) and Bentler(1995) recommended minimum of 5:1. A sample of 200 is adequate in testing SEM model as suggested by (Hair et al., 1998; Snoj et al., 2004). Few authors recommended that the sample size of 200 or more is appropriate as it provide good statistical power for analysis (Garver & Mentzer, 1999; Hoeltler, 1983; Loehlin, 1998; Thomas, 2004; Sekaran, 2003; Tabachnick & Fidell, 1996). A sample size greater than 200 is widely adopted and suggested for complex model in SEM (Fan & Sivo, 2007; Hair et al., 2006; Hulland et al., 1996; Kline, 2011).
Furthermore determining the threshold value for the sample for better generalizability and results accuracy is vital. For this purpose minimum sample required was determined using Israel (1992) criteria with 5% precision level (or sampling error), 95% confidence interval and known population. As described previously the unit of analysis in this study are the managers working in petroleum companies and they are approximately numbered to 700 as a population. As per the Israel (1992) set criteria the minimum sample size required is 255. The same was also confirmed through Yamane (1967:1973) formula i.e. \( n = \frac{N}{1+Ne^2} \) with 95% confidence level and 5% precision level. \( N \) represents Population represents sample size and “e”, the precision level. Incorporating these values in the formula resulted in a sample size of 254.

Keeping in view the above cited recommendations and criteria, sample size of 260 was considered appropriate for the current study. These sample units were selected using stratified random sampling. This sampling strategy was adopted because of the reason that this methodology of sampling produces a lesser amount of errors of random sampling. This methodology helps in reflection of each strata or subgroup under consideration thus better representing the overall population under study as well as provides the researcher a better insight of the whole population. For this purpose 450 questionnaires were sent to these petroleum companies. Furthermore the sample size for each strata was calculated according the proportionate allocation stratified sampling procedure. A total of valid 234 responses were received back with the response rate of 52%. The sample which finally obtained valid i.e. 234 was used for further analysis and is well in range as
recommended the previous research for SEM analysis that is a sample size greater than 200 (Fan & Sivo, 2007; Hair et al., 2006; Kline, 2011; Hulland et al., 1996).

Table 3-1: Sample Distribution breakup

<table>
<thead>
<tr>
<th>Stratum (Petroleum Companies)</th>
<th>Total Sample Companies</th>
<th>Sample size</th>
<th>Questionnaire administered</th>
<th>Sample Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration and Production</td>
<td>25</td>
<td>108</td>
<td>200</td>
<td>64</td>
</tr>
<tr>
<td>Refineries</td>
<td>5</td>
<td>22</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>Marketing companies (Oil &amp; Gas)</td>
<td>30</td>
<td>130</td>
<td>200</td>
<td>140</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>260</td>
<td>450</td>
<td>234</td>
</tr>
</tbody>
</table>
3.2.5 Measurement Scale

The measurement tool i.e. Likert Scale which was previously developed by Rensis Likert (1930) is widely accepted tool in the present day research (Cooper & Emory, 1995, 2005; Fink, 1995a). The participant agreement against each statement/item was measured on 5-point scale whose numerical coding running from 5 (Strongly Agree) to 1 (Strongly Disagree).
3.3 Instrumentation and Operationalization

This section of the study attributed to the operational definitions and instrumentation of the variables under investigation. The data was collected through the questionnaire. The comprehensive survey consists of 86 items/questions to measure constructs under study as well the general information of the respondent. The survey was divided into six sections broadly i.e. (Section-1 through Section-6). Section-1 enquires about the general information from the respondents which includes position of the respondent, qualification, experience, department and supply chain initiative the company have since its inception. Section-2 comprises 23 items regarding the factors/interventions or antecedents for improving/fostering integration/cross functional harmony among departments. The factors include job rotation, interdepartmental training, management commitment for improving integration, intra-organizational knowledge sharing, supporting information technology and strategic consensus. The next section-3 which comprises of 28 items measures the organization’s internal integration, integration practices with its external partners i.e. customers and suppliers. Section-4 measures supply chain performance as well as overall performance of the organization through 17 items. The last part i.e. section-6 measures the role of two moderators (i.e. Supply chain socialization and organization culture) consist of five and six items respectively. The questionnaire end with a space provided for an open ended question for any comments from the respondents. The final copy of the questionnaire is attached at the end (Appendix A).
3.3.1 Antecedents of Internal Integration

- 3.3.1.1 Job Rotation

The lateral transfer of an employee between jobs is termed as job rotation (JR) and literature reveals that practice of job rotation is a tool to broaden the knowledge/awareness of the firm and cross-functional harmony and cohesiveness. It increases problem solving skills, courage relationships, collaboration and enhances the understanding of processes and procedures of the firm which consequently lead to internal integration/harmony (Hatvany & Pucik, 1981; Kusunoki & Numagami, 1998; Griffin & Houser, 1996; Peery & Song, 1993; Jansen et al., 2005).

Job rotation in this study referred the firm’s emphasis on the planned rotation of the employees and managers among different functional areas for enhancing communication/understanding among departments. To measure the construct of job rotation in this study, 3-item scale was used. Two items (JR1 and JR2) was adopted from Song, Xie and Dyer (2000) and one item JR3 was newly developed.

3.3.1.2 Intra-organizational Knowledge sharing

Intra-organizational Knowledge sharing (IoKS) refers here review of information accumulated, sharing of experience, mistakes / faults and lesson learned from past which is extensively communicated across different functional units within the particular organization (Calantone, Cavusgil & Zhao, 2002; Hult & Ferrell, 1997). Eng (2006) concluded that IoKS enhances cross functional coordination.
Intra-organizational Knowledge sharing in this study refers to dissemination of learning through knowledge sharing within the firm. IoKS is measured through 4-items (IKS1 to IKS4) adopted from Calantone et al. (2002) and Hult and Ferrell (1997).

3.3.1.3 Management Commitment

Management commitment (MC) refers here the degree to which the management is committed in providing an environment and resources for teams work, cooperation and collaboration among internal functions of the organization (Song, Xie & Dyer, 2000). Cohesiveness in an organization can be possible through the top management support/commitment as it enhances communication, interaction, collaboration among functional units and is source of productivity, efficiency, communal vision, product success and diminishing the interdepartmental adversarial relations (Basnet & Wisner, 2013; Pagell, 2004).

Management commitment which is an antecedent of integration is measured in this study through four items (MC1 to MC4), adopted from Parry and Song (1993), which determines the extent to which the top management promote integration, facilitate socialization opportunities for functional units (i.e. marketing, production, R&D etc.), creating interfunctional consensus as well as setting clear objectives.

3.3.1.4 Interdepartmental Training

Interdepartmental training (IDT) refers the organization’s emphasis on training employees regarding their own and other departments within the organization without relocation which increases the employees understanding of other functions in the internal supply chain (Basnet & Wisner, 2012).
Three items scale was adapted to measure the interdepartmental training construct. Two items (IDT1 & IDT2) was adapted from Basnet and Wisner (2012) and one item (IDT3) is newly developed.

### 3.3.1.5 Strategic Consensus

Strategic consensus (SCon) refers as the level of shared perception, mutual understanding of strategic objectives among different management levels within the firm and agreement towards overall strategy.

Four items scale was used to measure the extent of companywide consensus on strategy, shared perception and mutual understanding. Two items (SCon1 and SCon2) were adapted from Basnet and Wisner (2012), item SCon3 was adopted from Sinkula, Baker and Noordewier (1997), and item (SCon4) was adopted from Akhtar (2009).

### 3.3.1.6 Supporting Information Technology

Supporting information technologies (SIT) refers to the uses of technologies (e-mail system, video conferencing, intranet, ERP systems etc.) by the managers within the organization for data processing and information exchange. This facilitates communication, collaboration or integration and makes available the information visibility for all internal functions.

Five item scales was adapted from the previous literature. Three items i.e. SIT1, SIT2 and SIT3 were adapted from Andersen (2001) measures the degree of usage of means (electronic) of communication within the organization by the managers.
like email, computer networks and other electronic means. The remaining two items i.e. SIT4 and SIT5 were adopted from the Chen and Paulraj (2004) measures the extent of transaction processing (IT-enabled) and the extent of intra-organizational coordination achieved through supporting information technologies.

3.3.2 **Internal Integration**

Following the definitions of previous researches (e.g. Khan and Mentzer (1998); Koufteros et al (2005); Basnet (2013); Zhao et al. (2011)), Internal integration (Int_I) in this study refers to the process of interaction, collaboration and use of cross functional teams within the functional units of the organization. Ten items scale was developed from previously validated instruments and review of literature to measure the internal integration.

Among these 10 items, two items (i.e. Int_I1 & Int_I2) measures the interaction aspect i.e. flow of information with the organization. This aspect measures how different departments within the organization interact with others through exchange of standard documentations and other means like through meetings, phone conversation, reports, email, committees, teleconferencing etc. These items were adapted from Van de Ven and Ferry’s (1980).

The next six items which measures the collaboration aspect (i.e. Int_I3 to Int_I8). This aspect measures how departments within the organization work together informally, possessing team work, mutual understanding, and collective goals and shared resources etc. All items (i.e. Int_I3 to Int_I8) for this aspect were adapted from Khan and Mentzer (1998).

The last two items capture the usage of cross functional teams were adapted from Narasimhan and Kim (2002).
3.3.3 Customer Integration and Supplier Integration

8 items scale (i.e. Cus_I1 to Cust_I8) was adapted from previous validated instruments of Narasimhan and Kim (2002), Frohlich and Westbrook (2001) and Zhao et al. (2011). Customer integration measures information sharing and extent of cooperation between the focal firm and its customer.

Similarly 10 items scale (i.e. Suppl_I1 to Suppl_I10) was adapted from previous validated instruments of Narasimhan and Kim (2002), Frohlich and Westbrook (2001) and Zhao et al. (2011) to measure the extent of information sharing and cooperation of focal firm with its supplier.

3.3.4 Supply Chain Performance

11 items scale was used to measure supply chain performance (SCP). The supply chain performance was measured in terms of three aspects i.e. cost containment, reliability performance and flexibility performance. 4 items for cost efficiency and 3 items for reliability performance were adapted from Lee, Kwon and Severance (2007). For flexibility measure, four items were adapted from previous studies (Beamon, 1999; Sezen, 2008).

3.3.5 Organization Culture

The study adapts the internal-external dimension of the competing value framework (CVF) for organization culture by Quinn and Rohrbaugh (1983). The
center of attention of this dimension deals with how organization reacts with activities that are taken place within the firm and their improvements as well as how it conducts its business while emphasizes on adaptation and interaction with external environment outside the organization. The culture types i.e. Market and Adhocracy falls in this dimension and are externally focused. Dension and Spreitzer (1991) described that these two culture types that value differentiation, goal setting and transaction with external partners for achieving effectiveness, productivity and competitive strength (i.e. Market) and adaptation, innovation, creativity, external orientation, resource acquisition and readiness to change (i.e. Developmental or Adhocracy).

A six items scale on five-points likert type scale from strong disagree(1) to strongly agree (5) was adapted from previous validated instruments (Deshpande et al., 1993; Ke, Liu & Wei, 2010; Quinn & Spreitzer, 1991; McMott & Stock, 1999) to measure organization culture (i.e. Market and Adhocracy/Developmental).

3.3.6 Supply Chain Socialization

The supply chain socialization construct refers to the mechanism, policies adopted by the organization to facilitate communication, personal intimacy and problem solving between buyer and supplier firm (Cousins & Menguc, 2006; Gupta & Govindarajan, 2000; O’Donnell, 2000). These includes kaizen workshops, onsite visits, social events, casual meals, team building exercises and supplier conferences.

Five items scale for Supply chain socialization was adapted from previous studies (Chung et al., 2000; Cousins & Menguc, 2006; Gupta & Govindarajan, 2000; Lawson, Petersen, Cousins & Handfield, 2009; O’Donnell, 2000).
3.3.7 Organization Performance

The subjective approach for operationalizing the organization’s performance through management’s perceptions while comparing it with their major rivals is widely acknowledge in the previous research (Chakravarthy, 1986; Des & Robinson, 1984; Tan et al., 1998). Respondents were asked to rate the performance aspect of their company on five point Likert scale as compared to their major industry rivals/competitors. For this purpose six items scale was adapted widely used by the previous researchers which measures performance through financial as well as market performance aspects (Claycomb, Droge, & Germain, 1999; Droge et al., 2004; Flynn et al., 2010; Green et al., 2004; Green and Inman, 2005; Gupta & Govindarajan, 1984; Li, Ragu-Nathan, Ragu-Nathan & Rao, 2006; Mohrman et al., 1995; Shetty, 1987; Stock, Griss & Kasarda, 2000; Tan et al., 1999; Vickery, Calantone & Droge, 1999; Zhang, 2001). The items includes Market share, ROI, growth in market share, sales growth, profit margin and overall competitive position.

It may be noted that existing literature was extensively and comprehensively reviewed and considered along with consultations with academicians and industry experts in order to adapt all the measures.
3.4 Pre codification of the questionnaire/survey

The questionnaire used for data collection is attached (Annexure-A). For the purpose of the data entry in the statistical software (i.e. SPSS) and further analysis in AMOS, all the variables and items were pre coded as shown in the Table 3-2

Table 3-2: Pre coding of the Questionnaire

<table>
<thead>
<tr>
<th>Variable/Construct notation</th>
<th>Variable/Construct Name</th>
<th>No. of Items</th>
<th>Cipher/Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section-1</td>
<td>General Information</td>
<td>07</td>
<td>G1 to G7</td>
</tr>
<tr>
<td>Section-2</td>
<td>Factors effecting Internal Integration</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Job rotation</td>
<td>3</td>
<td>JR_1-JR_3</td>
</tr>
<tr>
<td></td>
<td>2. Inter-departmental</td>
<td>3</td>
<td>IDT_1-IDT_3</td>
</tr>
<tr>
<td></td>
<td>Trainings(Training regarding other departments)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Management Commitment</td>
<td>4</td>
<td>MC_1-MC_4</td>
</tr>
<tr>
<td></td>
<td>4. Intra-organizational knowledge</td>
<td>4</td>
<td>IoKS_1-IoKS_4</td>
</tr>
<tr>
<td></td>
<td>sharing(IoKS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Supporting information technology</td>
<td>5</td>
<td>SIT_1-SIT_5</td>
</tr>
<tr>
<td></td>
<td>6. Strategic Consensus</td>
<td>4</td>
<td>SCon_1-SCon_4</td>
</tr>
<tr>
<td>Section-3</td>
<td>Internal Integration</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Interaction</td>
<td>2</td>
<td>Int_I_1 to Int_I_10</td>
</tr>
<tr>
<td></td>
<td>b. Collaboration</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Cross functional Teams</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Variable/Construct Name</td>
<td>No. of Items</td>
<td>Cipher/Symbol</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td>4</td>
<td><strong>External Integration</strong></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. <strong>Customer Integration</strong></td>
<td>8</td>
<td>Cust_I1-CustI_8</td>
</tr>
<tr>
<td></td>
<td>b. <strong>Supplier Integration</strong></td>
<td>10</td>
<td>Suppl_1-Suppl_10</td>
</tr>
<tr>
<td>5</td>
<td><strong>Supply chain performance</strong></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. <strong>Cost efficiency</strong></td>
<td>4</td>
<td>SCP_1-SCP_10</td>
</tr>
<tr>
<td></td>
<td>b. <strong>Reliability</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. <strong>Flexibility</strong></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Organization Performance</strong></td>
<td>6</td>
<td>Org_perf_1 to Org_perf_6</td>
</tr>
<tr>
<td>7</td>
<td><strong>Moderating Constructs</strong></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. <strong>Organization Culture</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. <strong>Adhocracy culture</strong></td>
<td>3</td>
<td>OC_1-OC_3</td>
</tr>
<tr>
<td></td>
<td>2. <strong>Market culture</strong></td>
<td>3</td>
<td>OC_4-OC_6</td>
</tr>
<tr>
<td></td>
<td>b. <strong>Supply Chain Socialization</strong></td>
<td>5</td>
<td>Social_1-Social_5</td>
</tr>
<tr>
<td></td>
<td><strong>Total Items/Elements</strong></td>
<td>86</td>
<td></td>
</tr>
</tbody>
</table>

Table 3-2: Pre coding of the Questionnaire (Continued….)
3.5 Pilot Study Results, Validity and Reliability of Instrument

Before proceeding to the planned extensive study, the researcher needs to conduct the pilot study i.e. an approach to pretest the measurement instrument, its reliability and validity. The reliability and validity of the instrument (whether adopted or adapted) is perquisite before moving to the next stage of study as it scrutinize as well as highlight the issues and problems at an early stage. This process consequently enhance the researcher’s confidence because high scores on validity and reliability represents true reflection of the population under study. Additionally this process also makes the researcher to understand about the fact that how well the constructs actually measure what they are supposed to (Cooper & Schindler, 2006; Cooper & Emory, 1995; Gravetter & Forzano, 2012). The current study also begins with pilot study in order to address the validity and reliability of the measurement instrument. For this purpose a sample of 60 managers from six petroleum companies selected on convenient basis (Two each from exploration & Production, refineries and marketing companies respectively). Cooper and Schindler (2000) recommended the sample for pilot as 25-100. These managers (i.e. respondents) at this stage were selected to administered the instrument designed for pilot study from the target population of the actual study. A Permission letter was obtained from the Ministry of Petroleum and natural resources Pakistan – Directorate General of Petroleum concession (DG Oil and DG Gas). The research also got an opportunity to visit the refineries and marketing companies to administer the questionnaire to the respondents. Fifty five questionnaires were returned back with two questioners with missing value (discarded from analysis). Finally 53 questionnaires completely filled with response rate of 88% were regarded as fit for analysis of the pilot study.
3.5.1 Participants details/Profiles for Pilot study

As described above 53 respondents from six companies were approached. The general information of participants who responds are described in the table below i.e. Table 3-2

Table 3-3 Participant’s general Information-Pilot study

<table>
<thead>
<tr>
<th>Characteristics of Respondent</th>
<th>Descriptions</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Operational</td>
<td>10</td>
<td>18.9</td>
<td>20.8</td>
</tr>
<tr>
<td>Position level</td>
<td>Tactical/Middle</td>
<td>26</td>
<td>49.1</td>
<td>54.2</td>
</tr>
<tr>
<td></td>
<td>Top/Strategic</td>
<td>12</td>
<td>22.6</td>
<td>23</td>
</tr>
<tr>
<td>Department</td>
<td>Production/Manufacturing</td>
<td>3</td>
<td>5.6%</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>Marketing/Sales</td>
<td>14</td>
<td>26%</td>
<td>29.16%</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>6</td>
<td>11%</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td>Supply Chain/Logistics</td>
<td>10</td>
<td>19%</td>
<td>20.8%</td>
</tr>
<tr>
<td></td>
<td>IT/MIS</td>
<td>4</td>
<td>8%</td>
<td>8.3%</td>
</tr>
<tr>
<td></td>
<td>HR/Admin</td>
<td>3</td>
<td>6%</td>
<td>6.25%</td>
</tr>
<tr>
<td></td>
<td>Purchase/Procurement</td>
<td>8</td>
<td>15%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Experience</td>
<td>1-3 years</td>
<td>10</td>
<td>18.9</td>
<td>19.6%</td>
</tr>
<tr>
<td></td>
<td>3-5 years</td>
<td>2</td>
<td>3.8</td>
<td>3.9%</td>
</tr>
<tr>
<td></td>
<td>Greater than 5 years</td>
<td>39</td>
<td>73.6</td>
<td>76.5%</td>
</tr>
<tr>
<td>Qualification</td>
<td>Bachelor</td>
<td>13</td>
<td>24.5</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>34</td>
<td>64.2</td>
<td>66.7%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>4</td>
<td>7.5</td>
<td>7.8%</td>
</tr>
<tr>
<td>Length of SC Initiative</td>
<td>&lt; than 1 year</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1-3 years</td>
<td>5</td>
<td>9.4</td>
<td>9.4%</td>
</tr>
<tr>
<td></td>
<td>3-5 years</td>
<td>48</td>
<td>90.6</td>
<td>90.6%</td>
</tr>
</tbody>
</table>
The respondent’s characteristics at the pilot study stage as depicted from the Table 3-3, regarding the participant’s position indicated that 49.1% were the managers at the tactical/middle level and 23% at the strategic level participation.

Similarly departmental profile indicated that respondents covered all functions across the supply chain i.e. marketing / sales (26%), supply chain / logistics (19%), IT / MIS (8%), purchasing / procurement (15%) etc. It is quite evident from the results as depicted in Table 3-3 that almost all the function which are involved internal supply chain as well as with external supply chain (i.e. marketing /sales and purchasing / procurement department) participated at the pilot study stage.

Experience level of the participants as depicted from the Table 3-3 demonstrated that 73.6% of the respondents possesses more than 5 years of experience surely indicating the importance as well as the significance of their information provided.

Qualification results at the pilot study stage indicated that 64.2% of the respondents holds master qualification demonstrating their good speciality in their respective areas. Lastly, approximately 90% of the respondents provide useful insight that company’s under investigation possesses SC initiative i.e. maintaining relationships within and across the boundary span of the company with partners is more than 5 years.
3.5.2 Results Summary-Pilot Study

An SPSS, statistical package data sheet was prepared based on the data collected (Pilot study) to assess the suitability of the instruments for the main study. Along with necessary descriptive analysis, reliability and validity measures were also checked for this purpose.

3.5.2.1 Descriptive results analysis

The Table 3-4 below describes the respondent’s responses on each of the variables under investigation. Moreover the normality of each construct was also measured to show the behavior of score against each construct/variables. The variables includes job rotation (JR), Interdepartment training (IDT), Management Commitment (MC), Intraorganizational knowledge sharing (IoKS), Supporting information technology (SIT), Strategic Consensus (SC), Internal Integration (InT_I), Supply chain performance (SCP), Customer integration (Cust_I), Supplier integration (Suppl_I), Supply chain socialization (Social), Market culture (OC_1), Adhocracy culture (OC_2) and Organization performance (Org_perf). Table 3-4 below tabulates the participant’s mean, standard deviation, skewness and kurtosis against each variable under investigation.
Table 3-4: Participant’s Mean, Standard Deviation (SD) and Normality-

Pilot study (N=53)

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>N(Pilot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>3.66</td>
<td>0.715</td>
<td>-0.169</td>
<td>0.097</td>
<td>53</td>
</tr>
<tr>
<td>IDT</td>
<td>3.77</td>
<td>0.62</td>
<td>-0.22</td>
<td>-0.80</td>
<td>53</td>
</tr>
<tr>
<td>MC</td>
<td>4.14</td>
<td>0.59</td>
<td>-0.05</td>
<td>-0.879</td>
<td>53</td>
</tr>
<tr>
<td>IoKS</td>
<td>3.82</td>
<td>0.52</td>
<td>0.446</td>
<td>-0.84</td>
<td>53</td>
</tr>
<tr>
<td>SIT</td>
<td>4.45</td>
<td>0.45</td>
<td>-0.85</td>
<td>-0.67</td>
<td>53</td>
</tr>
<tr>
<td>SCon</td>
<td>4.46</td>
<td>0.45</td>
<td>-0.85</td>
<td>-0.67</td>
<td>53</td>
</tr>
<tr>
<td>Int_I</td>
<td>4.06</td>
<td>0.49</td>
<td>0.004</td>
<td>-1.17</td>
<td>53</td>
</tr>
<tr>
<td>SCP</td>
<td>3.78</td>
<td>0.38</td>
<td>0.05</td>
<td>-0.564</td>
<td>53</td>
</tr>
<tr>
<td>Cust_I</td>
<td>3.86</td>
<td>0.56</td>
<td>0.25</td>
<td>-0.306</td>
<td>53</td>
</tr>
<tr>
<td>Suppl_I</td>
<td>3.52</td>
<td>0.518</td>
<td>0.78</td>
<td>0.34</td>
<td>53</td>
</tr>
<tr>
<td>Socialization</td>
<td>3.54</td>
<td>0.43</td>
<td>-0.219</td>
<td>-0.710</td>
<td>53</td>
</tr>
<tr>
<td>OC_1</td>
<td>3.99</td>
<td>0.48</td>
<td>0.65</td>
<td>0.03</td>
<td>53</td>
</tr>
<tr>
<td>OC_2</td>
<td>4.44</td>
<td>0.56</td>
<td>-0.214</td>
<td>-1.67</td>
<td>53</td>
</tr>
<tr>
<td>Org_Perf</td>
<td>3.72</td>
<td>0.70</td>
<td>0.16</td>
<td>-0.63</td>
<td>53</td>
</tr>
</tbody>
</table>

Note. JR=Job rotation, IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS = Intraorganizational Knowledge Sharing, SIT=Supporting information technologies, SCon= Strategic Consensus, Int_I=Internal Integration, SCP=SC Performance, Cust_I= Customer Integration, Suppl_I = Supplier Integration, Socialization = SC Socialization, OC_1 = Adhocracy Culture, OC_2 = Market Culture, Org_Perf = Organization Performance.
The respondents score on each of the constructs above revealed that responses are tilting towards the agreement side and ranges from 70% to 88% depicting a good score.

Table 3-4 which demonstrated the descriptive statistics i.e. Means and standard deviations for all the variables and responses were rated against strongly agree (SA) =5 to strongly disagree (SD) =1. It may be further noted that participant mean score was also evaluated in the form of percentage (%) score to indicate the state of the variable i.e. unsatisfactory (below 3 i.e. < 60%) , good (above 60% and below 80% ) and excellent (i.e. above 80% ). The mean score for job rotation (JR) is 3.66 (73.2%) which is above neutral point i.e. above 60% which is threshold and pointing towards agreement that job rotation practices are important and though organization give importance to this factor but still this needs further improvement. Furthermore the standard deviation of this construct (0.715) fell below 1 demonstrating that responses are clustered around the mean response. Furthermore the skewness (-0.169) and kurtosis (0.09) which reaffirms the fact that the response are equally distributed. Similarly mean for training regarding other department i.e. IDT (3.77) i.e. 75.4 % is also pointing towards agreement ensuring the importance of training /education for understanding the functioning of other functional areas as well as his own department . Though the average value depicting good state of this construct within the organization but still need improvement in this area. Additionally standard deviation of this construct (0.62) fell below 1 also indicating the information that respondent’s answers towards the trainings of other departments are dispersed and found clustered around the central value i.e.
showing stable deviations. This is further confirms through the values of the skewness (-0.22) and kurtosis (-0.80) which reaffirms the fact that the response are equally distributed.

The mean value for the variable management commitment i.e. MC = 4.14 which 88% showing an excellent state of the constructs thus demonstrating that the management give due importance and general agreement exists about the management role and support for ensuring the organization’s objectives alignment and team work for product initiation decisions. The dispersion of this construct (SD =0.59) also demonstrating the information that respondent’s answers towards the management commitment towards supporting integration are deviated and clustered closely to the mean value thus showing stable dispersion. Furthermore the skewness (-0.05) and kurtosis (-0.87) reaffirming the fact that the response are equally distributed.

Supporting information technology (SIT) demonstrated the mean i.e. 4.45 which is also 89% with SD = 0.45 indicating that organization understand the importance and significance of the role information technologies. The organization is widely using the information technologies based infrastructure and supporting technologies as coordination mechanism within a company .The values of standard deviation, skewness (-0.85) and kurtosis (-0.67) demonstrating in favor that construct is normally distributed and responses are bunched around the mean.

Strategic Consensus (SCon) with mean (4.46 i.e. 89%) and SD = 0.45 and internal integration (Int_I) with mean (4.06 i.e. 81%) and SD =0.49 indicated that broadly there exists a shared consensus on company strategy among all functional areas as well as integration through interaction, collaboration and
making use of cross functional teams is also given due importance within the company and functional areas work together as a team. Standard deviation (0.45) and values of the skewness and kurtosis of theses constructs also signifying the fact that variables are normally distributed.

The intraorganizational sharing i.e. 3.82 that lesson learning from failures and successes are given due importance as the mean of this variable is pointing towards agreement. The vales of the skewness (0.446) and kurtosis (-0.84) also signifying that the response are bunched closely to the mean and are distributed normally.

The mean for external integration i.e. customer and supplier integration i.e. 3.86 with SD = 0.56 and 3.52 with SD =0.51 respectively is also pointing towards agreement side indicating the importance the company give to maintaining practices with partners. Furthermore the vales of the skewness (0.25) and kurtosis (-0.306) for customer and skewness (0.78) and kurtosis (0.34) for supplier signifying that responses in both cases are equally distributed as shown in Table 3-4. Thus constructs are homogeneously distributed as the values fall in the acceptable range as suggested by the previous literatures.

The mean value for supply chain performance i.e. SCP = 3.78 i.e. 75% demonstrating that that the company is giving importance to maintain the supply chain for improving these frontiers of performance. The SD = 0.38 and values of kurtosis and skewness also demonstrating the stable deviation around the mean as well as behaves normality.
The mean value for the socialization practices i.e. 3.54 i.e. 70% indicating the good current state and demonstrating that company gives importance to socialization practices. The SD = 0.43 and values of kurtosis and skewness also demonstrating the stable deviation around the mean as well as behaves normality.

The mean for the market as well as adhocracy culture as depicted from the Table 3-4 also pointing towards the agreement that organization under discussions are emphasizing on acquiring new resources, appreciating innovativeness and is moving towards efficiency. Furthermore SD values i.e. 0.48 and 0.56 respectively for market and adhocracy culture demonstrating stable deviations and are bunched around the mean. The skewness and kurtosis values as shown in Table 3-4 behaves normality and constructs are homogeneously distributed as the values fall in the acceptable range as suggested by the previous literatures.
3.5.3 Reliability analysis for instrument

Reliability of the research instrument/questionnaire is prerequisite before carrying data analysis and it represents the stability, repeatability and consistency among the items of the research questionnaire (Jack & Clarke, 1998; Jones & Rattray, 2010). Simply it determines whether the items of the constructs exhibits internal consistency among items/elements. The more the correlation among elements/items more is the internal consistency. Previous research identified test-retest, internal consistency and parallel approaches to measure the reliability of the construct. Cronbach’s alpha method is most widely used to test the consistency among the items or inter-items correlation (Polit & Beck, 2010; Sekaran, 2006). Prior literature agreed that cronbach’s alpha value closer to 1 is believed to be adequate for internal consistency or reliability of the instrument. More specifically value greater than or equal to 0.70 is acceptable and satisfactory (Bernard & Bernard, 2012; Bowling, 1997; Cronbach, 1951; Nunnally, 1978). According to Kerlinger and Lee (2000), a value ≥ 0.60 indicate the adequate reliability of the construct. All the Cronbach alpha values were ranged from 0.65 to 0.89 satisfied the above recommendations as suggested by famous researchers (e.g. Kerlinger & Lee, 2000; Hair et al., 2006), thus showing satisfactory consistency among the items of all the constructs. The value for rotation (JR = 0.81), management commitment (MC = 0.83), IoKS – intra organizational knowledge sharing (0.87), supporting information technology (SIT = 0.84), strategic consensus (SCon =0.87), internal integration (Int_I = 0.87), supply chain performance (SCP = 0.76), customer integration (Cust_I = 0.87), supplier integration (Suppl_I = 0.82), adhocracy culture (OC_1=0.72), market culture (OC_2 = 0.87) and Org_Perf (0.87). The value for interdepartmental trainings -IDT (0.68), Socialization (0.67) and flexibility...
measure (0.65) which was later improved when sample size increases in the main study. The observed results of the reliability analysis at this stage i.e. pilot or test run provide useful insight that all the constructs behaves good internal consistency thus ensuring that the instrument is reliable and giving a go ahead signal for proceeding to the main study.

Table 3-5: Reliability results (N=53)

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th># of items</th>
<th>Alpha value</th>
<th>N(Pilot)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>3</td>
<td>0.81</td>
<td>53</td>
</tr>
<tr>
<td>IDT</td>
<td>3</td>
<td>0.68</td>
<td>53</td>
</tr>
<tr>
<td>MC</td>
<td>4</td>
<td>0.83</td>
<td>53</td>
</tr>
<tr>
<td>IoKS</td>
<td>4</td>
<td>0.87</td>
<td>53</td>
</tr>
<tr>
<td>SIT</td>
<td>5</td>
<td>0.84</td>
<td>53</td>
</tr>
<tr>
<td>SCon</td>
<td>4</td>
<td>0.87</td>
<td>53</td>
</tr>
<tr>
<td>Int_I</td>
<td>10</td>
<td>0.87</td>
<td>53</td>
</tr>
<tr>
<td>SCP</td>
<td>10</td>
<td>0.76</td>
<td>53</td>
</tr>
<tr>
<td>Cost</td>
<td>3</td>
<td>0.71</td>
<td>53</td>
</tr>
<tr>
<td>Reliability</td>
<td>3</td>
<td>0.76</td>
<td>53</td>
</tr>
<tr>
<td>Flexibility</td>
<td>4</td>
<td>0.65</td>
<td>53</td>
</tr>
<tr>
<td>Cust_I</td>
<td>7</td>
<td>0.87</td>
<td>53</td>
</tr>
<tr>
<td>Suppl_I</td>
<td>7</td>
<td>0.82</td>
<td>53</td>
</tr>
<tr>
<td>Socialization</td>
<td>5</td>
<td>0.67</td>
<td>53</td>
</tr>
<tr>
<td>OC_1</td>
<td>3</td>
<td>0.72</td>
<td>53</td>
</tr>
<tr>
<td>OC_2</td>
<td>3</td>
<td>0.87</td>
<td>53</td>
</tr>
<tr>
<td>Org_Perf</td>
<td>6</td>
<td>0.87</td>
<td>53</td>
</tr>
</tbody>
</table>

**Note.** JR=Job rotation, IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS = Intraorganizational Knowledge Sharing, SIT=Supporting information technologies, SCon=Strategic Consensus, Int_I=Internal Integration, SCP=SC Performance, Cost=Cost, Reliab = Reliability, Flex=Flexibility, Cust_I = Customer Integration, Suppl_I = Supplier Integration, Socialization = SC Socialization, OC_1 = Adhocracy Culture, OC_2 = Market Culture, Org_Perf = Organization Performance.
3.5.4 Construct Validity

Construct validity depicts whether the items which are designed to measure the latent construct does actually measure it (Churchill, 1979; Coldwell & Herbest, 2004; Hair et al., 2006). Construct validity usually comprises of convergent validity, content validity and discriminant validity.

3.5.4.1 Content Validity

Content validity ensures the appropriateness of the items/constructs that adequately cover the domain area. It refers to “Content validity of a measuring instrument is the extent to which it provides adequate coverage of the investigative questions guiding the study” (Cooper & Shindler, 2006, 318). Since all the scales are previously validated so content validity is assured (Dunn et al., 1994). Content validity can be done procedurally by expert judgment by academicians and industry experts as suggested by (Cooper & Schindler, 2006; Zikmund, 2003). For this purpose the current study instrument was discussed with three academic professors and three professionals from refineries, marketing companies and E&Ps. These experts were approached to their office after appointment and were interviewed to discuss their respective items for their appropriateness. As per the guidance and comments of the academicians and professionals the items were improved through rewarding wherever necessary.
3.5.4.2 Face Validity

Face validity refers to the fact that whether the items which are designed to measure the construct actually look like to measure that construct (Burns & Bush, 2001; Sekaran, 2000). The face validity of instrument for the current study was done in two steps. In the first step the questionnaire was presented to the lecturer (holding or possessing MS/MPhil/PhD degrees or qualifications) who are teaching operations management, supply chain management and other management science subjects. As per their comments (oral as well written) by these lecturers, changes were made. In the second step the current study instrument was also discussed and consulted with three operations management/logistics experts and changes made as per feedback and guidelines received. Some of the items of flexibility, a measure for supply chain performance were removed and remaining were reworded as per the context after discussions with logistics/supply chain and other managers. Finally the supervisor approved the questionnaire and declared appropriate and valid for conducting the further study.

Other validity measures were also carried out in the next part of the study (discussed in chapter-4). These include example convergent and discriminant validity.
3.6 Data Collection procedure

As per findings and feedback received at the stage of pilot study, the research instrument was finalized and made ready for the larger sample. The process of data collection started in November, 2013 and continued till March 2014. As previously described the researcher himself approached the ministry of petroleum in September 2013 and later as per advise received the researcher approached the director general petroleum concession. A meeting was arranged with the director general petroleum concession (i.e. DG oil, DG gas etc.) in which the purpose and the motivation behind the research was explained and official permission to approach the companies was sought, and list of companies was obtained. An official letter which was addressed to the CEO of petroleum companies (i.e. Oil marketing, Refineries, Gas marketing and E&P) was given to the research to help facilitate the process of data collection. After this the questionnaire was distributed along with the cover letter explaining the purpose of collecting the details asked for was explained. The letter from director General PC to CEOs of companies along with letter from the parent university was forwarded. A few companies were personally visited by the researcher for data collection and meetings with the potential respondents were held to obtained the required information. The researcher is deeply indebted to the warm cooperation offered. Two telephonic calls were made to the secretary CEO and the focal person nominated by the company i.e. HR manager to requesting them to help provide the required information and help ensure the optimum participation.

450 questioners were sent for data collection and 248 were received back with a response rate of 55%. 12 questionnaires were discarded due to the missing value and are not properly filled. The final analysis was done with 236 valid questionnaires.
3.7 Data Examination

Before going for the multivariate analysis the researcher must examine the data as suggested by the Hair et al. (2006). He further added that most of the time it is overlooked or skimmed the importance and significance of the data examination or screening by many researchers. This includes the analysis of missing value, identification of outliers and normality data etc. The screening of these eventualities is very important as they can disturb the further analysis because majority of statistical approaches/tests requires these assumption to be priorly met. In order to draw meaningful inference or conclusion, data must be cleared from having abnormal spread, abnormal outliers and skewed distribution. For example if there exists outliers they may results in extravagant errors as well as distortions of estimates and decreases the power of the statistical approach adopted which consequently leads to poor inferences. Keeping in view the above, current study also examined the data and make fit the data for applying the structural equation modeling (a multivariate technique).

3.7.1 Missing Values, Outliers and normality

The analysis of missing values and its patterns was investigated through SPSS and found that missing values were not more than 5% (only 12 questionnaires were found containing missing values out of 248) and were ignored as suggested by previous research (Tabachnick & Fidell, 2001). Analysis of missing value was very much required as it is an important component of data examination/screening. The occurrence of this factor more than the threshold limit is really a problem and creates detrimental effects not only on results but also on generalizability.
Furthermore Little’s MCAR test was performed to test the pattern and found that missing values do not depend on other data value values were missing completely at random. Furthermore missing values were replaced with series mean using SPSS package.

Identification of outliers was also investigated as SEM analysis is affected by the presence of values outside the generally accepted range i.e. more than ±3SD as suggested by the Kline (2005). For each variable Z-score or standardized score was computed and none of the variable was found to indicate standard deviation exceeding the above mention range. Moreover all the variables have z-score are less than 3.29 as suggested by Tabachnick and Fidell (2001). Two cases 235 and 236 have zscore value of 3.28. Furthermore the data was thoroughly examined or screened for not having any data entry mistake. Box plot which is widely used graphical procedure for detection of values that are out of range was also carried out for all the constructs under study.

Furthermore to identify the multivariate outlier, Mahalanobis distance i.e. $D^2$ was calculated for each case using SPSS through regression command. Each case was examined through chi-square distribution and its significance at 0.001 because as per Tabachnic and Fidell (2001) criteria a case will be identified as an outlier if probability value for $D^2$ is found to be $\leq 0.001$. As per the criteria, two cases i.e. case#235 and 236 were identified as outlier and were deleted before the final analysis was conducted.

Linearity was also assessed through scatter plots for visualizing the linear relationships among variables. Scatter plots are widely used for visualizing linearity
graphically whereas statistically correlation coefficients are used as suggested by previous researches (Hair et al., 2006; Pallant, 2007). Chapter 4 presented the linearity results.

Normality of data was also assessed and values of skewness and kurtosis for all constructs were calculated. Skewness and Kurtosis refers to the data distribution’s asymmetric nature and peakedness respectively. A value of zero of skewness and kurtosis indicate the ideal normal distribution. It may be noted that normality and other assumptions are vital and prerequisite when applying parametric techniques for analysis as it ensures reliability and accuracy of results of the sample. It was found that all the values of Skewness and Kurtosis as depicted in Table 4-6 were well in the range i.e. (±2) as specified by Tabachnick and Fidell (2001). Moreover if this value exceeds 3 indicating sign of abnormality (Kline, 2005). For the complete data skewness and kurtosis were calculated and described in Table 4-6. Additionally through univariate Q-Q plots, multivariate normality was verified as suggested by Raykov and Marcoulides (2000). In Q-Q plot if the data points or values are clustered and gathered close to the straight line i.e. diagonal it indicates the presence of normality.

3.8 Statistical Techniques and Software used

In order to understand and examine the patterns of data and relationships, widely used techniques of statistics like descriptive statistics and SEM (Structural Equation modeling) were employed in the current study. Furthermore mediation analysis was carried out by adopting the method as suggested by as suggested by Baron and Kenny (1986) and Sobel (1982). For moderation analysis, multiple group method of
SEM (known as multi-group SEM) was used (briefly described in section 4.6.6) through AMOS Package (20th Version).

### 3.8.1 Descriptive statistics

Descriptive statistics was utilized to measure central tendency (e.g. mean), dispersion (e.g. standard deviation). These procedures are widely adopted to see statistically to represent the data concerning the variable in to a single number and to see how the values are clustered or spread narrowly to this number/value usually known as central value. Standard deviation (dispersion) explains the degree to which the data points are dispersed or deviated from the value (i.e. mean here). Larger this value, more is the spread, whereas small value indicate the small spread of the data values. The smaller value is always desired as it indicates that the data points are closely bunched around the central value. Furthermore for graphical display (i.e. histogram, q-q plots etc.) were also carried out for outlining respondent’s response and their patterns.
SEM

SEM a multivariate methodology which is a combination of factor and regression analysis used to estimate simultaneously series of relationships i.e. both direct and indirect (Hair et al., 2006; Schumacker & Lomax, 2004; Iacobucci, 2009; Ullman, 2001). SEM is divided into two parts i.e. measurement part/model also called confirmatory factor analysis and structural parts/model (Hair et al., 2006; Jöreskog & van Thillo, 1972; Kline, 2011). SEM methodology which is applied in this study is widely adopted because it not only consider confirmatory factor approach as opposed to exploratory one but also explicitly estimate error variances. Furthermore SEM also accommodates both latent and measured variables as well as test the model with multiple dependent variables simultaneously to fit the desired model and whereas traditional data analysis approaches e.g. regression do not provide such benefits (Byrne, 2001; Bagozzi & Yi, 2012). SEM not only analyze multiple criterion models but also accommodate measurement errors whereas these can not be modeled in regressions. Another notable benefit of SEM is that it provides new opportunity/avenue for future research and helps in testing the alternate models which better fit the data (Bagozzi & Yi, 2012). Another distinguishing characteristic of SEM is that it provide an alternate model and redesign the proposed model into different nested models with better fit. Rogdon (1999) reaffirm this notable contribution/benefit of SEM who termed this benefit as “fruitfulness” of SEM in a way that it helps in comparing alternative models. The criterias as described in literature which helps in providing an evidence that model under study cross validate the given sample with a better fit with the same sample are $\chi^2$-square difference test and information criteria (Cudeck
The information measures used for model comparison as suggested by Homburge (1990) are AIC (i.e. Akaike info. Criteria and BIC (Bayesian information criteria) with small value of statistics signifying the better fit model (Akaike, 1973; Schwarz, 1978).

In order to validate and fit the measurement and overall model fit, several fit indices are proposed to examine to confirm and see how well the model fit the data or sample. In the current study following fit indices were used as recommended by the previous researchers (Kline, 1998; Byrne, 1998). These includes Chi-square (χ² statistics), χ²/df, goodness of fit (GFI) index, Comparative fit (CFI) index, RMSEA(root means square error of approximation). The set criteria is described below.

1) Chi-square (χ² statistics) indicate that how the proposed model fits the data well i.e. whether model truly represent the data of not. This should be non-significant. However this statistics has been reported least because non-significance of this statistics is rarely achieved. It may be noted that this statistics is sensitive to sample size, so other fitness indices should also be considered in order to validate the model (Tabachnick & Fidell, 2001). As the sample size increases so does this statistics and as a result it becomes significant that’s why this statistics alone does not provide the true reflection of the model fitness.

2) The ratio of Chi-square (χ²) to degree of freedom (df) should be less than 3 as suggested by Hu and Bentler (1999). However some researcher e.g. Marsch and Hocevar (1985) agreed that a value <5 is also indicate a good fit.
3) Fit indices like GFI and CFI should exceed or equal to 0.90 indicating good fit of the model (Byrne, 2001; Hu & Bentler, 1999; Gerbing & Anderson, 1992; Kline, 1998). GFI >0.80 is also good as recommended by MacCallum & Hong (1997). These are alternative goodness of fit along with the $\chi^2$ statistics.

4) RMSEA value between 0.05 and 0.08 represent an adequate fit or less than 0.08 is adequate (Bryne, 2001). However the value <0.10 is an adequate (Steiger, 1992).

5) RMR <0.05 as recommended by (Wu, 2009)

Before applying SEM analysis, some crucial assumptions pertaining to SEM should be taken into consideration as suggested by the previous research (Hair et al., 2006). This comprises of for example (1) appropriate sample size (2) dealing with missing values/data (3) normality, outliers, linearity and other issues.

Firstly, sample size, this issue has been given due consideration in the current study before applying SEM, a parametric multivariate technique. The sample size of 260 was set appropriate keeping in view the recommendations and criteria as highlighted by the previous research. The section 3.2.4 briefly this highlighted and fulfilled this requirement.

Secondly, SEM analysis like all other multivariate techniques entails normality, linearity etc. The normality requirement as well as linearity was given importance in this study and is discussed in section 4.1.6 (Chapter 4).
Furthermore SEM do not permit multicollinearity among the constructs. According to the Tabachnick and Fidell (2007) criteria, a correlation above 0.90 signaling this issue. This has been discussed in Chapter-4. Another notable assumption as highlighted by the previous research is the number of items/elements measuring a construct. Though there is no consensus among researchers on this requirement, however it is widely believed that at least three items are considered as a threshold number of items/elements to measure a construct as suggested by Hair et al. (2006) as it would help evade in model mis-identification issue. As discussed above in section 3.3, all the constructs in this study were measured with at least three elements/items following the recommendations thus fulfilling this assumption.
3.8.3 AMOS and SPSS

Two well known packages for data analysis purposes were used in the current study i.e. SPSS (Statistical package for social sciences) and AMOS (analysis of moment structure). First was used for preparing sample data sheet collected from the target population. Basic descriptive analysis was conducted through SPSS. Later the data sheet was used in AMOS (Version 20) which was further used for analyzing measurement model as well structural model. This software AMOS is widely used for structural equation modeling.
3.9 Researcher’s Interference

Following the approach of Sekaran (2009) the current study was conducted ensuring the minimal interference and the companies were approached and questionnaires were distributed during the office hours. Later the data was analyzed and concluded the findings.

3.10 Research ethics and ethical consideration

Again following the Sekaran (2009) approach regarding research ethics, the researcher give due importance to research ethics by keeping ethical bar up. For this purpose researcher prepared a covering letter with questionnaire explaining the theme of the research and required information along with the ensuring the privacy, confidentiality of the information provided to the researcher. Furthermore the same was ensured through department Dean’s letter from the university.
3.11 Summary of chapter

The methodology chapter described in detail as above reflects the whole procedure to carry out the current study. Target population was the petroleum companies and data was collected from three main strata’s i.e. E&P, refineries and marketing companies with the help of ministry of petroleum with consent received. The sample was collected using proportionate random sampling methodology. A research questionnaire was prepared using previous validated instruments and was administered. The research questionnaire was precodified. To ensure the reliability and validity of the instrument and the study, pilot study was conducted and received from 53 respondents was first screened, examined and further analyzed to confirm the suitability of the instrument for the main study. The results of the reliability analysis as well as the validity at this stage i.e. pilot or test run provide useful insight that all the constructs behaves good internal consistency as well as validity thus ensuring that the instrument is reliable, valid and giving a go ahead signal for proceeding to the main study.

Furthermore the data collection procedure was described in detail. Importance of data examination and its major methods were highlighted e.g. dealing with missing values, outliers and other assumptions like normality etc. SEM methodology, model fitness along with its superiority over regression was also discussed. Furthermore assumptions pertaining to SEM was also discussed. The chapter concludes with ensuring minimal interference of the researcher and consideration of research ethics.
CHAPTER 4
SAMPLE DESCRIPTION AND EMPIRICAL ANALYSIS OF DATA

This chapter aims at presenting the complete description of the attributes (i.e. descriptive) of the sample collected as well as the analysis of the stated hypotheses (i.e. inferential) using SPSS and AMOS. The analysis chapter starts with important assumption pertaining to multivariate analysis like SEM. Preliminary analysis is presented stating the appropriateness of sample size as well as initial screening of data. The demographics as well as descriptive results are also presented. Moreover measurement, structural and model fitness statistics were also described in this chapter. Reliability and validity measures were also described briefly.

4.1 Data Examination- Preliminary analysis

As this chapter presents the results of the study and multivariate techniques e.g. SEM was applied to investigate the relationships among the construct so it was very important to describe crucial assumptions pertaining to SEM being met. First of all the appropriate sample size which has been briefly described in section 3.2.4 thus fulfilling the criteria of sample appropriateness, secondly the case of missing values, as there were only 12 questionnaires out of 248 which was less 5% thus acceptable and is a green signal for go ahead for the further analysis.

Normality of data was also assessed and values of skewness and kurtosis for all constructs in Section 4.2.6. It was found that all the values of skewness and kurtosis as depicted in Table 4-6 were well in the range i.e. (±2) as specified by Tabachnick and Fidell (2001). Furthermore it was further verified through histograms and
univariate Q-Q plots. The results of the histograms for all the constructs show that all constructs behaves normality. The histograms for all the constructs i.e. job rotation, interdepartmental trainings, strategic consensus, supporting information technology, intraorganizational knowledge sharing, internal integration, customer integration, supply chain performance, supplier integration, socialization, organization culture (market culture and adhocracy culture) and organization performance are shown in Appendix-B. Furthermore Q-Q plots for all the constructs visually confirmed that data points or values are clustered and gathered close to the straight line i.e. diagonal thus ensuring the presence of normality. Histograms and Q-Q plots for all the constructs are shown in Appendix-B.

As previously described SEM do not permit the multicollinearity. This was assessed through correlation coefficients between the constructs under study and found that it ranges between 0.13 to 0.60 as shown in Table 4-23 i.e. section 4.4.3 thus ensuring the non-presence of multicollinearity as per the recommended criteria of Tabachnic and Fidell (2007). Thus it is fairly concluded through data examination/screening process as described above that data fulfills the possible assumptions of applying any multivariate analysis. These are prerequisite before applying any multivariate test and found that results provide positive foundation for applying multivariate technique. The graphical display of all the constructs behaves normality, linearity and homogeneous in nature thus fulfils the assumptions for applying any parametric or multivariate techniques of data analysis.
4.2 Descriptive analysis

This part of the thesis is predicated to the description of the profiles of the respondents who took part in this study as well as the description of the variables under study.

4.2.1 Management position of the respondents

The respondent’s characteristic regarding their position is tabulated below in Table 4-1 described that managers of all level i.e. top/strategic, middle and operational level participated in the study. Results indicated that 22% were top and strategic level, 51% were tactical level and 26% were operational level.

Table 4-1 Participant’s Position Statistics-Main Study

<table>
<thead>
<tr>
<th>Characteristics of Respondent</th>
<th>Descriptions</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid % age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Position level</td>
<td>Top/Strategic</td>
<td>52</td>
<td>22.2</td>
<td>22.3</td>
</tr>
<tr>
<td>Position level</td>
<td>Tactical/Middle</td>
<td>120</td>
<td>51.2</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>Operational</td>
<td>61</td>
<td>26.1</td>
<td>26.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>233</td>
<td>99.5</td>
<td>100</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>1</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>234</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
4.2.2 Experience

The respondent’s characteristic regarding their experience with petroleum company is tabulated below in Table 4-2 described that majority of the respondents were having experience greater than 5 years i.e. 63.7% followed by 1-3 years’ experience i.e. (27.8%). Results indicated that the respondents have good experience and their responses surely indicate the importance of their information provided for the current study. It may be noted that experience was categorized as 1-3, 3-5 and >5 and majority fall in the 3rd category of experience.

<table>
<thead>
<tr>
<th>Characteristics of Respondent</th>
<th>Descriptions</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid % age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent’s experience</td>
<td>1-3 years</td>
<td>65</td>
<td>27.8</td>
<td>28.5%</td>
</tr>
<tr>
<td></td>
<td>3-5 years</td>
<td>14</td>
<td>6.0</td>
<td>6.1%</td>
</tr>
<tr>
<td></td>
<td>Greater than 5 years</td>
<td>149</td>
<td>63.7</td>
<td>65.4%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>228</td>
<td>97.5</td>
<td>100%</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>6</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>234</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
4.2.3 Department profiles

The respondent’s departmental profile or expertise areas are within the company is tabulated below in Table 4-3. The data described that Production/manufacturing 5.6%, marketing/sales 15.4%, engineering 18%, logistics/supply chains 15%, IT/MS 10.3%, HR/Admin 10.3%, Purchase/procurement 15% and other 10.3% participated in the study. From the results it is fairly right to say that respondents in the current study covered all functions across the Supply chain i.e. purchasing, manufacturing/production, engineering, Logistics/supply chains to marketing and sales along with other supporting functional areas like Human resource, IT/MIS etc. Furthermore the respondents from the functional areas like purchase/procurement and marketing/sales have significantly participated in the current study and their responses will clearly give insight to the company’s relationship intensity with external partners i.e. customers and suppliers.
<table>
<thead>
<tr>
<th>Characteristics of Respondent</th>
<th>Department</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid % age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td>Production/Manufacturing</td>
<td>13</td>
<td>5.5%</td>
<td>6.25</td>
</tr>
<tr>
<td></td>
<td>Marketing/Sales</td>
<td>36</td>
<td>15.4%</td>
<td>29.16%</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td>43</td>
<td>18.4%</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td>Supply Chain/Logistics</td>
<td>35</td>
<td>15.0%</td>
<td>20.8%</td>
</tr>
<tr>
<td></td>
<td>IT/MIS</td>
<td>24</td>
<td>10.3%</td>
<td>8.3%</td>
</tr>
<tr>
<td></td>
<td>HR/Admin</td>
<td>24</td>
<td>10.3%</td>
<td>6.25%</td>
</tr>
<tr>
<td></td>
<td>Purchase/Procurement</td>
<td>35</td>
<td>15%</td>
<td>16.6%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>24</td>
<td>10.3%</td>
<td>10.3%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>234</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
4.2.4 Qualification

The respondent’s characteristic regarding their qualifications is tabulated below in Table 4-4 described that majority of the respondents i.e. (54%) have master’s degrees in their respective specialized areas as described above ,33% have their bachelor degrees and approximately 10% have their degrees in other specialized areas . Results indicated that the respondents were highly educated their responses surely indicate the importance of their information provided for the current study because of their specialties in their respective areas.

**Table 4-4 Participant’s Qualification**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Descriptions</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid % age</th>
</tr>
</thead>
<tbody>
<tr>
<td>of Respondent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualification</td>
<td>Bachelor</td>
<td>79</td>
<td>33.8</td>
<td>34.3%</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>127</td>
<td>54.3</td>
<td>55.2%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>24</td>
<td>10.3</td>
<td>10.4%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>230</td>
<td>98.3</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>4</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>234</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
4.2.5 SC initiative period

The Table 4-5 below tabulated the company’s SC initiative i.e. the company’s initiative towards maintaining relationship within and across the company with the external partners i.e. customers and suppliers. The results indicated that majority of the companies i.e. 62% have supply chain initiative more than 5 years. This really provides an insight to the researcher about the length of the relationships and knowing what the level is exists and how this can be enhanced by adopting the practices highlighted in the current study.

Table 4-5 Company’s SC initiative stats

<table>
<thead>
<tr>
<th>Characteristics of Respondent</th>
<th>Descriptions</th>
<th>Frequency</th>
<th>% age</th>
<th>Valid % age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of SC Initiative</td>
<td>&lt; than 1 year</td>
<td>18</td>
<td>7.7</td>
<td>8.2%</td>
</tr>
<tr>
<td></td>
<td>1-3 years</td>
<td>35</td>
<td>15.0</td>
<td>16.0%</td>
</tr>
<tr>
<td></td>
<td>3-5 years</td>
<td>20</td>
<td>8.5</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>Greater than 5 years</td>
<td>146</td>
<td>62.5</td>
<td>66.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>219</td>
<td>93.6</td>
<td>100</td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td>15</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>234</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
4.2.6 Descriptive analysis of the variables for current study

Descriptive analysis described in Table 4-6 demonstrated means (a central tendency measure) of each variable, their variability and normality statistics (i.e. skewness and kurtosis). Furthermore graphical display of these variables through histogram, q-q plots and scatter diagram was carried out to show and to confirm the normality, linearity etc. of each variable. The results of skewness and kurtosis were found well in range as previously described criteria in chapter-3 thus ensuring the normality of each variable. Furthermore the same was shown through graphical approach i.e.q-q plot to further confirm this. The graphical results are shown in Appendix-B
<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>3.549</td>
<td>0.852</td>
<td>-0.892</td>
<td>0.883</td>
<td>234</td>
</tr>
<tr>
<td>IDT</td>
<td>3.66</td>
<td>0.720</td>
<td>-0.276</td>
<td>-0.568</td>
<td>234</td>
</tr>
<tr>
<td>MC</td>
<td>3.83</td>
<td>0.59</td>
<td>-0.251</td>
<td>0.660</td>
<td>234</td>
</tr>
<tr>
<td>IoKS</td>
<td>3.66</td>
<td>0.617</td>
<td>-0.439</td>
<td>0.407</td>
<td>234</td>
</tr>
<tr>
<td>SIT</td>
<td>4.16</td>
<td>0.489</td>
<td>-0.072</td>
<td>-0.654</td>
<td>234</td>
</tr>
<tr>
<td>SCon</td>
<td>3.93</td>
<td>0.694</td>
<td>-1.146</td>
<td>1.640</td>
<td>234</td>
</tr>
<tr>
<td>Int_I</td>
<td>4.05</td>
<td>0.517</td>
<td>-0.23</td>
<td>0.46</td>
<td>234</td>
</tr>
<tr>
<td>Interac</td>
<td>4.12</td>
<td>0.584</td>
<td>-0.35</td>
<td>0.011</td>
<td>234</td>
</tr>
<tr>
<td>Collab</td>
<td>4.09</td>
<td>0.595</td>
<td>-0.37</td>
<td>0.284</td>
<td>234</td>
</tr>
<tr>
<td>CFT</td>
<td>3.94</td>
<td>0.597</td>
<td>0.12</td>
<td>-0.090</td>
<td>234</td>
</tr>
<tr>
<td>SCP</td>
<td>3.65</td>
<td>0.502</td>
<td>-0.53</td>
<td>1.61</td>
<td>234</td>
</tr>
<tr>
<td>Cost</td>
<td>3.71</td>
<td>0.54</td>
<td>-0.68</td>
<td>0.96</td>
<td>234</td>
</tr>
<tr>
<td>Reliab</td>
<td>3.63</td>
<td>0.55</td>
<td>-0.455</td>
<td>0.234</td>
<td>234</td>
</tr>
<tr>
<td>Flex</td>
<td>3.61</td>
<td>0.57</td>
<td>-1.176</td>
<td>0.217</td>
<td>234</td>
</tr>
<tr>
<td>Cust_I</td>
<td>3.76</td>
<td>0.55</td>
<td>-0.195</td>
<td>0.919</td>
<td>234</td>
</tr>
<tr>
<td>Suppl_I</td>
<td>3.59</td>
<td>0.482</td>
<td>0.019</td>
<td>0.08</td>
<td>234</td>
</tr>
<tr>
<td>Socialization</td>
<td>3.67</td>
<td>0.57</td>
<td>0.35</td>
<td>-0.102</td>
<td>234</td>
</tr>
<tr>
<td>OC_1</td>
<td>3.75</td>
<td>0.62</td>
<td>-0.85</td>
<td>1.503</td>
<td>234</td>
</tr>
<tr>
<td>OC_2</td>
<td>4.21</td>
<td>0.61</td>
<td>-0.733</td>
<td>.77</td>
<td>234</td>
</tr>
<tr>
<td>Org_Perf</td>
<td>3.62</td>
<td>0.626</td>
<td>0.113</td>
<td>0.112</td>
<td>234</td>
</tr>
</tbody>
</table>

*Note. JR=Job rotation, IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS=Intraorganizational Knowledge Sharing, SIT=Supporting information technologies, SCon=Strategic Consensus, Int_I=Internal Integration, Interact=Interaction, Collab=Collaboration, CFT=Cross functional Teams, SCP=SC Performance, Cost=Cost, Reliab=Reliability, Flex=Flexibility, Cust_I=Customer Integration, Suppl_I=Supplier Integration, Socialization=SC Socialization, OC_1=Adhocracy Culture, OC_2=Market Culture, Org_Perf=Organization Performance.*
Descriptive statistics for all the variables as tabulated above in Table 4-6 describe the means and standard deviations of each variable. Each response was rated against Strongly agree (SA) = 5 to Strongly Disagree (SD) = 1. As described in section 3.5.2.1, the mean score for all the constructs were also expressed in the form of percentage (%) to indicate the state of the variable. For example, a score below 3 (<60%) is unsatisfactory, good (above 60% and below 80% i.e. $3 \leq \text{score} < 4$) and above 80% i.e. (score $\geq 4$) representing excellent state. The mean score for job rotation (JR) was above neutral point i.e. 3.549 (71%) and pointing towards agreement that job rotation practices are important and this tool is used for better communication/understanding for developing capabilities of its employees. The score also suggested organizations for more improvements in this area. Furthermore, the standard deviation of this construct (0.85) fell below 1 indicating the information that respondent’s answers towards the job rotation are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed. Similarly, mean for training regarding other department i.e. IDT was also pointing towards agreement (3.66 i.e. 73%) ensuring its importance for understanding the functioning of other functional areas. The average value though depicting good state of this variable within the organization but still suggested further improvement. The standard deviation of this construct (0.72) fell below 1 also indicating the information that respondent’s answers towards the trainings of other departments are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the
values of the skewness and kurtosis which reaffirms the fact that the response are equally distributed. Furthermore there is general agreement exists about the importance management role and support for ensuring the organization’s objectives alignment and team work for product initiation decisions as mean is at agreement level as shown above in Table 4-6. The mean value for MC was 3.83 i.e. 76% with SD = 0.59. The dispersion of this construct (0.59) also fell below 1 demonstrating the information that respondent’s answers towards the management commitment towards supporting integration are deviated and found closely to the mean value thus showing stable dispersion. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed.

The highest mean for supporting information technologies (SIT) i.e. 4.16 with SD = 0.48 indicated that organization understand the importance of the information technologies and that intraorganizational coordination is achieved among internal functional units through electronic links and informational technologies usage. Standard deviation of this construct also fell below 1 indicating the information that respondent’s answers towards the construct are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed.

Strategic Consensus (SCon) with mean (3.93 i.e. 78%) and internal integration (Int_I) with mean (4.05 i.e. 81%) indicated excellent prevailing state of the constructs. This revealed that there exist a shared consensus on company strategy among all functional areas. Integration through interaction, collaboration and making use of cross functional teams is also given due
importance within the company and functional areas work together as a team. Standard deviation for both the constructs fell below 1 indicating the information that respondent’s answers towards the strategic consensus and internal integration are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirms the fact that the response are equally distributed.

The intraorganizational sharing for lesson learning from failures and successes are given due importance as the mean of this variable was found pointing towards agreement. The mean value for this construct was 3.66 with SD = 0.61 fell below indicating the information that respondent’s answers towards the intraorganizational knowledge sharing are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed.

The mean for external integration i.e. customer and supplier integration was also found pointing towards agreement side indicating the importance the company give to maintaining practices with partners. The mean value for both constructs i.e. customer and supplier integration was 3.76 i.e. 75% and 3.59 i.e. 71% with SD = 0.55 and 0.48 respectively. Both values fell below 1 indicating the information that respondent’s answers towards the both constructs are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed as shown in Table 4-6.
The mean value for supply chain performance on cost, reliability and flexibility performance and overall performance was also pointing towards agreement indicating that the company is giving importance to maintain the supply chain for improving these frontiers of performance as well as overall performance is also improving.

Moreover company also gives importance to socialization practices as the mean for this construct was 3.67 with SD = 0.57 which was also less than 1 indicating the information that respondent’s answers towards the both constructs are dispersed and found closely to the mean value thus showing stable deviations. This was further confirmed through the values of the skewness and kurtosis which reaffirm the fact that the response are equally distributed. Lastly the mean for the market as well as adhocracy culture were also found pointing towards the agreement that organization under discussions are emphasizing on acquiring new resources, appreciating innovativeness and is moving towards efficiency. The values for standard deviations for both were 0.62 and 0.61 respectively depicting that values are closely to the mean value thus showing stable deviations. The skewness and kurtosis values for both constructs as shown in Table 4-6 also confirmed that variables possesses the normality.
4.3 Structural Equation Modeling

The Structural Equation Modeling (SEM) was used for data analysis purpose which is widely recommended in empirical research (Bollen, 1989; Lee, 2007; Kelloway, 1998). The hypothesized relations among the constructs in the current study were investigated using the AMOS software (Version 20) in two step process as suggested by (Anderson & Gerbing, 1988). Measurement models for each construct was investigated i.e. CFA confirmatory factor analysis as once each measurement part is validated then it is easy to get fit the structural part later (Anderson & Gerbing, 1988). Reliability and validity issues were investigated for suitability of the instruments for analysis carried out in the second stage. In the second step, SEM models were evaluated and results found were highlighted for proposed and alternate models along with their fitness statistics.

4.3.1 Measurement Parts of the research Model-Confirmatory factor analysis

Analysis of the measurement model for each construct was evaluated before further analysis i.e. SEM. Hypothesized relationships were investigated once measurement model holds. It helps in identifying the indicators that do not measure the construct before proceeding to structural analysis. This process confirms the validation of measurement instrument. For this purpose confirmatory factor analysis (CFA) was performed for each construct used in the main model to see the suitability of the indicators underlying the construct. Chi square statistics and other famous fit indices e.g. CFI, GFI, RMR, RMSEA discussed in chapter 3 were utilized to ascertain the fitness of the model. The standardized regression weights for all the constructs (see
were found significant and sufficient loading to represent the respective construct following the recommendations of Hair et al. (2006).

### 4.3.1.1 CFA for Job Rotation

Measurement model for Job rotation (JR) as shown in Table 4-7 revealed that all the factor loadings are above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for JR were statistically found significant with larger t-values indicated the significance (Byrne, 2001; et al., 1994). The same can be visualized in Figure 4-1

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>JR_1</td>
<td>0.81</td>
<td>12.147</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>JR_2</td>
<td>0.82</td>
<td>12.165</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>JR_3</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

JR = Job rotation; JR_1-JR_3 items used to measure job rotation’s = Critical Ratio; P < 0.05

CFI = 1

**Figure 4-1** Measurement Model for Job Rotation
4.3.1.2 CFA for Management Commitment

Results for management commitment (MC), CFA model revealed (Table 4-8) that all the factor loadings are above 0.50, the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for MC were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for MC variable was found fit as indicated by the insignificant result \( \chi^2/df = 1.656, p = 0.191 \). Moreover \( \chi^2/df \) value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). The same can be visualized in Figure 4-2

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>MC_1</td>
<td>0.75</td>
<td>9.794</td>
<td>0.000</td>
</tr>
<tr>
<td>commitment</td>
<td>MC_2</td>
<td>0.70</td>
<td>9.493</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>MC_3</td>
<td>0.72</td>
<td>9.645</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>MC_4</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MC = Management commitment; MC_1- MC_4 items used to measure Management commitment construct; CR = Critical Ratio; P < 0.05
\( \chi^2/df = 1.656, p = 0.191 \),

RMR = 0.010,
GFI = 0.99
CFI = 0.983
TLI = 0.948
NFI = 0.959
RMSEA = 0.053
Figure 4-2  Measurement Model for Management Commitment
4.3.1.3 CFA for Intraorganizational Knowledge Sharing

Similarly CFA model for Intraorganizational Knowledge Sharing (IoKS) revealed (Table 4-9) that all the factor loadings are above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for IoKS were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for IoKS variable was found fit as indicated by the insignificant result ($\chi^2_{min} / df =1.919$, p=.137). Moreover $\chi^2 / df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). The same can be visualized in Figure 4-3.
<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_ value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraorganizational Knowledge</td>
<td>IoKS_1</td>
<td>0.72</td>
<td>10.531</td>
<td>0.000</td>
</tr>
<tr>
<td>Sharing</td>
<td>IoKS_2</td>
<td>0.84</td>
<td>11.811</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>IoKS_3</td>
<td>0.72</td>
<td>10.859</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>IoKS_4</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IOKS = Intraorganizational Knowledge Sharing; IoKS_1-IoKS_4 items used to measure Intraorganizational Knowledge Sharing construct; CR = Critical Ratio ; P < 0.05

$\chi^2_{\text{min}}/df = 1.919$, p=0.137.

RMR=0.011,  GFI = 0.99  CFI = 0.976  TLI = 0.929  NFI=0.95

RMSEA = 0.06

*Figure 4-3*  Measurement Model for Intraorganizational Knowledge Sharing
4.3.1.4 CFA for Interdepartmental training

All the factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity (Table 4-10). Moreover all the loading for Interdepartmental training (IDT) were statistically found significant with larger t-values indicated the significance (Byrne, 2001; Dunn et al., 1994). CFA was also visually described (Figure 4-4)

Table 4-10 CFA Output for Interdepartmental training

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdepartmental</td>
<td>IDT_1</td>
<td>0.71</td>
<td>8.350</td>
<td>0.000</td>
</tr>
<tr>
<td>trainings</td>
<td>IDT_2</td>
<td>0.94</td>
<td>7.471</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>IDT_3</td>
<td>0.58</td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

IDT = Interdepartmental trainings; IDT_1-IDT_3 items used to measure interdepartmental trainings ; CR = Critical Ratio; P < 0.05
CFI=1

Figure 4-4  Measurement Model for Interdepartmental Trainings
4.3.1.5 CFA for supporting information technology

All the factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity as revealed by the Table 4-11. Moreover all the loading for supporting information technology (SIT) were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for SIT variable was found fit as indicated by the insignificant result \( \chi^2_{\text{min}} / df = 2.08, p = 0.07 \). Moreover \( \chi^2 / df \) value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). The same is visually described in Figure 4-5.

Table 4-11 CFA Output for supporting information technology

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting Information Technology</td>
<td>SIT_1</td>
<td>0.63</td>
<td>9.334</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SIT_2</td>
<td>0.69</td>
<td>8.619</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SIT_3</td>
<td>0.87</td>
<td>9.613</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SIT_4</td>
<td>0.64</td>
<td>8.115</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SIT_5</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SIT = Supporting information technology; SIT_1-SIT_5 items used to measure Supporting information technology construct; CR = Critical Ratio; P < 0.05
\( \chi^2_{\text{min}} / df = 2.08, p = 0.07 \).

RMR = 0.01, GFI = 0.98, CFI = 0.99, TLI = 0.97, NFI=0.98

RMSEA = 0.06.
Figure 4-5  Measurement Model for Supporting IT
4.3.1.6 CFA for Strategic Consensus

All the factor loadings were above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity as revealed by the Table 4-12. Moreover all the loading for Strategic Consensus (SCon) were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for SCon variable was found fit as indicated by the insignificant result ($\chi^2_{min}/df = 2.67, p = .07$). Moreover $\chi^2/df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). The same is visually described in Figure 4-6.

Table 4-12 CFA Output for Strategic Consensus

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic</td>
<td>SCon_1</td>
<td>0.76</td>
<td>13.80</td>
<td>0.000</td>
</tr>
<tr>
<td>Consensus</td>
<td>SCon_2</td>
<td>0.76</td>
<td>13.75</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SCon_3</td>
<td>0.88</td>
<td>17.06</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SCon_4</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SCon = Strategic Consensus; SCon_1-SCon_4 items used to measure Strategic Consensus construct; CR = Critical Ratio; P < 0.05 $\chi^2_{\text{min}}/df = 2.67$, p = 0.07, RMR = 0.01, GFI = 0.98, CFI = 0.99, TLI = 0.98, NFI = 0.99, RMSEA = 0.08.
Figure 4-6  Measurement Model for Strategic Consensus
4.3.1.7 CFA for Customer Integration

CFA for customer integration (Cust_I) as described in Table 4-13 demonstrated that all the factor loadings were found above 0.50 except the item 3, possesses the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Item 3 has been eliminated from further analysis. This item possesses factor loading less than 0.50 thus challenging unidimensionality of the construct therefore eliminated as suggested by Hulland (1999).

Moreover all the loading for Cust_I were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for customer integration variable was found fit as indicated by the insignificant result ($\chi^2 / df = 2.87$, p=.01). Moreover $\chi^2 / df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). Moreover critical values for all the items are also significant. The same can be visualized in Figure 4-7.
<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Integration</td>
<td>Cust_I1</td>
<td>0.74</td>
<td>10.31</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I2</td>
<td>0.59</td>
<td>8.202</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I4</td>
<td>0.74</td>
<td>10.37</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I5</td>
<td>0.72</td>
<td>10.08</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I6</td>
<td>0.79</td>
<td>10.97</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I7</td>
<td>0.65</td>
<td>12.31</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Cust_I8</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cust_I = Customer Integration; Cust_I1-Cust_I8 items used to measure Customer Integration construct; CR = Critical Ratio; P < 0.05

$\chi^2_{min}/df = 2.87$, p=0.01,

RMR=0.01, GFI = 0.96, CFI = 0.97

TLI = 0.94, NFI=0.956

RMSEA = 0.09.
Figure 4-7  Measurement Model for Customer Integration
4.3.1.8 CFA for Supplier Integration

As demonstrated by Table 4-14 CFA values depicted that first three items have low factor loadings and were eliminated from the further analysis. These items were possessing factor loading less than 0.50 thus challenging unidimensionality of the construct therefore eliminated as suggested by Hulland (1999).

All the other factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for supplier integration (Suppl_I) are statistically found significant with larger CR (critical ratio) values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for Suppl_I variable was found fit as indicated by the insignificant result ($\chi^2_{\text{min}}/df = 2.84$, p=.01). Moreover $\chi^2/df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). Figure 4-8 visually described the CFA for supplier integration.
### Table 4-14 CFA Output for Supplier Integration

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator items</th>
<th>Factor loading</th>
<th>CR (t_ value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>Suppl_I4</td>
<td>0.81</td>
<td>13.11</td>
<td>0.000</td>
</tr>
<tr>
<td>Integration</td>
<td>Suppl_I5</td>
<td>0.74</td>
<td>11.80</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Suppl_I6</td>
<td>0.73</td>
<td>11.45</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Suppl_I7</td>
<td>0.71</td>
<td>11.16</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Suppl_I8</td>
<td>0.68</td>
<td>10.54</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Suppl_I9</td>
<td>0.67</td>
<td>10.38</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Suppl_I10</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Suppl_I = Supplier Integration; Suppl_I1-Suppl_I10 items used to measure Supplier Integration construct; CR = Critical Ratio; P < 0.05

$\chi^2_{\text{min}} / df = 2.84, \ p = 0.01,$

RMR=0.02, GFI = 0.96, CFI = 0.97, TLI = 0.95, NFI=0.96

RMSEA = 0.08.

![Figure 4-8 Measurement Model for Supplier Integration](image-url)
4.3.1.9 CFA for Socialization

As demonstrated by the Table 4-15, CFA results depicted that all the factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for Socialization are statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for socialization variable was found fit as indicated by the insignificant result ($\chi^2_{min}/df = 1.143, p=0.13$). Moreover $\chi^2/df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). CFA statistics are visually described in figure 4-9.

Table 4-15 CFA Output for Socialization

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/Items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>Social_1</td>
<td>0.72</td>
<td>10.88</td>
<td>0.000</td>
</tr>
<tr>
<td>Socialization</td>
<td>Social_2</td>
<td>0.84</td>
<td>12.312</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Social_3</td>
<td>0.85</td>
<td>13.498</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Social_4</td>
<td>0.87</td>
<td>13.15</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Social_5</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Social_1-Social_5 items used to measure SC socialization construct; CR = Critical Ratio; P < 0.05 $\chi^2_{min}/df = 1.143, p=0.33$, RMR=0.005, GFI = 0.99 CFI = 0.99 TLI = 0.99 NFI=0.99 RMSEA = 0.02.
Figure 4.9 Measurement Model for Socialization
4.3.1.10 CFA for Adhocracy Culture

CFA statistics as demonstrated by the Table 4-16 revealed that all the factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for Adhocracy Culture are statistically found significant with larger t-values indicated the significance (Byrne, 2001; Dunn et al., 1994). CFA statistics are visually described in figure 4-10.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator/items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>OC_1</td>
<td>0.89</td>
<td>6.48</td>
<td>0.000</td>
</tr>
<tr>
<td>Adhocracy Culture</td>
<td>OC_2</td>
<td>0.69</td>
<td>7.28</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>OC_3</td>
<td>0.54</td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

OC_1-OC3 items used to measure Adhocracy Culture construct; CR = Critical Ratio; P < 0.05 CFI=1

Figure 4-10 Measurement Model for Adhocracy Culture
4.3.1.11 CFA for Market Culture

Table 4-17 statistically demonstrated that all the factor loadings were found above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for market type culture were statistically found significant with larger t-values indicated the significance (Byrne, 2001; Dunn et al., 1994). CFA for market culture is also visually described in figure 4-11.

Table 4-17 CFA Output for Market Culture

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>OC_4</td>
<td>0.66</td>
<td>10.21</td>
<td>0.000</td>
</tr>
<tr>
<td>Market Culture</td>
<td>OC_5</td>
<td>0.83</td>
<td>11.99</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>OC_6</td>
<td>0.89</td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

OC_4-OC_6 items used to measure Market Culture construct; CR = Critical ratio

CFI=1;

![Figure 4-11 Measurement Model for Market Culture](image)

190
4.3.1.12 CFA for Org Performance

Table 4-18 demonstrated the CFA for organization performance (Org_Perf) and depicted that all the factor loadings were above 0.50 the threshold value as suggested by the Hair et al. (2006) thus items measure the construct and ensure the convergence or convergent validity. Moreover all the loading for organization performance were statistically found significant with larger CR values indicated the significance (Byrne, 2001; Dunn et al., 1994). Moreover measurement model for Organization performance variable was found fit as indicated by $\chi^2_{min}/df < 3$ value ($\chi^2_{min}/df = 2.19 < 3$, $p=.02$).

Moreover $\chi^2/df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006; Marsh & Hocevar, 1985). Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). The CFA of this construct is also visually described in a figure 4-12.
Table 4-18 CFA Output for Org. Performance

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicator items</th>
<th>Factor loading</th>
<th>CR (t_value)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>Org_perf1</td>
<td>0.63</td>
<td>10.79</td>
<td>0.000</td>
</tr>
<tr>
<td>Performance</td>
<td>Org_perf2</td>
<td>0.69</td>
<td>10.25</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Org_perf3</td>
<td>0.73</td>
<td>10.96</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Org_perf4</td>
<td>0.83</td>
<td>12.41</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Org_perf5</td>
<td>0.75</td>
<td>11.22</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Org_perf6</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\text{Org\_perf} = \text{Organization Performance}; \text{Org\_perf1}_i - \text{Org\_perf6}_i \text{ items used to measure Organization performance construct}; \text{CR} = \text{Critical Ratio}; P < 0.05$

$\chi^2_{\min} / df = 2.19$, $p=0.02,$

$\text{RMR}=0.01, \text{ GFI}=0.97, \text{ CFI}=0.98, \text{ TLI}=0.98, \text{ NFI}=0.97$

$\text{RMSEA} = 0.07.$

![Figure 4-12 Measurement Model for Org. Performance](image-url)
4.4 Reliability analysis

As previously described the importance of reliability analysis in the pilot study phase, the reliability of each construct for the complete sample was also carried out to assess the internal consistency each construct possesses and for confirming the appropriateness of the research instrument for further analysis of the sample collected for the current study.

Table 4-19 Reliability results (N=234)

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th># of items</th>
<th>Alpha value</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>3</td>
<td>0.85</td>
<td>234</td>
</tr>
<tr>
<td>IDT</td>
<td>3</td>
<td>0.78</td>
<td>234</td>
</tr>
<tr>
<td>MC</td>
<td>4</td>
<td>0.81</td>
<td>234</td>
</tr>
<tr>
<td>IoKS</td>
<td>4</td>
<td>0.84</td>
<td>234</td>
</tr>
<tr>
<td>SIT</td>
<td>5</td>
<td>0.82</td>
<td>234</td>
</tr>
<tr>
<td>SC</td>
<td>4</td>
<td>0.89</td>
<td>234</td>
</tr>
<tr>
<td>Int_I</td>
<td>10</td>
<td>0.79</td>
<td>234</td>
</tr>
<tr>
<td>SCP</td>
<td>10</td>
<td>0.79</td>
<td>234</td>
</tr>
<tr>
<td>Cost</td>
<td>3</td>
<td>0.78</td>
<td>234</td>
</tr>
<tr>
<td>Reliability</td>
<td>3</td>
<td>0.80</td>
<td>234</td>
</tr>
<tr>
<td>Flexibility</td>
<td>4</td>
<td>0.76</td>
<td>234</td>
</tr>
<tr>
<td>Cust_I</td>
<td>7</td>
<td>0.88</td>
<td>234</td>
</tr>
<tr>
<td>Suppl_I</td>
<td>7</td>
<td>0.89</td>
<td>234</td>
</tr>
<tr>
<td>Socialization</td>
<td>5</td>
<td>0.89</td>
<td>234</td>
</tr>
<tr>
<td>OC_1</td>
<td>3</td>
<td>0.73</td>
<td>234</td>
</tr>
<tr>
<td>OC_2</td>
<td>3</td>
<td>0.83</td>
<td>234</td>
</tr>
<tr>
<td>Org_Perf</td>
<td>6</td>
<td>0.87</td>
<td>234</td>
</tr>
</tbody>
</table>

Note. JR=Job rotation, IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS = Intraorganizational Knowledge Sharing, SIT=Supporting information technologies, SC= Strategic Consensus, Int_I=Internal Integration, SCP=SC Performance, Cost=Cost, Relia = Reliability, Flex=Flexibility, Cust_I = Customer Integration, Suppl_I = Supplier Integration, Socialization = SC Socialization, OC_1 = Adhocracy Culture, OC_2 = Market Culture, Org_Perf = Organization Performance.
As demonstrated by the Table 4-19 above the reliability of all the constructs ranges between 0.73-0.88. For example, alpha value was found for job rotation (JR = 0.85) which was measured through 03 items/elements; interdepartmental trainings (IDT = 0.78) which was measured through 03 items/elements; Management commitment (MC = 0.81) which was measured through 04 items/elements; Intraorganizational knowledge sharing (IoKS = 0.84) which was measured through 04 items/elements; Supporting information technology (SIT = 0.82) which was measured through 05 items/elements; Strategic Consensus (Scon = 0.89) which was measured through 04 items/elements. Furthermore, the values for alpha for the construct internal integration (Int_I = 0.79); Supply chain performance (SCP = 0.79); Customer integration (Cust_I = 0.85); Supplier integration (Suppl_I = 0.88); Socialization (Socialization = 0.89); Adhocracy culture (OC_1 = 0.73); Market Culture (OC_2 = 0.83) and Organization performance (Org_perf = 0.87). Reliability coefficients for all the constructs under investigation ensures appropriateness of all the construct for final analysis and all the values of Alpha values exhibit excellent reliability as recommended by the previous researches as described earlier (Kerlinger & Lee, 2000; Hair et al., 2006; Sekaran, 2003).
4.5 Construct Validity

Construct validity as previously described usually comprises of convergent validity, content validity and discriminant validity.

4.5.1 Content Validity

For content validity the instrument was discussed with three academic professors and three professionals from refineries, marketing companies and E&Ps. These experts were approached to their office after appointment. As per the guidance and comments of the academicians and professionals the items were improved through rewarding wherever necessary.

4.5.2 Convergent Validity

Confirmatory factor analysis was used to measure the convergent validity. For this purpose as suggested by the Hair et al. (2006), standardized factor loading, construct reliability (CR) and average variance extracted (AVE) were investigated to ensure the convergent validity. The significant factor loading greater than 0.50, CR values larger than 0.50 and AVE values exceeding 0.50 used as cutoff values ensuring the convergent validity (Bagozzi & Yi, 1991; Fornell & Larker, 1981; Hair et al., 2006). All construct as shown below in Table 4-20 have significant factor loading and are above threshold value as indicated above by the previous researchers indicating convergence thus found explaining the construct that were theorized based on theory. Similarly the values of construct reliability (CR score) and average variance extracted (AVE Score) as shown in the Table-4-20 below are the well above the recommended cutoff values thus indicating sufficient convergent validity. For example for job rotation (JR) the values for alpha (reliability), CR and
AVE are respectively 0.85, 0.854 and 0.662. Similarly for interdepartmental trainings (IDT) the values for alpha (reliability), CR and AVE are respectively 0.78, 0.796 and 0.575. For for strategic consensus (Scon) the values for alpha (reliability), CR and AVE are respectively 0.89, 0.89 and 0.67. For other constructs the values for CR, alpha and AVE are tabulated in Table 4-22. The AVE scores were calculated following the formula as described by Hair et al. (2006) i.e. \[ \frac{\sum_{k=1}^{n} k_i^2}{n} \], \( i = 1 \ldots n \). Here, \( k \) represents the factor loading (standardized) and \( n \) represents the number of indicators measuring the construct. For example for Job rotation (JR) the AVE is computed as \[ \frac{0.81^2 + 0.82^2 + 0.73^2}{3} = 0.662 \]. Similarly for intraorganizational knowledge sharing (IoKS) it is \[ \frac{0.72^2 + 0.84^2 + 0.72^2 + 0.76^2}{3} = 0.58 \]. Following the same procedure, it was concluded that all the variables pass the recommended criteria thus signifying the fact that variance netted by the variables in the current study are greater than the variance as netted because of the measurement error.
Table 4-20  Convergent Validity (Factor loadings, Construct reliability and average variance extracted), CR = Construct Reliability

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Indicators or items</th>
<th>Factor loading (standardized)</th>
<th>Cronbach Alpha value</th>
<th>CR value</th>
<th>AVE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>JR_1, JR_2, JR_3</td>
<td>0.81, 0.82, 0.81</td>
<td>0.85</td>
<td>0.854</td>
<td>0.662</td>
</tr>
<tr>
<td>IDT</td>
<td>IDT_1, IDT_2, IDT_3</td>
<td>0.71, 0.94, 0.58</td>
<td>0.78</td>
<td>0.796</td>
<td>0.575</td>
</tr>
<tr>
<td>MC</td>
<td>MC_1, MC_2, MC_3, MC_4</td>
<td>0.75, 0.70, 0.72, 0.75</td>
<td>0.816</td>
<td>0.82</td>
<td>0.53</td>
</tr>
<tr>
<td>IoKS</td>
<td>IoKS_1, IoKS_2, IoKS_3, IoKS_4</td>
<td>0.72, 0.84, 0.72, 0.76</td>
<td>0.84</td>
<td>0.84</td>
<td>0.58</td>
</tr>
</tbody>
</table>
Table 4-20 (Continued…) Convergent Validity (Factor loadings, Construct reliability and average variance extracted), CR = Construct Reliability; AVE = Average Variance Extracted

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Indicators or items</th>
<th>Factor loading (standardized)</th>
<th>Cronbach Alpha value</th>
<th>CR value</th>
<th>AVE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIT</td>
<td></td>
<td></td>
<td>0.82</td>
<td>0.82</td>
<td>0.49</td>
</tr>
<tr>
<td>SIT_1</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT_2</td>
<td>0.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT_3</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIT_4</td>
<td>0.64</td>
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<td></td>
<td></td>
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<td>SIT_5</td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.89</td>
<td>0.67</td>
</tr>
<tr>
<td>SCon_1</td>
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<td></td>
<td></td>
<td></td>
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<td>SCon_2</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCon_3</td>
<td>0.88</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>SCon_4</td>
<td>0.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Int_I</td>
<td></td>
<td></td>
<td>0.79</td>
<td>0.84</td>
<td>0.64</td>
</tr>
<tr>
<td>IL_1</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IL_2</td>
<td>0.87</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL_3</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4-20 (Continued…) Convergent Validity (Factor loadings, Construct reliability and average variance extracted), CR = Construct Reliability

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Indicators or items</th>
<th>Factor loading (standardized)</th>
<th>Cronbach Alpha value</th>
<th>CR value</th>
<th>AVE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCP</td>
<td></td>
<td></td>
<td>0.79</td>
<td>.89</td>
<td>0.72</td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td></td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cust_I</td>
<td>Cust_I1</td>
<td>0.74</td>
<td>0.88</td>
<td>0.87</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Cust_I2</td>
<td>0.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cust_I4</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cust_I5</td>
<td>0.72</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Cust_I6</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cust_I7</td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cust_I8</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC Social</td>
<td>Social_1</td>
<td>0.72</td>
<td>0.89</td>
<td>0.90</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Social_2</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social_3</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social_4</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social_5</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4-20 (Continued…) Convergent Validity (Factor loadings, Construct reliability and average variance extracted), CR = Construct Reliability

<table>
<thead>
<tr>
<th>Name of Variable/construct</th>
<th>Indicators or items</th>
<th>Factor loading (standardized)</th>
<th>Cronbach Alpha value</th>
<th>CR value</th>
<th>AVE Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppl_I</td>
<td>Suppl_I4</td>
<td>0.81</td>
<td>0.89</td>
<td>0.89</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Suppl_I5</td>
<td>0.74</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Suppl_I6</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppl_I7</td>
<td>0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppl_I8</td>
<td>0.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppl_I9</td>
<td>0.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppl_I10</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC_1</td>
<td>OC_1</td>
<td>0.89</td>
<td>0.73</td>
<td>0.75</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>OC_2</td>
<td>0.69</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>OC_3</td>
<td>0.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC_2</td>
<td>OC_4</td>
<td>0.66</td>
<td>0.83</td>
<td>0.83</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>OC_5</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OC_6</td>
<td>0.89</td>
<td></td>
<td></td>
<td></td>
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<td>Org_Perf</td>
<td>Org_perf1</td>
<td>0.63</td>
<td>0.87</td>
<td>0.87</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Org_perf2</td>
<td>0.69</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Org_perf3</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Org_perf4</td>
<td>0.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Org_perf5</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Org_perf6</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. JR=Job rotation , IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS = Intraorganizational Knowledge Sharing , SIT=Supporting information technologies, SCon= Strategic Consensus ,Int_I=Internal Integration, Ii_I1 = Interaction, Ii_I2 =Collaboration , Ii_I3 = Cross functional Teams ,SCP=SC Performance, Cost=Cost, Reliab = Reliability, Flex=Flexibility, Cust_I = Customer Integration ,Suppl_I = Supplier Integration, Socialization = SC Socialization , OC_1 = Adhocracy Culture,OC_2 = Market Culture, Org_Perf = Organization Performance.
4.5.3 Discriminate Validity

Discriminant validity refers to the independent nature of the constructs that is each construct and its items must be independent enough from the other constructs (Hair et al., 2010; Hatcher, 1994). For this purpose pair wise correlations among constructs were investigated and found that all the correlations were less than cutoff value less than 0.85 as recommended by the Harrington (2009). Furthermore discriminant validity was also confirmed through the method as described by the Fornell and Larcker (1981) and found that the square roots of AVE (Bold figures in diagonal) of each construct was found to be larger than its correlations with other. For example if we take job rotation (JR) and interdepartmental trainings, AVE for the JR is 0.81 and squared correlation between theses constructs is 0.18 (0.424^2). It is evident that the AVE is much larger than the squared correlation indicating that each of the construct is different from other construct and explains significant variance with its own items or elements than it explains with other variable. It can be found for all other constructs that the square root of each variable is larger than its correlation coefficient with other variables in the study. The results as shown in the Table 4-21 confirms the discriminant validity.
Table 4-21 Discriminant Analysis Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>x1</th>
<th>x2</th>
<th>x3</th>
<th>x4</th>
<th>x5</th>
<th>x6</th>
<th>x7</th>
<th>x8</th>
<th>x9</th>
<th>x10</th>
<th>x11</th>
</tr>
</thead>
<tbody>
<tr>
<td>x1</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x2</td>
<td>0.424**</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x3</td>
<td>0.59**</td>
<td>0.51**</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x4</td>
<td>0.51**</td>
<td>0.60**</td>
<td>0.592**</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x5</td>
<td>0.34**</td>
<td>0.26**</td>
<td>0.49**</td>
<td>0.27**</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x6</td>
<td>0.47**</td>
<td>0.514**</td>
<td>0.51**</td>
<td>0.54**</td>
<td>0.47**</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x7</td>
<td>0.40**</td>
<td>0.38**</td>
<td>0.54**</td>
<td>0.44**</td>
<td>0.37**</td>
<td>0.59**</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x8</td>
<td>0.254**</td>
<td>0.37**</td>
<td>0.33**</td>
<td>0.36**</td>
<td>0.19**</td>
<td>0.29**</td>
<td>0.25**</td>
<td>0.70</td>
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<tr>
<td>x9</td>
<td>0.002</td>
<td>0.13**</td>
<td>0.15**</td>
<td>0.06*</td>
<td>0.20</td>
<td>0.22**</td>
<td>0.18**</td>
<td>0.21**</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x10</td>
<td>0.245**</td>
<td>0.20**</td>
<td>0.29**</td>
<td>0.25**</td>
<td>0.28**</td>
<td>0.33**</td>
<td>0.22**</td>
<td>0.25**</td>
<td>0.33**</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>x11</td>
<td>0.00</td>
<td>0.13**</td>
<td>0.18**</td>
<td>0.04</td>
<td>0.15**</td>
<td>0.28**</td>
<td>0.27**</td>
<td>0.21**</td>
<td>0.42**</td>
<td>0.35**</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Note. x1=Job rotation (JR), x2=Interdepartmental trainings (IDT), x3=Management Commitment (MC), x4=Intraorganizational Knowledge Sharing (IoKS), x5=Supporting information technologies (SIT), x6=Strategic Consensus (SCOn), x7=Internal Integration (Int_I), x8=Customer Integration (Cust_I), x9=Supplier Integration (Suppl_I), x10=SC Performance (SCP), x11=Organization Performance (Org_Perf). Bold values are the square roots of AVE
*p<.05; **p<.01
In nutshell validity measures which were vital for any research were done through convergent validity, content validity as well as discriminant validity. Results divulges that AVE (average variance extracted) values, factor loadings, significant critical ratios and construct reliability for each variable posses the threshold criteria as described by literature thus exhibiting desired convergent validity. Content validity was assured through validating the instrument by the expert review from academia and industry. Furthermore all the constructs of the study were found significantly and positively related thus ensuring that instrument behaves accordingly as hypothesized the relationships to prove the proposed or stated research questions of the study. Lastly discriminant validity was also assured as described in the section 4.5.3.
4.6 The Structural Modeling

The assessment of the structural model is the next step as suggested by Hair et al. (2006) once the measurement model has been investigated.

4.6.1 Testing of Hypotheses H1-H6

In the first phase for all the six hypothesis i.e. H1 through H6, direct effects of six factors (i.e. job rotation, interdepartmental trainings, management commitment, intraorganizational knowledge sharing, supporting information technologies and strategic consensus) on internal integration were investigated. The individual effects of each factor were ascertained. The hypotheses were accepted based on the criteria of 5% level of significance. This means that if the p values is less than this threshold value, null hypothesis was rejected and true or alternate hypothesis as hypothesized was accepted. The smaller the p value, larger the t-value (CR value) more is the contribution of the variable thus signaling in favor of accepting the hypothesis as hypothesized.

For Hypothesis H-1, from the results, it was found that JR practices was positively and significantly (this is evident from the p value less than as specified 5% significance level) related with internal integration. The significant path coefficient ($\beta_1 =0.44$, p< 0.05) indicated the acceptance of the first hypothesis as shown in Table 4-22. Furthermore the value of Chi square, its insignificance and values of the fit indices which are well within the range as specified by the research show the model fitness. As depicted by the Table 4-22 the value of $\chi^2_{min}/df <3$ value ($\chi^2_{min}/df =0.51<3$, p=.59) .Moreover $\chi^2/df$ value is less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006; Marsh & Hocevar, 1985).
Values for fit indices as indicated above are all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). Thus as per the results of AMOS, $\chi^2_{\text{min}} / df$ statistics, fit indices demonstrated the fitness of the model and significant path coefficient ($\beta_1 = 0.44$) resulted in support of H1.

Table 4-22 Job Rotation & Internal Integration

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (Unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I←JR</td>
<td>0.23</td>
<td>0.44</td>
<td>0.03</td>
<td>6.353</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Int_I=internal integration; JR = Job rotation; CR = Critical ratio, SE=Std error ; $P < 0.05$

Chi Square = 1.030, DF =2, $p = 0.59$

$\chi^2_{\text{min}} / df = 0.515$, RMR=0.006, GFI = 0.99

CFI = 1 NFI=0.99 RMSEA = 0.00.
For Hypothesis H-2, from the results, it was found that interdepartmental trainings (IDT) was positively and significantly related with internal integration. The significant path coefficient (0.43, p< 0.05) indicated the acceptance of the second hypothesis as shown in Table 4-23. Furthermore the value of Chi square, its insignificance and values of the fit indices which are well within the range as specified by the research show the model fitness. As depicted by the Table 4-23 the value of $\chi^2_{\text{min}}/df < 3$ value ($\chi^2_{\text{min}}/df = 1.157 < 3, p= .315$). Moreover $\chi^2/df$ value was found less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006; Marsh & Hocevar, 1985). Values for fit indices as indicated above were all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 was also within the acceptable range as recommended by Hair et al. (1995). Thus as per the results of AMOS, $\chi^2_{\text{min}}/df$ statistics, fit indices demonstrated the fitness of the model and significant path coefficient ($\beta_2 = 0.43$) resulted in support of H2.

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I←IDT</td>
<td>0.279</td>
<td>0.43</td>
<td>0.04</td>
<td>6.318</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Int_I=internal integration; IDT = Interdepartmental trainings; CR = Critical ratio; SE=Std error; P < 0.05

Chi Square = 2.313, DF = 2, p = 0.315
$\chi^2_{\text{min}}/df = 1.157$, RMR=0.007, GFI = 0.99
CFI = 0.99 NFI=0.99 RMSEA = 0.02.
For Hypothesis H-3, from the results, it was found that Management commitment (MC) was positively and significantly related with internal integration. The significant path coefficient indicated the acceptance of the 3rd hypothesis as shown in Table 4-24. Furthermore the value of Chi square, its insignificance and values of the fit indices which were well within the range as specified by the research show the model fitness. As depicted by the Table 4-24 the value of $\chi^2_{\text{min}} / df < 3$ value ($\chi^2_{\text{min}} / df = 1.795 < 3$, $p=.161$). Moreover $\chi^2 / df$ value was found less than 3 which is widely recommended by previous research (e.g. Hair et al., 2006; Marsh & Hocevar, 1985). Values for fit indices as indicated above were all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 was also within the acceptable range as recommended by Hair et al. (1995). Thus as per the results of AMOS, $\chi^2_{\text{min}} / df$ statistics, fit indices demonstrated the fitness of the model and significant path coefficient ($\beta_3 = 0.58$) resulted in support of H3.

Table 4-24 Management Commitment and Internal Integration

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I←MC</td>
<td>0.46</td>
<td>0.583</td>
<td>0.053</td>
<td>8.86</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

*Int_I=internal integration; MC = Management Commitment; CR = Critical ratio, SE=Std error ; P < 0.05

Chi Square = 3.591, DF =2, $p = 0.166$

$\chi^2_{\text{min}} / df = 1.795$, RMR=0.006, GFI = 0.99

CFI = 0.99 NFI=0.98 RMSEA = 0.05
For Hypothesis H-4, from the results, it was found that Intraorganizational knowledge sharing (IoKS) was positively and significantly related with internal integration. The significant path coefficient indicated the acceptance of the 4th hypothesis as shown in Table 4-25. Furthermore, the value of Chi square, its insignificance and values of the fit indices which were found well within the range as specified by the research show the model fitness. As demonstrated by the Table 4-25, the statistics for $\chi^2_{\text{min}} / df < 5$ value ($\chi^2_{\text{min}} / df = 3.17 < 5, p = 0.042$). Additionally, the value of $\chi^2 / df$ was found less than 5 which is widely recommended by previous research (e.g. Bentler, 1988; Hair et al., 2006; Marsh & Hocevar, 1985; Schumacker and Lomax, 2004). Values for fit indices as indicated above were all within the acceptable range i.e. all are above 0.90 and value of RMSEA < 0.08 is also within the acceptable range as recommended by Hair et al. (1995). Thus as per the results of AMOS, $\chi^2_{\text{min}} / df$ statistics, fit indices demonstrated the fitness of the model and significant path coefficient ($\beta_4 = 0.50$) resulted in support of H4.

Table 4-25 Intratorganizational Knowledge Sharing & Internal Integration

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (Unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I ← IoKS</td>
<td>0.36</td>
<td>0.50</td>
<td>0.05</td>
<td>7.290</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Int_I=internal integration; IoKS = Intraorganizational Knowledge Sharing; CR = Critical ratio; SE = Std error; P < 0.05

Chi Square = 6.34, DF = 2, p = 0.042
$\chi^2_{\text{min}} / df = 3.17$, RMR = 0.009, GFI = 0.98

CFI = 0.98 NFI = 0.98 RMSEA = 0.09
For Hypothesis H-5, from the results, it was found that supporting information technology (SIT) was positively and significantly related with internal integration. The significant path coefficient indicated the acceptance of the fifth hypothesis as shown in Table 4-26. Thus as per the results of AMOS, $\chi^2_{min}/df$ statistics, fit indices demonstrated the fitness of the model and significant path coefficient ($\beta_5 = 0.38$) resulted in support of H5.

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (Unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I←SIT</td>
<td>0.38</td>
<td>0.39</td>
<td>0.06</td>
<td>5.574</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

INT_I = internal integration; SIT = Supporting information technology; CR = Critical ratio, SE = Std error; P < 0.05
For Hypothesis H-6, from the results, it was found that Strategic Consensus (SCon) was positively and significantly related within internal integration. The significant path coefficient indicated the acceptance of the 6th hypothesis as shown in Table 4-27. Thus as per the results of AMOS, \( \chi^2_{\text{min}} / df \) statistics, fit indices demonstrated the fitness of the model and significant path coefficient (\( \beta_6 = 0.64 \)) resulted in support of H6.

Table 4-27 Strategic Consensus & Internal Integration

<table>
<thead>
<tr>
<th>Path</th>
<th>Regression weight (Unstandardized)</th>
<th>Standardized Regression weight</th>
<th>SE</th>
<th>CR</th>
<th>Sig.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I→SCon</td>
<td>0.434</td>
<td>0.65</td>
<td>0.04</td>
<td>9.95</td>
<td>0.00</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Int_I=int internal integration; Scon = Supporting information technology; CR = Critical ratio, SE=Std error; P < 0.05
From the results above it has been found that all the hypotheses (H1 –H6) were accepted and concluded that all the factors once evaluated individually have shown significant effects on internal integration. The summary of findings is described below in Table 4-28

**Table 4-28 Summary of Hypotheses results H1-H6**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Beta value</th>
<th>Critical Value</th>
<th>P value</th>
<th>Decision / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>β₁ (Int_I ← JR)</td>
<td>0.44</td>
<td>6.353</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>β₂ (Int_I ← IDT)</td>
<td>0.43</td>
<td>6.318</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>β₃ (Int_I ← MC)</td>
<td>0.583</td>
<td>8.86</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>β₄ (Int_I ← IoKS)</td>
<td>0.50</td>
<td>7.290</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>β₅ (Int_I ← SIT)</td>
<td>0.39</td>
<td>5.519</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>β₆ (Int_I ← SC)</td>
<td>0.64</td>
<td>9.95</td>
<td>0.00</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Note.** JR=Job rotation ; IDT=Interdepartmental Trainings, MC=Management Commitment, IoKS = Intraorganizational Knowledge Sharing , SIT=Supporting information technologies, SCon=Strategic Consensus , Int_I=Internal Integration.
4.6.2 Testing of Full Model

4.6.2.1 Phase -1-Direct Method

Further analysis was carried out into two phases to see the effects these factors (i.e. JR, IDT, MC, IoKS, SIT and SCon) on internal integration. In the first phase the individual effects of these variables were investigated as shown the model-1(Figure 4-13). The results indicated that the only two factors namely Strategic Consensus (SCon) with path coefficient 0.53, p <0.05 i.e. significant and management commitment (MC) with path coefficient 0.37, p<0.05 significantly affect internal integration (Int_I). All other factors were found insignificantly related to internal integration. Moreover the fitness indices and the Chi-square statistics as indicated by the model have a poor fit of the data and none of the fit indices is satisfying the cutoff values as suggested by the previous researchers. The results are as follows

Chi-square = 740.421, df = 85, p=0.00, $\chi^2_{min}/df=8.711$, RMR=0.100, GFI = 0.624, CFI = 0.59, NFI=0.566, RMSEA = 0.182.

Figure 4-13 Model-1
Phase -2 Integrated Method/Model

In the second phase, on aligning these factors (i.e. integrating or combining), the results as indicated from the alternate model revealed some interesting facts (Figure 4-14). All the factors now significantly load to the integrated construct for example JR with (0.64, p=0.00<0.05), IDT (0.61, p=0.00<0.05), MC (0.86, p=0.00<0.05), SIT (0.57, p=0.00<0.05) and SC (0.82, p=0.00<0.05). The path coefficient found was 0.75 and significant. The coefficient of determination i.e. \( R^2 \) is (0.75)^2 =0.56 for alignment of practices thus explaining 56% variance in internal integration. It means that if a firm align these integration practices of job rotation (JR), interdepartmental trainings (IDT), Management commitment towards integration (MC), supporting information technology (SIT) and consensus on strategy (SCon) this will demonstrate high levels of contribution to internal integration (Int_I). This model i.e. Model-2 was found better as compared to the previous model Model-1 thus indicating the complementary nature of these practices. All the fit indices were found in the accepted range and model was found fit i.e. Chi-square = 203.149, df = 79, p=0.00, \( \chi^2_{\text{min}}/df =2.572 \), RMR=0.02, GFI = 0.90, CFI = 0.92, NFI=0.88, RMSEA = 0.08 < 0.10 (as recommended by Steiger, 1992). This was evident that the statistics for \( \chi^2_{\text{min}}/df <5 \) value (\( \chi^2_{\text{min}}/df =2.572<5 \), p= 0.000). \( \chi^2/df \) was found less than 3 which is as per criteria recommended by Hu and Bentler (1999).

So it can be said that these factors have a stronger effect on internal integration (Int_I) when these are integrated or jointly implemented than when each of these factors are considered independently. These results indicated the strong evidence
for integration of these practices as opposed to isolation to enhance internal integration.

The conception that the effect of a system (i.e. integrated approach) is generated by the overall impact of its constituents parts and not the parts taken separately is reiterated by the results of this study (Finni, 1997; Van de Ven & Ferry, 1980). The results of the alternate model suggested the implementation of supporting mechanism as opposed to a piecemeal approach for implementation of these practices for enhancing internal integration as this approach leads to a failure.

In order to understand this holistic fit, modeling fit as covariation which is one of the best approaches widely used was applied, which aims at determining a pattern of internal consistency or covariation among a group of underlying variables which are theoretically related. This technique has proved to be fruitful for analyzing integration of several concurrent dimensions of a factor that was otherwise deemed insufficient once these dimensions are taken separately to describe a system (Venkatraman, 1989).

As shown in the Figure 4-14 (integrated model i.e. Model-2) the loadings of the first order factors on the second order are significant signifying the presence of a common underlying thread among these factors. Furthermore their model fits better than the previous model. So finally it has been proved that these integration practices were combined as the integration of integration practices (i.e. fit) and their joint effect was found positive and significant. This demonstrated that these practices are closely related and must be coordinated with each other.
Figure 4-14  Model-2
4.6.3 Model Comparison- Validating the alternate Model

According to Rigdon (1999) contribution to the theory development can be optimized through comparisons with alternate models validated by the theory under the similar circumstances. Preforming analysis that contrasts already held view against another is one of the wisest ways to avoid reaching obvious conclusion and this goal can be reached by using SEM for comparisons of alternate models.

For this purpose the extant literature has provided a number of ways to compare the models that best represent the data with improved fit indices. These methods includes $\chi^2$ difference test (CDT), Information criteria methodology/indices and significance of the parameters (original and new) (Cudeck & Browne, 1983; Steiger et al., 1985).

The examination of the alternate model (Model-2) revealed that all the parameters (i.e. original) were found significant as compared to Model-1 thereby indicating the acceptability of the alternate model. In step-2, fit indices of the model-1 and Model-2 are compared. The fit indices (i.e. Chi-square/Df, CFI, GFI, RMSEA etc.) for the alternate model (Model-2) as shown in Table 4-29 were found better than the previous model-1 and passed the recommended threshold and are found significant. This gives us the second evidence in favor of model-2.

Thirdly AIC (Akaike information Criterion, an additional fit index) was also compared for these two models. For Model-1 AIC = 810.421 and Model-2, AIC = 285.149 which is much less than Model-1 indicated that the model-2 is better fit as compared to Model-1.

Fourthly Chi-square ($\chi^2$) difference test was applied to further confirm the comparison made between two models. As observed from the Table 4-29, Chi-square for Model-1 is 740.421 (with df =85) and for Model-2 it is 203.149 (with df
The difference for chi-square for two models is found to be 537.101 with 05 as change in difference of degree of freedom. Applying the Chi-square test and consulting the Chi-square table against 5 degree of freedom at 5% level of significance, the value is 11.07. This critical value is less than the value as obtained in this research study i.e. 537.101 which indicated that the model-2 resulted in better fit.

From the discussion above and with four evidence in favour of Model-2 that integration of practices for integration once they are aligned as opposed to when each of which is considered resulted in a better fit. So the model-2 resulted in a better fit.
Table 4-29 Model Comparison Statistics

<table>
<thead>
<tr>
<th>Model Fit Statistics</th>
<th>Recommended Criteria</th>
<th>Model-1</th>
<th>Model-2</th>
<th>Decision / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td></td>
<td>740.250</td>
<td>203.149</td>
<td></td>
</tr>
<tr>
<td>Statistics ($\chi^2$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta \chi^2$</td>
<td></td>
<td>537.101</td>
<td></td>
<td>Model-1 is rejected and</td>
</tr>
<tr>
<td>$Df$</td>
<td></td>
<td>85</td>
<td>79</td>
<td>Model-2 is accepted</td>
</tr>
<tr>
<td>$\Delta Df$</td>
<td></td>
<td>06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\chi^2_{min}/Df$</td>
<td>$\leq 3$</td>
<td>8.711</td>
<td>2.572</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>$\geq 0.90$</td>
<td>0.59</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>GFI</td>
<td>$\geq 0.90$</td>
<td>0.62</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td>$\leq 0.08$ or $\leq 0.10$</td>
<td>0.182</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>CAIC</td>
<td>Minimum is the best</td>
<td>966.357</td>
<td>467.817</td>
<td></td>
</tr>
<tr>
<td>AIC</td>
<td></td>
<td>810.421</td>
<td>285.149</td>
<td></td>
</tr>
<tr>
<td>BIC</td>
<td></td>
<td>931.357</td>
<td>426.817</td>
<td></td>
</tr>
</tbody>
</table>
4.6.4 Testing of Hypotheses H7-H12

Once the model fitness was obtained as described previously. The next step is analyzing the hypotheses previously formulated i.e. H7-H12 based on the literature as discussed in chapter-2.

For the hypothesis H-7 which investigated the relationship between internal integration and external integration i.e. with customers was examined. The results indicated the positive influence of internal integration on customer integration with significant path coefficient ($\beta_7 = 0.33$, $p< 0.05$) support the proposition that there is a direct relation which is positive and significant between internal integration and customer integration thus supporting in favor to H7. The significant path coefficient also provide an evidence for rejecting the null hypothesis that no relationship exist between the variables being analyzed. Furthermore the critical value (i.e. 4.75) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-8 which investigated the relationship between internal integration and external integration i.e. with suppliers was also examined. The results indicated the positive influence of internal integration on supplier integration with significant path coefficient ($\beta_8 = 0.22$, $p< 0.05$) support the proposition that there is a direct relation which is positive and significant between internal integration and supplier integration thus supporting in favor to H8. Furthermore the critical value (i.e. 3.14) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-9 which investigated the relationship between internal integration and SC performance (i.e. cost containment, flexibility and performance reliability) was examined.
The results indicated the positive influence of internal integration on supply chain performance with significant path coefficient ($\beta_9 = 0.21$, $p < 0.05$) support the proposition that there is a direct relation which is positive and significant between internal integration and supply chain performance thus supporting in favor to H9. Furthermore the critical value (i.e. 2.71) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-10 which investigated that higher the higher Customer integration enhances supply chain performance in cost-containment, performance reliability and flexibility was examined. The results indicated the positive influence of customer integration on supply chain performance with significant path coefficient ($\beta_{10} = 0.14$, $p < 0.05$) support the proposition that there is a direct relation which is positive and significant between customer integration and supply chain performance thus supporting in favor to H10. Furthermore the critical value (i.e. 2.07) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-11 i.e. higher supplier integration enhances supply chain performance in cost-containment, performance reliability and flexibility was examined. The results indicated the positive influence of supplier integration on supply chain performance with significant path coefficient ($\beta_{11} = 0.28$, $p < 0.05$) support the proposition that there is a direct relation which is positive and significant between supplier integration and supply chain performance thus supporting in favor to H11.
Furthermore the critical value (i.e. 4.19) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-12 i.e. a higher internal integration enhances the overall organization performance was examined. The results demonstrated the positive influence of internal integration on organization performance with significant path coefficient ($\beta_{12} = 0.18$, $p < 0.05$) support the proposition that there is a direct relation which is positive and significant between internal integration and supply organization performance thus supporting in favor to H12. Furthermore the critical value (i.e. 2.72) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

For the hypothesis H-13 i.e. the supply chain performance positively influences organizational performance was examined. The results indicated the positive influence of supply chain performance on organizational performance with significant path coefficient ($\beta_{13} = 0.22$, $p < 0.05$) support the proposition that there is a direct relation which is positive and significant between supply chain performance and organization performance thus supporting in favor to H13. Furthermore the critical value (i.e. 3.24) which is well above the threshold value of 1.96 thus exhibiting the significant contribution.

The summary of all the above hypotheses is described below in Table 4-30. It may be noted that critical values for all the constructs were above the threshold value i.e. 1.96 for 5% level of significance indicating that all the proposed propositions/hypotheses were found significantly supported.
Table 4-30 Summary of Hypotheses results H7-H13

<table>
<thead>
<tr>
<th>Connection Between Variables</th>
<th>Beta (Std. Paths weights)</th>
<th>Beta (Un Std. Path weights)</th>
<th>Critical Value</th>
<th>P value</th>
<th>Decision / Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_7$ (Int$_I \rightarrow$ Cust$_I$)</td>
<td>0.33</td>
<td>0.394</td>
<td>4.75</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_8$ (Int$_I \rightarrow$ Suppl$_I$)</td>
<td>0.21</td>
<td>0.22</td>
<td>3.14</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_9$ (Int$_I \rightarrow$ SCP)</td>
<td>0.20</td>
<td>0.209</td>
<td>2.71</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_{10}$ (Cust$_I \rightarrow$ SCP)</td>
<td>0.12</td>
<td>0.14</td>
<td>2.07</td>
<td>0.03</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_{11}$ (Suppl$_I \rightarrow$ SCP)</td>
<td>0.278</td>
<td>0.276</td>
<td>4.19</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_{12}$ (Int$_I \rightarrow$ Org_Perf)</td>
<td>0.18</td>
<td>0.234</td>
<td>2.72</td>
<td>0.00</td>
<td>Supported</td>
</tr>
<tr>
<td>$\beta_{13}$ (SCP$\rightarrow$Org_Perf)</td>
<td>0.22</td>
<td>0.29</td>
<td>3.24</td>
<td>0.00</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note. Int$_I$=Internal Integration, SCP=SC Performance, Cust$_I$ = Customer Integration, Suppl$_I$ = Supplier Integration, Org_Perf = Organization Performance.
4.6.5 Testing Mediation Hypotheses H14-H15

In this study as shown by the model, external integration (i.e. customer as well as supplier integration) was proposed as a mediator between internal integration and supply chain performance. For this purpose steps as suggested by Baron and Kenny (1986), Sobel (1982) and Iacobucci, Saldanha and Deng (2007) were adopted. In the first step, direct and indirect path and model fit through SEM should be examined and if all the paths are found to be significant this is the first indication that some sign of mediation occurs i.e. independent and mediator as well as mediator and outcome are significant. If either of the paths coefficients are non significant, then this is indication that no mediation can occurs and no further analysis is required. In the second step Sobel statistics (Sobel, 1982), was computed to see explicitly the direct and indirect paths. Following the steps as suggested by Baron and Kenny (1986) and Iacobucci et al.(2007) if the Sobel statistics is significant and direct path from independent variable is not significant then there will be a full mediation. On other hand if both are significant then there will be a partial mediation.

Since the constructs of internal integration, customer integration, supplier integration and SC performance has already been investigated and were found significantly related. Now it is intended to test that internal integration is expected to influence the criterion SC performance through its effect on external integration i.e. with customers and suppliers. If differently said this part of the study intends to explore that external integration (i.e. with customer and supplier) is expected to mediate the effect of internal integration on SC performance. To test the mediation effects and its significance, Sobel test which is widely used method is considered in this study also which investigates and helps in exploring that whether or not the
mediator (i.e. external integration here) controls the relationship between internal integration (say x) and SC performance (say y).

It can be seen from the results that the path from internal integration to customer integration is significant (0.394, p<0.05) as well as from customer integration to supply chain performance is significant (0.122, p<0.05). Secondly Sobel statistics i.e. \( Z = \frac{a \times b}{\sqrt{b^2 S_a^2 + a^2 S_b^2}} \) was applied. In this formula, a and b refers to regression coefficient, Sa and Sb are standard error of estimates. For current hypothesis customer integration mediates the relationship between internal integration and customer integration, a = 0.394, S_a=0.082, t_a=4.782 and b = 0.122, S_b=0.059, t_b=2.072 ,Z = 1.899, Se = 0.025, p\leq 0.05. Since both the paths and Sobel statistics are significant, this is the indication of the partial mediation i.e. significant portion in supply chain performance is due to internal integration via/through indirect than direct path. Thus it can be concluded that customer integration (Cust_I) partially mediates the relationships between internal integration (Int_I) and SCP. The results are as shown in the Table 4-31

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate</th>
<th>S_e</th>
<th>Sobel Statistic</th>
<th>t_a</th>
<th>t_b</th>
<th>Sig</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I→Cust_I</td>
<td>0.394</td>
<td>0.082</td>
<td>1.899</td>
<td>4.732</td>
<td>2.072</td>
<td>***</td>
<td>Partial</td>
</tr>
<tr>
<td>Cust_I→SCP</td>
<td>0.122</td>
<td>0.059</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mediation</td>
</tr>
</tbody>
</table>

Int_I = internal integration; Cust_I = customer integration; ***p≤0.05
Similarly for the hypothesis supplier integration mediates the relationship between internal integration and supply chain performance, \( a = 0.222, S_a = 0.073, t_a = 3.06 \) and \( b = 0.276, S_b = 0.065, t_b = 4.216, Z = 2.4724, p \leq 0.05 \). Since both the paths and Sobel statistics are significant this is the indication of the partial mediation i.e. significant portion in supply chain performance due to internal integration via/through indirect than direct path. Thus it can be concluded that Supl_I partially mediates the relationships between internal integration (Int_I) and SCP. The results are as shown in the Table 4-32

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate</th>
<th>( S_e )</th>
<th>Sobel Statistics</th>
<th>( t_a )</th>
<th>( t_b )</th>
<th>Sig</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I ( \rightarrow ) Supl_I</td>
<td>0.222</td>
<td>0.073</td>
<td>2.4724</td>
<td>3.06</td>
<td>4.216</td>
<td>***</td>
<td>Partial mediation</td>
</tr>
<tr>
<td>Supl_I ( \rightarrow ) SCP</td>
<td>0.276</td>
<td>0.065</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( \text{Int}_I = \text{internal integration}; \text{Suppl}_I = \text{Supplier integration}; ***p \leq 0.05 \)

In nutshell, it has been observed from the analysis above as depicted from Table 4-31 and Table 4-32 both customer integration (Cust_I) and supplier integration (Suppl_I) partially mediate the relation under investigation i.e. internal integration (Int_I) and SCP.
4.6.6 Testing Moderation Hypotheses H16-H17

In order to test the moderating effects of hypotheses H16-H17 in the current study, multiple group method of SEM (known as multi-group SEM) was used through AMOS Package (20th Version). This is in accordance with the previous research which suggested and widely applied group analysis method by converting the moderating variables in to groups based on median into high vs. low group (Baron & Kenny,1986; Bryde & Robinson,2007; Hair et al.,2010; Jaworski & MacInnis,1989; Maiyaki,A.,2013). For this purpose the data collected was split through median and categorized as high group that attained the value above median whereas as below this was categorized as low group. Using multiple-group analysis for internal integration to explore the external integration (i.e. with both customer and supplier) role under the presence of high level of moderator under consideration as well as low level. That is, this methodology was used for internal integration to evaluate the external integration impacts under the influence of varying levels of moderators i.e. under low and high levels of socialization and organization cultures, the moderators in the current study. The main purpose of this is to determine whether the moderator produces significant change/difference in the parameter estimate between two groups. Adapting the procedure as devised by previous research mentioned above, the model paths were calculated for both constrained and unconstrained way for both groups identified as above. If Chi-square value for both constrained and unconstrained multiple group SEM model produces significant differences, this is indication that parameter estimates for different groups significantly produces difference. This provides an evidence that moderator significantly moderated the relationship which was hypothesized (Dabholkar &
In case the statistics fails to produce the significant difference across the groups then moderation fails to occurs.

Based on the procedure discussed above, the SC socialization, the moderating variable was split into two group i.e. low level of socialization vs. high level of socialization through computing median. The two groups are i.e. high socialization \((n_1 =108 )\) and low socialization \((n_2 = 126)\).t-test for independence was performed to confirm the discrimination of subsample of the main sample which is divided based on median for the socialization construct in the first phase. The statistics for the t-test revealed with \(t = -24.105\) with \(p = 0.000 < 0.05\) thus confirming the significant difference of subsample.

The aim of the above described procedure is to determine whether the SC socialization produces significant change across groups between internal integration and customer integration. The estimates for the paths and \(\chi^2\) Value from independent to dependent variable under high and levels of moderator under consideration between baseline and constrained model were calculated. The baseline model refers in which the parameters are allowed to freely vary across two moderator groups. The path from predictor i.e. internal integration and customer integration was investigated for both groups i.e. for high level of socialization and low level of socialization. Chi-Square difference between constrained and unconstrained model were investigated along with model fitness.

The path coefficient from internal integration to customer integration was investigated for the constrained and unconstrained way. Results revealed as shown in Table 4-33 produce significant chi-square change \((\Delta \chi^2 = 4.396, \ p < 0.05 \ )\) signifying that path coefficient (loadings) significantly varies across two groups confirming the fact that SC socialization significantly moderates the relationships.
i.e. relationship is strengthened under high levels of socialization. This supports the hypothesis that SC socialization significantly moderated the relation between internal integration and customer integration. This further indicated that organization with better internal integration will have more customer integration when the level of supply chain socialization is high. These results supports the hypothesis H-16.

**Table 4-33 Moderation Test-1-Multi-group Structural Model -SC Socialization**

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics (χ²)</th>
<th>χ² change</th>
<th>Df</th>
<th>DF</th>
<th>χ²/DF</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 (Baseline)</td>
<td>244.118</td>
<td>158</td>
<td></td>
<td></td>
<td>1.545</td>
<td>0.93</td>
<td>0.04</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>M2 (Constrained)</td>
<td>248.514</td>
<td>4.396</td>
<td>159</td>
<td>1</td>
<td>1.563</td>
<td>0.933</td>
<td>0.04</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

Int_I = internal integration; Cust_I = Customer integration; ***p≤0.05
Adapting the same procedure discussed above, the SC socialization, the moderating variable was also investigated to see whether it moderates the relationship between internal integration and supplier integration. The aim is to determine whether the SC socialization produces significant change across groups between internal integration and supplier integration. Chi-Square difference between constrained and unconstrained model were investigated along with model fitness.

The path coefficient from internal integration to supplier integration was investigated for the constrained and unconstrained. Results revealed as shown in Table 4-34 produce significant chi-square change (▲χ² = 4.294, p < 0.05) signifying that loadings (or coefficient) varies across groups significantly and confirming the fact that SC socialization significantly moderates the said relationships. This supports the hypothesis that SC socialization significantly moderated the relation between internal integration and supplier integration. This indicated that organization with better internal integration will have more supplier integration when the level of supply chain socialization is high. These results support the hypothesis H-17.

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics (χ²)</th>
<th>χ² change</th>
<th>Df</th>
<th>Df Change</th>
<th>χ²/DF</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>M³ (Baseline)</td>
<td>244.118</td>
<td></td>
<td>158</td>
<td></td>
<td>1.545</td>
<td>0.93</td>
<td>0.048</td>
<td>***</td>
<td>Supported</td>
</tr>
<tr>
<td>M⁴ (Constrained)</td>
<td>248.412</td>
<td>4.294</td>
<td>159</td>
<td>1</td>
<td>1.562</td>
<td>0.93</td>
<td>0.04</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

Int_I = internal integration; Suppl_I = Customer integration; ***p≤0.05
4.6.7 Testing Moderation Hypotheses H18-H19

Based on the procedure discussed above the Organization culture (i.e. Adhocracy or developmental culture type) the moderating variable was split into two group i.e. low level of adhocracy culture vs. high level of adhocracy culture through computing median. The two groups are i.e. high adhocracy culture (n$_1$ = 149 ) and low adhocracy culture (n$_2$ = 85 ).t-test for independence was performed to confirm the discrimination of subsample of the main sample which is divided based on median for the organization culture (adhocracy culture type) construct in the first phase. The statistics for the t-test revealed with $t = -16.136$ with $p = 0.000 < 0.05$ thus confirming the significant difference of subsample.

The aim is to determine whether the organization culture (Adhocracy) produces significant change across groups between internal integration and customer Integration. Chi-Square difference between constrained and unconstrained model were investigated along with model fitness.

The path coefficient from internal integration to customer integration was investigated for the constrained and unconstrained way. Results revealed as shown in Table 4-35 produce significant chi-square change ($\Delta \chi^2 = 4.87$, $p < 0.05$) indicative of the fact that coefficients (path loadings) varies across groups significantly thus confirming the fact that moderator significantly moderates the relationships i.e. relationship is strengthened under high levels of developmental culture of the organization.

This supports the hypothesis that adhocracy type organization culture significantly moderated the relation between internal integration and customer integration .The indicated that organization withinternal integration will have more customer
integration when they possess higher level of Adhocracy culture (i.e. flexibility, readiness, creativity, growth and differentiation etc.) as compared to low level of Adhocracy culture.

Table 4-35 Moderation Test-3-Multi-group Structural Model – Organization culture (Adhocracy type) for Customer

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics ((\chi^2))</th>
<th>(\chi^2) change</th>
<th>df</th>
<th>Change in Df</th>
<th>(\chi^2 / Df)</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4 Baseline</td>
<td>229.894</td>
<td></td>
<td>158</td>
<td>1.455</td>
<td>0.948</td>
<td>0.04</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>M5 Constrained</td>
<td>234.767</td>
<td>4.87</td>
<td>159</td>
<td>1.477</td>
<td>0.945</td>
<td>0.045</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

Int_I = internal integration; Cust_I = Customer integration; ***p≤0.05
Similarly the organizational culture (i.e. Adhocracy) was also investigated as a moderator between internal integration and supplier integration.

The path coefficient from internal integration to supplier integration was investigated for the constrained and unconstrained. Results revealed as shown in Table 4-36 produce significant chi-square change ($\Delta \chi^2 = 13.2$, p < 0.05) indicative of the fact that factor loadings (paths coefficients) varies across groups thus confirming the fact that moderator significantly moderates the relationships i.e. relationship is strengthened under high levels of developmental culture of the organization.

This supports the hypothesis that adhocracy culture type organization culture significantly moderated the relation between internal integration and supplier integration. This indicated that organization with internal integration will have more supplier integration when they possesses higher level of Adhocracy as compared to low level of Adhocracy culture. This organization which possesses higher levels of Adhocracy (i.e. flexibility, readiness, creativity, growth and differentiation etc.) will tend to have more external integration i.e. with customers and suppliers.

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics $\chi^2$</th>
<th>Change in $\chi^2$ df</th>
<th>Change in Df $\chi^2$/Df</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 (Baseline)</td>
<td>229.89</td>
<td>158</td>
<td>1.455</td>
<td>0.948</td>
<td>0.044</td>
<td>***</td>
</tr>
<tr>
<td>M7 (Constrained)</td>
<td>243.095</td>
<td>159</td>
<td>1</td>
<td>1.529</td>
<td>0.939</td>
<td>0.048</td>
</tr>
</tbody>
</table>

Int_1 = internal integration; Suppl_1 = Customer integration; ***p≤0.05
Similarly the organizational culture (Market or rational culture type) was investigated as a moderator between internal integration and customer integration. On the similar pattern he moderating variable was split into two group i.e. low level of market culture vs. high level of market culture through computing median. The two groups are i.e. high market culture and low market culture. T-test for independence was performed to confirm the discrimination of subsample of the main sample which is divided based on median for the organization culture (market culture type) construct. The statistics for the t-test revealed with $t = -20.611$ with $p = 0.000 < 0.05$ thus confirming the significant difference of subsample.

Results revealed as shown in Table 4-37 which indicated a significant chi-square change of 5.92 indicative of the fact that variation across two groups w.r.t. path loadings thus confirming the fact that organization with market culture significantly moderates the relationships. This supports the hypothesis that Market culture type organization culture significantly moderated the relation between internal integration and customer integration. This indicated that organization with internal integration will have more customer integration when they possess higher level of market culture (i.e. which emphasizes goal clarity/setting, efficiency, productivity, measurable outcomes etc.) as compared to low level of market culture. The organization which possesses higher levels of market culture will tend to have more external integration i.e. with customers.
Market culture was also examined as a moderator between internal integration and supplier integration. Results revealed as shown in Table 4-38 which indicated a significant chi-square change of 17.57 which in fact demonstrated that variation across the groups w.r.t. path coefficients thus confirming the fact that organization with market culture significantly moderates the relationships. This supports the hypothesis that market culture type organization culture significantly moderated the relation between internal integration and supplier integration. This indicated that organization with internal integration will have more supplier integration when they possesses higher level of market culture (i.e. which emphasizes goal clarity/setting, efficiency, productivity, measureable outcomes etc.) as compared to low level of market culture. The organization which possesses higher levels of market culture will tend to have more external integration i.e. with suppliers. From the results it is evident that more the organization possesses higher levels market culture as well adhocracy culture the higher will be the external integration with customers and suppliers.

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics ($\chi^2$)</th>
<th>Change in $\chi^2$</th>
<th>df</th>
<th>$\chi^2 / \text{df}$</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8 (Baseline model)</td>
<td>259.174</td>
<td>158</td>
<td>1.64</td>
<td>0.926</td>
<td>0.053</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>M9 (Constrained) (Constrained Path) Int_I $\rightarrow$ Cust_I</td>
<td>256.094</td>
<td>5.92</td>
<td>159</td>
<td>1.66</td>
<td>0.923</td>
<td>0.054</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Int_I = internal integration; Cust_I = Customer integration; ***p≤0.05
Finally the composite score of organization culture i.e. external focus dimension of CVT (i.e. competing value framework) which comprises of market culture type and adhocracy culture type was also investigated to determine whether it moderates between internal integration and external integration (i.e. w.r.t. with customers and suppliers). Using multiple group SEM analysis approach, based on median, two groups i.e. (n₁ = 141) and (n₂ = 93) i.e. high level of externally focused organization culture as well as and low level were formed. Estimates for the paths and $\chi^2$-value from internal integration to customer and internal integration to supplier integration respectively and $\chi^2$-value under high and low level of organization culture between baseline model and constrained model (where each if the path were constrained separately) were investigated. In both cases significant $\chi^2$-change was observed indicated that path coefficients (loadings) varies across two groups of external focused culture. This signifying that the construct significantly moderated the relationship i.e. the said relationship is strengthen under higher levels of external focused organization culture. This further demonstrated that organization with better internal integration will have more external integration with customers as well as with suppliers if it possesses high levels of adhocracy as well as market type of organization culture.
### Table 4-39: Moderation Test-7-Multi-group Structural Model – (Organization Culture)

<table>
<thead>
<tr>
<th>Model</th>
<th>Statistics ((\chi^2))</th>
<th>Change in (\chi^2)</th>
<th>df</th>
<th>(\chi^2 / df)</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline model</td>
<td>260.891</td>
<td>158</td>
<td>1.651</td>
<td>0.925</td>
<td>0.053</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>(Constrained Path) Int_I → Cust_I</td>
<td>266.788</td>
<td>5.897</td>
<td>159</td>
<td>1.678</td>
<td>0.92</td>
<td>0.054</td>
<td>***</td>
</tr>
<tr>
<td>(Constrained Path) Int_I → Suppl_I</td>
<td>278.144</td>
<td>17.253</td>
<td>159</td>
<td>1.749</td>
<td>0.913</td>
<td>0.057</td>
<td>***</td>
</tr>
</tbody>
</table>

Int_I = internal integration; Cust_I = Customer integration; Suppl_I = supplier integration; ***p≤0.05
4.7 Chapter Summary

This chapter starts with presenting data examination for initial analysis along with the characteristics of the sample and analysis of the data obtained as a sample from the population under investigation. The summary of descriptive statistics e.g. means, SD for all variables was tabulated and discussed followed by the skewness, kurtosis and graphical plots for ensuring normality, linearity issues and all variables were found to pass the set criteria.

Later measurement model for all constructs in the current study i.e. CFA was conducted to test the measurement model validity. Reliability analysis was conducted and all constructs were found reliable passing the set criteria. Validity measures i.e. construct validity which includes content validity, convergent validity; discriminant validity was also investigated before further analysis. For convergent validity AVE score were calculated and were found satisfactory thus behaving good convergent validity as per the set criteria. Furthermore factor loadings and critical ratios were found significant. Correlation matrix displayed good discriminant validity. Based on these three criteria i.e. AVE score, factor loadings, discriminant validity and construct validity were assured.

Structural models were tested to see the direct effects of factors affecting internal integration i.e. H1-H6. All the hypotheses were supported.

Secondly, the full structural model was tested in two phases. In the first phase i.e. direct method, individual effect of six factors was investigated in the full model and results indicated that only two factors were found significant. Furthermore the model was not fit as per fit indices and other criteria’s as previously defined.

In the second phase all these factors were aligned or combined following model fit as covariation and found that all factors of integration have common underline thread...
among these integrated practices which were previously taken in isolation in the model. This model which is called as an alternate model was found a better fit than the previous model originally proposed.

In order to confirm this a model comparison was done following the criteria as discussed above e.g. chi-square ($\chi^2$) difference test criteria, fit indices and information criteria i.e. AIC or BIC etc. Chi square ($\chi^2$) difference tests, fit indices and values of AIC and BIC were found better in alternate model.

Hypotheses H7-H13 were tested to see the effects of internal integration on external integration (i.e. customer and supplier) and on supply chain performance (i.e. cost, reliability and flexibility performance). All the hypotheses were found supportive as hypothesized.

Mediation analysis was done to test the hypotheses H14-15. It was found that customer integration and supplier integration partially mediates the relation between internal integration (Int_I) and SCP. Finally moderation analysis was done using multi-group SEM model. Two moderator SC socialization and organization culture i.e. market or rational and adhocracy or developmental culture types were also investigated. Results revealed in the favor to the fact that organizations with better internal integration and with high levels of adhocracy culture i.e. innovativeness, creativity and readiness for change will have better external integration. The same was observed with organization with market culture. Both the moderators resulted in the favor as hypothesized that organization with better internal integration will have more external integration if it possesses and value practices of socialization as well as possesses external focused organization culture. In a nutshell, it was found that all the hypotheses were found supportive as hypothesized.
CHAPTER 5
RESULT DISCUSSIONS

5.1 Introduction
The role of internal integration is highly emphasized as it is the prerequisite for having external integration though there is very little research on how to achieve this. Although the previous research is replete with discussion on the SCI phenomenon and performance relationships yet inconsistent results showing relationships between SCI and performance as well as scarce research on how to achieve better internal integration calls for further research. As previously all studies were conducted in developed countries in Western culture except China. So this study intends not only to empirically determine and assess the level of internal integration (along with the role for its antecedents intra-organizational knowledge sharing, job rotation, inter-departmental training, management commitment, strategic consensus, and supporting information technologies that may influence) which is prerequisite for external integration as suggested by literature but also aims at investigating its impact on the external integration (i.e. with customers and suppliers) and its mediating effects. It also aims at determining the moderating effects of enablers for example SC socialization and organizational culture between internal and external integration for enhancing the process of external integration. As a matter of fact no such study has been conducted in Pakistan in such areas. This study, as described above, not only discusses the relationships between SCI and performance as well as the factors that may enhance internal integration which has not been discussed before but also discusses/investigates the factors that create an environment for establishing such integration external to the company. Supply chain
socialization practices and the organization culture based on market type as well as developmental type were investigated as a moderator. Some recent researches have suggested some factors to be investigated in future research like competitive environment, relationship commitment, organization characteristics, trust, and role of national culture, power and dependence etc to better develop the relationships (Flynn et al., 2010) while discussing SCI and performance relationships. Factors like SC complexity, environmental uncertainty were investigated as a moderator by few researchers (e.g. Gemenez, Vaart & Donk, 2012; Wong et al., 2011).

As discussed and highlighted previously in chapter-1, the research questions were formulated which focus (a) to what degree/level are the organizations, under discussion internally as well as externally integrated i.e. with customers and suppliers? (b) To determine as to what factors (antecedents) influence internal integration practices within the organization.(c)to determine whether internal integration influences external integration, supply chain performance and its contribution to overall performance (d) whether the impact of internal integration on performance is mediated by external integration (e)finally to determine the moderating role of the enablers of external integration i.e. supply chain socialization and organizational culture( i.e. market type as well as developmental type culture).

As per the stated research questions above, 19 hypotheses were formulated through extensive literature review .Two hypotheses were describing mediating and four hypotheses were constructed to analyze the moderating role of two moderators i.e. SC socialization practices and organizational culture( i.e. market type as well as developmental type culture).The succeeding section dicussed
and compared the results/findings of the study for each hypothesis along with its consistency or inconsistency with the previous literature.
5.1.1 Factors affecting internal integration

5.1.1.1 Job Rotation

Hypothesis H-1, from the results, as shown in previous chapter-4, it was found that JR practices have positive and significant relation with internal integration. The results of this study were found consistent with previous findings (Basnet & Wisner, 2012; Griffin & Hauser, 1996; Keys & Miller, 1984; Kusunoki & Numagami, 1998; Lenders & Wierenga, 2002; Pagell, 2004; Parry & Song, 1993; Song, Xie & Dyer, 2000; Xie, Song & Stringfellow, 2003). The results further revealed significant and positive correlation i.e. \( r = 0.40, p<0.05 \) with internal integration. The significant path \( \beta=0.44, p<0.05 \) between the two constructs also signify the fact that more the job rotation practices the higher will be the integration within the company. The mean value of the variable \( (M= 3.54, SD=0.85) \) was also found tilted towards agreement indicating the importance of this aspect as taken by the organizational authorities. Rotating employees among different functional areas enhances employee’s motivation, interdepartmental cooperation, coordination, collaboration and creates socialization which is useful for breaking silos mentality and enhancement of cross functional harmony (Kusunoki & Numagami, 1998). It has been widely used as a tool for creating cohesiveness, knowledge and awareness of organization in Japan (Keys & Miller, 1984; Hatvany & Pucik, 1981). Job rotation was found significantly correlated with the internal integration highlighting the fact that rotation process within the functional units enhances interaction and collaboration and is a source of harmony or integration.
Thus rotating employees helps in shared understanding, goal congruency and improves integration among functional areas and is a source of integration among functional units.

5.1.1.2 Interdepartmental Trainings

Hypothesis H-2, from the results, it was found that interdepartmental trainings (IDT) i.e. education/trainings of his personal department as well as other functional units of the firm are positively and significantly related with internal integration. Furthermore correlation between these two variables also indicated the significant positive correlation i.e. \( r = 0.38, p<0.05 \). Additionally the significant path \( \beta=0.43, p<0.05 \) between the two constructs also signifying the fact that more the trainings pactices of other departments, the higher will be the integration within the company. This means that if employees are also given trainings other than their specialties regarding other functional areas within chain, it would turn out to be positive and will enhance harmony among the functional areas to understand the problems, limitations and requirements of other departments in the chain. The mean value of the variable \( (M= 3.66, SD =0.72) \) was also found tilted towards agreement indicating the importance of this aspect as taken by the organizational authorities. Interdepartmental trainings (IDT) are a source of learning opportunities about functional units and enhances interaction, communication and integration and reduce the conflict of interest. Lack of awareness about other functional units e.g. if marketing department lacks knowledge of engineering or other functional units and vice versa it can reduce cross functional harmony and is a serious hindrance towards cohesivness. It can be made up through trainings regarding other functional
units so that each functional unit is well aware of the needs and requirements of the other functional units. For example as suggested by Mollenkopf et al. (2000) that in order to foster connectivity among employees of marketing and logistics units management should emphasize on cross functional education and training . The results of this study are substantiating or corroborating with the previous studies (Aggarwal & Singh, 2004; Basnet & Wisner, 2013; Daugerty et al., 1996; Gibson & Ozanne, 2000; Gupta et al., 1986; Mollenkopf et al. 2000; Montgomery & Hausman, 1985; Morgan & Piercy, 1998; Shaw & Shaw, 1998; Wilemon & Mayers, 1989).

5.1.1.3 Management Commitment

For Hypothesis H-3, from the results, it was found that management commitment (MC) towards integration is positively and significantly related with internal integration. Furthermore correlation between these two variables also indicated the significant positive correlation i.e. \( r = 0.54, p<0.05 \). The mean value of the variable \( \text{M} = 3.83, \text{SD} = 0.59 \) was also found close to the agreement indicating the importance of this aspect as taken by the organizational authorities. Additionally the significant path \( \beta = 0.58, p<0.05 \) between the two constructs also signify the fact that more the management commitment towards nurturing integration, the higher will be the integration within the company. The results of this study are in line with the notion that management support, their positive attitude and emphasis on integration by providing resources for team work are sources for enhancing communication, interaction, collaboration among functional areas and diminishing the adversarial interdepartmental relationship among functional units e.g. as

244
emphasized by Pagell (2004). The leadership role is vital for fostering integration. If the firm leadership creates conducive environment for bringing together the people, silos mentality and myopic mind set will automatically diminishes. The results of this study are substantiating or corroborating the previous research which proves the notion that top management’s support or management’s commitment towards integration enhances integration among functional areas (Basnet & Wisner, 2012; Dougherty et al., 1996; Mollenkopf et al., 2000; Pagell, 2004; Piercy, 2006; Ravichandran & Arun, 2000; Song, Xie & Dyer, 2000; Thompson & James, 1999; Van de Ven, Andrew, 1986; Xie, Song & Anee, 2003).

5.1.1.4 Intraorganizational Knowledge sharing

For Hypothesis H-4, from the results, it was found that Intraorganizational knowledge sharing (IoKS) is positively and significantly related with internal integration. Furthermore, correlation between these two variables also indicated the significant positive correlation i.e. \( r = 0.44, p<0.05 \). The mean value of the variable \( (M=3.66, SD =0.61) \) was also found tilted towards the agreement indicating the importance of this aspect as taken by the organizational authorities. Additionally the significant path \( (\beta=0.50, p<0.05) \) between the two constructs also signify the fact that more the intraorganizational knowledge sharing, the higher will be the integration within the company.

This phenomenon of (IoKS) aims at highlighting the need for reviewing the information accumulated and sharing of experience, mistakes / faults, and
lessons learned and their extensive communication across different functional units within the particular organization (Calantone, Cavusgil & Zhao, 2002; Hult & Ferrell, 1997). Organizational capabilities can be amplified by coordination of different functional units within an organization through the sharing of knowledge, experiences and information gathered from the diverse sources which ultimately keep everything alive and useful for future planning and fulfilling the discerning customer’s needs (Kogut & Zander, 1992; Lukas, Hult & Ferrell, 1996; Moorman & Miner, 1998). Once this practice is carried out it accumulates and maintains the knowledge management through sharing within the supply chain which further stimulates supportive culture through interaction of diversified people from different functional areas of the organization who coordinate within the supply chain. This practice not only enhances coordination and collaboration within the functional areas of the organization but also helps to make use of the experiences, views and lessons learned in a system thinking manner which was also emphasized and empirically verified by Eng (2006).
5.1.1.5 Supporting information Technology

For Hypothesis H-5, from the results, it was found that supporting information technology (SIT) is positively and significantly related with internal integration. The significant path coefficient indicated the acceptance of the fifth hypothesis as shown in chapter-4. Furthermore correlation between these two variables also indicated the significant positive correlation i.e. (r = 0.37, p<0.05). The mean value of the variable (M= 4.16, SD =0.486) indicates the strong agreement and stresses the importance of this aspect as taken by the organizational authorities and positing the fact that information technologies are widely used for coordination, exchanging information and transactions processing.

The results further signifies that for successful SCM, information technologies(e.g. ERP, intranet video conferencing, e-mail etc.) provides information visibility throughout the chain and capturing and communicating this information within and outside an organization creates integration /coordination within the organization ,better decision making and management of an organization ,relationships ,information collection, dissemination and retrieval(Knowledge management)(Alsene,1990 ; Alsene,2007; Bettis & Hitt,1995 ; Clesmons et al.,1993 ; Desanctis & Jackson,1994 ; Fawcett & Cooper,2001 ; Harrington,1973 ; Hine & Goul,1998 ; Gurbaxani & Whang,1991 ; Narasimhan & Kim,2001 ; Sudrajat,2007 ; Merchant,1961 ; Teece,2001).For example ERP provides information integration and makes information accessible to all functional units of the organizations(inventory, manufacturing, marketing etc.) and is a source of company’s integration as opposed to previous legacy systems which are outdated presently (Abu-alganam & Adaileh,2010 ; Alsene,2007 ; Davenport,2000 ; Daugherty et al.,1996;
Similarly the use of other technologies e.g. intranet, video conferencing etc. facilitate collaboration, improved communication, dissemination and information consistency, internal communication team work and innovation within the enterprise (Andersen, 2001; Curry & Stancich, 2000; Gallupe et al., 1992; Leow & MacLennan, 2000; Murgolo-poore, Pitt & Ewing, 2002; Murgolo-poore, Pitt & Berthon, Prendegast, 2003; Teece, 2001; Sproull & Kiesler, 1986; Ward, 2002; Wright, 2001). The results of this study were also found substantiating or corroborating the aforementioned results previously found.
5.1.1.6 Strategic Consensus

For Hypothesis H-6, from the results, it was found that Strategic Consensus (SCon) is positively and significant relation with internal integration. The strategic consensus or consensus on company’s strategy helps the employees to work closely with each other on similar goals and objectives leading to collective vision forming unity of effort and integration among all functions within the organization. From the results of the current study it can be revealed that mean value of the strategic consensus i.e.(Mean= 3.93, SD = 0.69) is tilted toward agreement side indicating that employees of the organization are well aware of the company’s goals and objectives and organization believes in the shared understanding to strategy of the company. The significant path (β=0.64, p<0.05) from strategic consensus to internal integration indicated that better the strategic consensus i.e. companywide consensus among the employees of the organization, more will be the internal integration. This supports the hypothesis H-6 and results were found to be substantiating or corroborating with the previous studies (Basnet & Wisner, 2012; Pagell, 2004). All the above hypotheses i.e. H1-H6 were found statistically significant and are supported by the previous literature.
In the next stage full SEM model was tested and all the above practices were investigated independently. The results revealed that only two factors namely Strategic Consensus (SCon) and management commitment (MC) i.e. management emphasis for integration were found to significantly affect internal integration with SCon higher role in explaining internal integration (Int_I) with ($\beta = 0.53$). This indicated that once organization members exhibit consensus on company’s strategy, goals and objectives, it will in turn enhance coordination, collaboration and interaction among functional units. Secondly, top management support for creating conducive environment and emphasis on integration is also vital and required. All other factors are not found significant. Moreover, fit indices for the model were also not possessing the recommended values thus showing poor model fit.

The insignificance of the factors when they were investigated independently in the model indicated the possibility of the presence of fit or match among the constructs (i.e. practices) following the contingency theory (Venkatraman & Prescott, 1990). This highlights the need for adopting the system approach as opposed to see the impact of each separately (Finnei, 1997; Van de Ven & Ferry, 1890). Venkatraman and Prescott (1990) highlighted that this approach (holistic investigation) is recommended for practices with complementary nature as these will be supposed to have greater impact or contribution. Covariation approach was adopted to investigate and understand the holistic nature which is widely used for multivariate models (Bergeron et al., 2000). This approach which is CFA (a 2nd order model) helps in identifying the underlying thread among these practices (job rotation, interdepartmental trainings, strategic consensus, supporting information technologies and intraorganizational
knowledge sharing) under discussion in this study i.e. effect of fit/match between these six practices.

Adopting the holistic perspective, the results indicated that once these factors (practices) are aligned (or integrated) they will better contribute to the internal integration instead they were considered independently. As shown in 4.6.2.2, Figure 4-16, all the loadings of the practices were found significant producing some interesting results. Management commitment (MC) was found to be a factor with strong loading (i.e. 0.86) in the integration construct followed by SCon (0.82). All other loadings were significant ensuring the presence of common underlying thread and denying the adaptation of piecemeal approach in application of these practices. This is evident from the notable contribution of the fit/integration of practices to the internal integration (i.e. β=0.75).

In other words, if differently said these practices though contribute to Int_I separately however their contribution was found higher when these practices were aligned. Integration of practices (i.e. job rotation, interdepartmental trainings, strategic consensus, supporting information technologies and intraorganizational knowledge sharing) ensures culmination of all efforts in a positive and significant effect complementing the complementarities notion which states that doing more of one thing increases the return of doing more of another (Milgrom & Roberts, 1995). Furthermore, the fit indices for this model were fell within the acceptable range as recommended and overall model was found fit.
5.1.2 Hypotheses H7-H15

Following hypotheses were tested

**H7.** Internal integration (Int_I) is positively related to the external integration i.e. with customers

**H8.** Internal integration (Int_I) is positively related to the external integration i.e. with Suppliers.

**H9.** A higher internal integration enhances supply chain performance (i.e. cost-containment, flexibility & reliability performance).

**H10.** A higher Customer integration enhances supply chain performance (i.e. cost-containment, flexibility & reliability performance).

**H11.** A higher Supplier integration enhances supply chain performance (i.e. cost-containment, flexibility & reliability performance).

**H12.** A higher level of internal integration enhances organization performance

**H13.** The higher the supply chain performance the more the organization performance.

**H14.** Customer integration mediates the influence of internal Integration on Supply chain performance

**H15.** Supplier integration mediates the influence of internal Integration on Supply chain performance

For the hypothesis H7, the results indicated the positive influence of internal integration on customer integration with significant path coefficient ($\beta_7= 0.33$, $p< 0.05$) support the proposition that there is a direct relation which is positive
and significant between internal integration and customer integration thus supporting in favor to H7. The results of this study were found substantiating or corroborating the findings of the earlier research (Brauncheidel & Suresh, 2009; Gimenez & Ventura, 2005; Handfield & Nichols, 1999; Huo, 2012; Morash & Clinton, 1998; Pagell, 2004; Rosenzweig et al., 2003; Singh & Power, 2009; Stank et al., 2001; Vickery et al., 2003; Woehner, Darknow & Kaiser, 2009; Yu, Jacobs, Salisbury & Enns, 2013; Zhao et al., 2011). The results further authenticate the notion that internal integration is precondition for having integration with customers. For appropriate and result-oriented relations with customers, the company needs to have effective interaction, collaboration among internal functional units within the company. This further reaffirms that if companies’ internal functional units work in silos and do not share information and do not collaborate or are lacking teamwork, integration with customers cannot be effectively maintained. Thus company having good internal practices i.e. communication, collaboration and using cross-functional teams representing absorptive capability, comprehending and learning from customers will ultimately be in a better position to maintain and facilitate the integration. Companies take steps giving due consideration towards relationship management with customers through information sharing, demand information, inventory data and communication as establishing such relationships enhances the integration between customer and company.

Similarly, the results also revealed the positive influence of internal integration on supplier integration with significant path coefficient ($\beta = 0.22, p < 0.05$) supporting the proposition that there is a direct relation which is positive and significant between internal integration and supplier integration thus supporting
in favor to H8. The results of the study were found substantiating or corroborating the findings of the earlier researchers (Brauncheidel & Suresh, 2009; Denese & Romano, 2011; Gimenez & Ventura, 2005; Handfield & Nichols, 1999; Huo, 2012; Morash & Clinton, 1998; Pagell, 2004; Rosenzweig et al., 2003; Singh & Power, 2009; Stank et al., 2001; Vickery et al., 2003; Woehner, Darknow & Kaiser, 2009; Yu, Jacobs, Salisbury & Enns, 2013; Zhao et al., 2011). The results also authenticate the notion that internal integration is a precondition for having integration with suppliers as well. For appropriate and result-oriented relations with suppliers the company needs to have effective interaction and collaboration among internal functional units within the company. This further reaffirms that if company’s internal functional units work in silos and do not share information and do not collaborate or are lacking teamwork, integration with suppliers can not be effectively maintained. Thus a company having good internal practices i.e. communication, collaboration and using cross functional teams representing absorptive capability, comprehending and learning from suppliers will ultimately be in a better position to maintain and facilitate the integration. Companies take steps giving due consideration towards relationship management with suppliers through information sharing, demand information, inventory data and communication as establishing such relationships enhances the integration between and company. With better internal integration, company get the benefit that the supplier understands the need of the company and involvement of supplier in the design stage, sharing of production plans/schedule, allied planning and inventory creates a win-win situation for both. This, in turn helps lessen redundant efforts, lessen error or waste.
in actions and further increases positive outcome in terms of rapid and correct order fulfillment and timely modifications to ensure to better and improved response to the end customers.

From the discussion above which supports the two hypotheses i.e. H7-H8 reflecting the positive notion that for successful external integration (i.e. both with customers as well as with suppliers), establishment of internal integration a precondition to it. As discussed above the results of the study reaffirming that the organization must first focus on integration among internal functional units before going for integration with external partners. If an organization possesseses integration among all the functional units it will consequently facilitates in establishing external integration.

For the hypothesis H-9, The results indicated the positive influence of internal integration on supply chain performance with significant path coefficient ($\beta_9 = 0.20, p < 0.05$) support the proposition that there is a direct relation which is positive and significant between internal integration and supply chain performance thus supporting or in favor to H9. The results of the study were found substantiating or corroborating the findings of the earlier researchers (Boon-Itt & Wong, 2011; Flynn et al., 2010; Lee et al., 2007; Swink et al., 2005). A better internal integration is a key to improving performance in terms of cost, reliability and flexibility as it ensures better communication, information sharing and coordination within the company. It also possesses good absorptive capacity and ensures minimum information distortion and helps in achieving performance benefits. As mentioned by Lee, Kwon and Severance (2007) internal linkages ensures better cost performance. Better internal integration which is obtained by removing silos mentality and
reassuring harmony within the functional units through interaction plus collaboration helps in improving supply chain performance through dipping cost, inventory and improving flexibility and delivery performance frontier (Boon-Itt & Wong, 2011; Sabath, 1995).

For hypothesis H10, higher customer integration enhances supply chain performance in cost-containment, performance reliability and flexibility. This was evident through significant path coefficient ($\beta_{10} = 0.12$, p< 0.05) which supports the proposition that there is a direct relation which is positive and significant between customer integration and supply chain performance. The results of the study were found substantiating or corroborating the findings of the earlier researchers (Carter & Ellram, 1994; Cousins & Menguc, 2006; Droge et al., 2004; Flynn et al., 2010; Frohlich & Westbrook, 2001; Kalwani & Narayandas, 1995; Koufterous et al., 2005; Lee et al., 2007; Narasimhan & Kim, 2002; Salvador et al., 2001; Stank et al., 2001; Woehner, Darknow & Kaiser, 2009).

Ensuring better customer integration i.e. information sharing i.e. production plans, inventory and point of sale information, coordination, following feedback will consequently reduce supply chain costs, increases fill rate, responsiveness in the supply chain.

Similarly for hypothesis H11, the results indicated the positive influence of supplier integration on supply chain performance with significant path coefficient ($\beta_{11} = 0.28$, p< 0.05) support the proposition that there is a direct relation which is positive and significant between supplier integration and supply chain performance. The results of the study were found substantiating or
corroborating the findings of the earlier researches (Carter & Ellram, 1994; Cousins & Menguc, 2006; Frohlich & Westbrook, 2001; Kalwani & Narayandas, 1995; Koufteros et al., 2005; Lee et al., 2007; Salvador et al., 2001). Some previous studies found insignificant relation (e.g. Flynn et al., 2010; Woehner, Darknow & Kaiser, 2009). This study echoes the fact that building collaborative relations with suppliers will be found to be fruitful in terms reducing cost, improving flexibility and increasing responsiveness.

For the hypothesis H12, results of the concluded the positive association between internal integration and performance with coefficient ($\beta_{12} = 0.18$, $p < 0.05$). The findings of the study reiterating the fact that if organization has good absorption capability and maintain fit with respect to external environment and value integration among internal functions through interaction and collaboration will ultimately contributes in reducing the demand distortion and contributes to better managing the demand which will consequently help rise in market share, competitive edge and other financial aspects of the performance.

The results of the study were found substantiating or corroborating the findings of the earlier researches (Droge et al., 2004; Frohlich & Westbrook, 2001; Handfield & Nichols, 1999; Ittner & Larcker, 1997; Pagell, 2004; Rosenzweig et al., 2003; Tan et al., 1998).

For the hypothesis H13, the supply chain performance positively influences organizational performance. The results indicated the positive influence of supply chain performance on organizational performance with significant path coefficient ($\beta_{13} = 0.22$, $p < 0.05$). The results of the study were found
substantiating or corroborating the findings of the earlier researches (Flynn et al., 2010; Rosenzweig et al., 2003; Woehner, Darknow & Kaiser, 2009).

For Hypothesis H14, the mediation analysis was conducted. For this purpose Baron and Kenny (1986) as well as Sobel test was used. It can be seen from the results that the path from internal integration to customer integration is significant (0.394, p<0.05) as well as from customer integration to supply chain performance it is significant (0.122, p<0.05). Secondly Sobel test statistics with Z = 1.899, p≤ 0.05 found significant indicating that the partial mediation i.e. significant portion in supply chain performance is due to internal integration via/through indirect than direct path. Thus it can be concluded that CI partially mediates the relationships between Int_I and SCP. It has been an irrefutable fact that there is not only the need to ensure the optimum level of internal integration to maximize the output of the organization but such efforts have also to be linked with integration practices with customers as well for enhancing the output or performance of the supply chain (Vickery et al., 2003; Woehner, Darknow & Kaiser, 2009). The results indicated that as the internal integration to customer integration as well as customer integration to supply chain performance are significantly and positively related and further show that customer integration partially mediate the relationship between internal integration and supply chain performance. The results of this study are in line with earlier research (Woehner, Darknow & Kaiser, 2009).

Similarly for the hypothesis H15, supplier integration mediates the relationship between internal integration and supplier integration, a = 0.222, Sa=0.073, ta=3.06 and b = 0.276, Sb=0.065, tb=4.216 , Z = 2.4724, p≤ 0.05.Since both the
paths and Sobel statistics are significant this is the indication of the partial mediation i.e. significant portion in supply chain performance is due to internal integration via indirect way than direct path. Thus it can be concluded that SI partially mediates the relationships between Int_I and SCP. The results of the current study were found in divergence with the study conducted by Woehner, Darknow & Kaiser (2009) which concluded the insignificant relationship between supplier integration and operation performance and further concluded that supplier integration fails to mediate the relation between internal integration and operational performance. Previous studies also found such insignificance of the relationship (e.g. Flynn et al., 2010). The results of the study were found in line with Frohlich and Westbrook (2001) which concluded that that there is not only the need to ensure the optimum level if internal integration to maximize the output of the organization but such efforts are also to be linked with integration practices with suppliers as well for enhancing the output or performance of the supply chain.

From the above discussion it can be wisely concluded that though internal integration is very much required ,but it will be more fruitful and productive to obtain better supply chain performance as well as overall performance if integration with external partners is also given due importance.
5.1.3 Hypotheses H16-H17

For hypotheses H16-H17, multiple group method of SEM was used to investigate the role of moderating variable using AMOS (Version 20). For this purpose the SC socialization, the moderating variable was split into two group i.e. low level of socialization vs. high level of socialization through computing median. The aim is to determine whether the SC socialization produces significant change across groups between internal integration and customer integration. Chi-Square difference between constrained and unconstrained model were investigated along with model fitness.

Results revealed as shown in Table 4-33 and Table 4-34 produce significant chi-square change confirming the fact that SC socialization significantly moderates the relationships between internal integration and external integration (i.e. customer and supplier). This supports the hypothesis that SC socialization significantly moderated the relation between internal integration and customer as well supplier integration. This indicated that organization with better internal integration will have more external integration when the level of supply chain socialization is high as compared to having low level of socialization. This supports the hypothesis H16. Previous research also confirms the role of socialization which stimulates and facilitates exchange of information, interaction among stakeholders thereby ensuring better inter-organizational relationships and is a method for ensuring and enhancing integration process between buyers and supplier (Chalos & O’Connor, 2004; Chung, Singh & Cousins & Menguc, 2006; Cooray & Ratnatunga, 2001; Gupta & Govindarajan, 2000; Lee, 2000; O’Donnell, 2000).
Thus it can be established from the findings of the current study that socialization practices are crucial for enjoying the fruitfulness of integration benefits. It means that socialization practices are required to further strengthen the integration between the firm and its suppliers and customers. So organization should devote its full efforts towards investing in socialization activities.

In a nutshell, results divulged that the organization needs to employ socialization techniques like kaizen workshops, on site visits, conduction of social events, causal meals, team building exercises, sports activities which help both in products improvements as well as exchange of intellectual capital which further strengthen the relationship between the company and its external partners. Thus, it can be wisely concluded that organizations with better integration will have better external integrating both with customers as well as suppliers when the level of socialization is high.
5.1.4 Hypotheses H18-H19

For the hypotheses H17-H18, Organizational culture was investigated as moderator between internal integration and external integration. In this study external focused culture i.e. market and adhocracy dimension of the organizational culture model by Quinn and Rohrbaugh (1983) known as Competing Value framework. These two culture types are externally focused. The market culture values differentiation, relationship or transaction with external partners for achieving effectiveness and competitive edge. Whereas the developmental or adhocracy type also externally oriented and value adaptability, flexibility, creativity etc.

Using multiple group SEM analysis as described in previous chapter, each of the culture type i.e. market and developmental culture was divided into two groups i.e. low vs. high group. Results divulged significant change in $\chi^2$ value indicating that an organization which values market culture focused moderates the relationship between external partners i.e. supplier and customers. This shows that an organization which possesses better internal integration and possesses high level of market culture will have better external integration. That is an organization which focus on external positioning and strive for fit with the external prevailing environment for attaining competitive edge will find itself better in attaining integration with external partners. It has been surmised through the findings of this study that relationship between internal integration (Int_I) and external integration will be fortified provided the organization possesses goal clarity, productive, set measureable goals and value differentiation. This is so because organization of such kind which possesses such characteristics as described above strive for establishing relationships or engage in a collaboration for exploitation and acquisition of
resources to get more benefits. This further helps in exploiting the resources and capabilities which consequently is source of competitive advantage.

Similarly, the adhocracy culture was sectioned into two groups i.e. low vs high level of developmental culture. Using, multiple group method of SEM, results divulged significant change in $\chi^2$ value indicating that an organization which values adhocracy or developmental culture focused moderates the relationship between external partners i.e. supplier and customers. This inferred that an organization which possesses better internal integration and possesses high level of focus on this culture will have better external integration thereby showing that an organization which gives importance to adaptability, possesses flexibility, creativity and shows readiness to change according to external environment will be in a better position to maintain and strengthen the relationships with external partners. Thus an organization which possesses this culture type is dynamic, creative, flexible and responsive as well as certainly striving for integration with external partners to learn from the external environment while maintain fit thus strengthen the integration between firm and its partners. The results of the study were found substantiating or corroborating the findings of the earlier research e.g. Braunscheidel et al., (2010).

Finally, the composite score of external focused organization culture i.e. market and adhocracy culture was considered to test the moderating effect. Two groups forming low external focused vs. high external focused culture were investigated and results revealed change in value of the $\chi^2$ along with different loadings demonstrated that organizations which already possessing internal integration will exhibit better integration with partners provided it possesses high level of external focused culture.
Previous studies also indicate the importance of the external focused culture for enhancing external integration in a supply chain and this culture type is relevant to supply chain relationships (Balakrishnan & Birger, 1986; Braunscheidel et al., 2010; Hewett et al., 2002; Ke, Liu & Wei, 2010). For an organization to expect to get benefited from the external integration for achieving improved performance it is only possible if organization focuses on the specific change in its behaviors or culture. This study provides an evidence that organization gets better fruits of integration if it focuses on market and development culture because an organization which possesses adhocracy culture favors change; is dynamic and entrepreneurial in nature and is very much required to maintain integration with external partners.
CHAPTER 6  
CONCLUSION, RECOMMENDATION AND IMPLICATIONS

6.1 Summary of Research Findings

Though by now the importance of the supply chain integration has been widely discussed and acknowledged yet some of the basic questions regarding SCI are still required to be answered to better understand the phenomenon in terms of how to achieve such integration and its impact on the performance. The previous literature and research conducted in different developed countries culminated in mixed results and called for further empirical evidences in other culture settings. So the present study was conducted in Pakistan (as no such study was previously conducted to the best of the knowledge of the researcher). Furthermore there is quite a dearth of studies on internal integration and how to achieve this except a few studies e.g. Pagell (2004) and Basnet and Wisner (2012) who studied/investigated some of the factors which are important for internal integration. The purpose of the current study is described as follows. Firstly, current study focuses on the internal integration and its antecedents. The antecedents discussed in this study were job rotation, interdepartmental trainings, management commitment, intraorganizational knowledge sharing and strategic consensus. Secondly, how internal integration influences external integration and supply chain performance. Thirdly, it was investigated as to whether the company’s external integration mediates the relation between the integration and supply chain performance. Fourthly, this study also intends to measure the moderating role of two variables namely SC socialization and
organizational culture (based on external focus dimension of competing value framework i.e. Market and developmental ) between internal and external integration.

Based on the extensive literature pertaining to the current study variables 19 hypotheses were formulated . The quantitative research approach was adopted and target population was the managers working in three stratas of petroleum sector of Pakistan i.e. Exploration & Production, Refineries and Marketing companies. For this purpose a sample of 260 was considered and data was collected from 60 companies through a questionnaire. For this purpose a permission letter from the Ministry of Petroleum and Natural Resources – Directorate General of Petroleum Concession was obtained. Before stepping towards the main study a pilot study was also conducted and data was received from 53 respondents. The data was first screened and examined and further analyzed to confirm the suitability for the main study. The results indicated that all the hypotheses proposed were found supported . The major findings of the study are described below.

Descriptive results revealed that the organizations under study were found internally integrated and possessing excellent score that is , interaction ,collaboration and use of cross functional teams are given due importance whereas score for external integration i.e. with customers and suppliers posseses good score i.e. above nuteral point which further demands that organizations need to put more efforts to better exploite the resources as well as fruitfulness of integration across the boundary span.

All the antecedents were found significantly correlated with internal integration when each of them taken separately (and not taken other practices in the model)
indicating the fact that each of the component is important and has its role in creating the cross functional harmony.

When all the above practices were investigated independently in full SEM model, results revealed that only two factors namely Strategic Consensus (SCon) and management commitment (MC) i.e. management emphasis for integration were found to significantly affect internal integration with all other factors have shown insignificant results thus indicating a poor model fit. This indicated the presence of fit or match among the constructs (i.e. practices) highlighting the need for adopting the system approach as opposed to see the impact of each separately. This approach is recommended for practices with complementary nature as these will be supposed to have greater impact or contribution (Finnei, 1997; Van de Ven & Ferry, 1890; Venkatraman & Prescott, 1990).

Covariation approach was adopted to investigate and understand the holistic nature and results indicated that once these factors (practices) are aligned (or integrated) they will better contribute to the internal integration instead of considering independently. Moreover, all loadings were significant ensuring the presence of common underlying thread and denying the adaptation of piecemeal approach in application of these practices. This is evident from the notable contribution of the fit/integration of practices to the internal integration (i.e. \( \beta=0.75 \)).

In other words, if differently said, these practices though contribute to internal integration separately however their contribution was found higher when these practices were aligned. Integration of practices (i.e. job rotation, interdepartmental trainings, strategic consensus, supporting information
technology and intraorganizational knowledge sharing) ensures culmination of all efforts in a positive and significant effect complementing the complementarities notion which states that doing more of one thing increases the return of doing more of another (Milgrom & Roberts, 1995). Furthermore the fit indices for this model fell within the acceptable range as recommended and overall model was found fit.

Internal integration was found significantly related to both customer and supplier integration. The results further authenticate the notion that internal integration is a precondition for having integration with external partners. For appropriate and result oriented relations, the company needs to have effective interaction & collaboration among internal functional units within the company. This further reaffirms that if companies’ internal functional units work in silos and do not share information and do not collaborates or are lacking teamwork, integration with customers can not be effectively maintained. Thus, a company having good internal practices i.e. communication, cooperation and using cross functional teams representing absorptive capability, comprehending and learning from customers as well as suppliers will ultimately be in a better position to maintain and facilitate the integration. Companies take steps giving due consideration towards relationship management with customers through information sharing for market, demand, inventory data and production plans as establishing such relationships enhances the integration between the customer and the company. On similar grounds, company gets the benefit that the supplier understands the need of the company and involvement of supplier in the design stage, sharing of production plans/schedule, allied planning and inventory creates a win win situation for both. This in turn helps
less redundant efforts, less error or waste in actions and further increases positive outcome in terms of rapid and correct order fulfilment and timely modifications for better and improved response to the end customers.

All three dimensions of integration i.e. internal, customer and supplier integration were found significantly related to supply chain performance. A better internal integration is a key to improved performance in terms of flexibility, cost and reliability as this ensures better communication, information sharing and coordination within the company. Better internal integration which is obtained through removing silos mentality and reassuring harmony within the functional units through interaction & collaboration helps in improving supply chain performance through dipping cost, information distortion in inventory and improving flexibility and delivery performance frontier. Similarly, higher customer integration enhances supply chain performance in cost-containment, reliability and flexibility performance. It means that ensuring better customer integration (i.e. information sharing, production plans, inventory and point of sale information, coordination, following feedback) which will consequently help in reducing supply chain costs, increasing fill rate, improving flexibility and responsiveness. In addition to it supplier integration also enhances supply chain performance reaffirming the fact that building collaborative relations with suppliers helps in reducing cost and improving responsiveness and flexibility. Results further conclude that both customer and supplier integration partially mediates the relationships between internal integration and SCP. This reiterates the fact that there is not only the need to ensure the optimum level of internal integration to exploit the output of the organization but such efforts have to be
linked with integration practices with customers and suppliers. Of course this would consequentially fruitful for enhancing the performance of the supply chain. The study confirmed the notion that internal integration is a precondition to the external integration. How to better achieve this external integration is very important. For this purpose this study investigated the role of SC socialization as a moderator. This indicated that organizations with better internal integration will have more external integration when the level of supply chain socialization is high as compared to having low level of socialization. The results also divulged that organizations need to employ socialization techniques like kaizen workshops, on-site visits, conduction of social events, causal meals, team buildings exercises and sports activities which help both in product improvement as well as exchange of intellectual capital which further strengthens the relationship between the company and its external partners. Organizational culture based on market and developmental culture type was also investigated as a moderator to the relation between internal and external integration. The results concluded that the organizations having internal integration will tend to have better external integration if it possesses high levels of market and development culture. It is so because an organization which possessesadhocracy culture favors change, dynamic and entrepreneurial in nature and very much requires to maintain integration with external partners. Similarly, an organization which focuses on external positioning and strives for fit with the external prevailing environment for attaining competitive edge will find itself better in attaining integration with external partners. This further helps in exploiting the resources and capabilities which consequently is a source of competitive advantage.
6.2 Managerial Implications and Recommendations

The findings of the current study offer substantial and significant managerial insights and suggest the following ways in order to develop better internal integration and to get the benefits of integration internally as well as externally. Firstly, the management or managers in the company should give due importance to the practices that enhance internal integration. These practices as specified and investigated in the current study include rotating the employees, interdepartmental trainings, management commitment, intraorganizational knowledge sharing and strategic consensus.

Secondly, from the management’s point of view though the above mentioned practices contribute to internal integration separately however contribution of these practices as found in the current study is significantly more as compared to the situation when these practices were integrated or aligned. Integration or alignment of these practices ensures the culmination of all efforts in a positive role complementing the complementarity notion. The findings also suggest that managers should emphasize on the company’s strategy along with commitment of management for supporting integration and harmony within the organization to better align or empower other practices i.e. job rotation, interdepartmental trainings, supporting information technology and intraorganizational knowledge sharing practices.

Thirdly, the company should strive for developing capability in integration within internal functions of the company before going for external integration as internal integration is a precondition to establishing integration with external partners. It is so because if the company lacks the expertise for maintaining
collaboration, interaction and teamwork within the company integration with external partner will remain a dream.

Fourthly, companies should invest and concentrate towards establishing integration with customers and suppliers as both have positive role in achieving better supply chain as well as overall performance of the company.

Fifthly, managers should not only ensure the integration within the company to optimum level to get the benefits in terms of performance for the supply chains but these efforts also need to be linked with the customer as well as supplier integration to ensure excellent overall integration.

Sixthly, managers or company should also invest in socialization activities to further enhance the relationship between internal and external integration. For example if a company employs and gives due importance to activities like kaizen workshops, social events, causal meals, team building exercises, sports activities and plan on-sites visits, it will strengthen the relationship between company and external partners i.e., customers and suppliers. It will not only prove to be a way to share the intellectual capital but will also bring everyone together to better understand the need of the end customer and exploitation of resources in a better way.

Lastly, the management of the company should ensure the company’s focus on external positioning and maintaining a fit with external environment. Company should give due importance to adaptability, flexibility, creativity and readiness for change. If the organization possesses cultural characteristics based on the market and developmental culture type, it will further strengthen the relationship between the company and its external partners.
6.3 Contribution of the Present Research

The earlier research remained inconclusive regarding SCI and performance relationship and desperately called for identification of the appropriate mechanism for establishing and strengthening such relationships. Earlier research though concluded with the notion that internal integration is prerequisite for establishing external integration yet still there is dearth of research on how to achieve better internal integration. Furthermore, previous research though investigated the SCI and performance and their link but what factors or steps are required to strengthen the relationship between the firm and its external partners was still a gap and was also highlighted by some recent research (e.g. Zhao et al., 2011). In addition to it, all the previous researches conducted on SCI were conducted in developed countries and it called for study in other cultural settings in developing countries.

Keeping in view all the above stated points, the current study has made several notable contributions. Firstly, as previously mentioned previous research had agreed on the fact that internal integration is a precondition to external integration and so has a positive role on the performance, but how to achieve this internal integration and its antecedents is still in infancy stage as there is very little research except a few studies (e.g. Basnet & Wisner, 2012; Pagell, 2004). This is perhaps one of the most important contributions of the current study which not only investigated the factors that may enhance the internal integration but also provided an integrated model or fit of the practices that better enhance the internal integration. The factors which were investigated in the study were job rotation, interdepartmental trainings, supporting information technology, intraorganizational knowledge sharing and
strategic consensus. Results gave insight that implementation of these practices, though each of them significantly enhances internal integration, should not be made in a piecemeal manner thus highlighting the importance of coordination aspect of all these practices. From management point of view this further highlights the fact that if the decision makers intend to take new measures to enhance internal integration, the new initiatives/measure should be coordinated with existing practices so that they improve and add to the effect of the current practices instead of detracting from them. Secondly, the results of the study reaffirm the previous findings about the relationship of internal integration with external partners i.e. customers and suppliers and supply chain performance complementing the earlier research in other cultural settings like Pakistan. Furthermore, the mediating role of external integration between internal integration and SC performance was also investigated and it added further to the theory that both customer integration and supplier integration partially mediate the said relationship. This further highlights the fact that companies should not only ensure the internal integration to the optimum level but their efforts to achieve better integration should also be linked with the customers as well as supplier integration. Another notable contribution of the current study is the investigation of the moderating role of SC socialization and organizational culture (external focused) strengthening the company’s and external partner’s relationships. Results highlighted that companies should give importance to socialization activities e.g. onsite visits, social events, causal meals, team building exercises, which will strengthen the relationship between company and external partners i.e. customer and supplier. Organization culture based on the competing value framework i.e. market and
developmental (external focused) highlighted the fact that organizations which value adaptability, creativity, responsiveness, external positioning and maintaining fit with the environment will better strengthen the existing relationship with customers and suppliers.

These results will not only benefit the company and its partners but will also add value to the existing theory.

Last but not the least, this is perhaps the first study to the best of the researcher’s knowledge which has been conducted on such an important aspect of the supply chain which plays a pivotal role in ensuring excellent running of organizations and ultimately giving boast to the economy of developing country like Pakistan.

6.4 Limitation and Future Research

In spite of the fact that the current study has resulted in useful insights/findings for theory and practice yet the study has certain limitations which can help open new avenues for future studies.

Firstly the data for study was collected only from the single industry i.e. petroleum companies thus limiting the generalizability of the study. Future studies may be extended to the other industries to further validate the findings.

Secondly, cross sectional data was employed in this current study; further studies may also employ longitudinal design to further validate the results.

The current study investigated the practices that enhance the internal integration and provide an alternate model in terms of integrated model, the future research needs to be conducted which can investigate the model to validate this holistic model in other industries.
The current study investigated the role of two factors i.e. SC socialization and organizational culture which needs to be further explored in other industries as well as other cultural setting for validating the results. Furthermore the current study could not investigate the role of other factors like environment, trust, relationship commitment, role of culture, power etc. so future studies should focus on these factors to better understand the relationship between company and its external partners i.e. customers and suppliers.
References:


296


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Senge


Respected Sir/Madam


It is intimated that I, Nadeem Talib, am a PhD Student in Management Sciences at National University of Modern Languages, Islamabad. I am carrying out a research study on “Measuring the impact of Supply Chain Integration on performance: the moderating role of socialization and organization culture”.

A survey questionnaire has been designed to collect information on the topic for academic analysis purpose only from the personnel of lower, middle and higher management level in your organization. Your contribution by filling this questionnaire is of a great importance and is highly appreciated. Information provided by you will be used for academic research purpose only, and its confidentiality is assured. No data will be reported/quoted at any level. Furthermore, this research is endorsed by the Ministry of Petroleum & Natural Resources (Directorate General of Oil, Gas and Petroleum concession)

I shall be grateful for your kind cooperation.

Yours truly

Nadeem Talib
PhD Scholar/Researcher
National University of Modern Languages, Islamabad.
Email: nadeem_tlb@yahoo.com
<table>
<thead>
<tr>
<th><strong>SECTION-1</strong></th>
<th><strong>General Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1</strong></td>
<td>Your company name ..............................................</td>
</tr>
<tr>
<td><strong>1.2</strong></td>
<td>Gender …………</td>
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<tr>
<td><strong>1.3</strong></td>
<td>Your Position in Management</td>
</tr>
<tr>
<td></td>
<td>a) Operational</td>
</tr>
<tr>
<td></td>
<td>b) Tactical/Middle</td>
</tr>
<tr>
<td></td>
<td>c) Top/Strategic</td>
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<tr>
<td><strong>1.4</strong></td>
<td>Your Qualification</td>
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<td></td>
<td>a) Bachelors degree</td>
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<tr>
<td></td>
<td>b) Master Degree</td>
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<tr>
<td></td>
<td>c) Others</td>
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<tr>
<td><strong>1.5</strong></td>
<td>Your Experience in this organization</td>
</tr>
<tr>
<td></td>
<td>a) 1-3 years</td>
</tr>
<tr>
<td></td>
<td>b) 3-5 years</td>
</tr>
<tr>
<td></td>
<td>c) Greater than 5 years</td>
</tr>
<tr>
<td><strong>1.6</strong></td>
<td>Your Department (Please Tick the relevant)</td>
</tr>
<tr>
<td></td>
<td>a) Production/Manufacturing</td>
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<tr>
<td></td>
<td>b) Marketing/Sales</td>
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<tr>
<td></td>
<td>c) Engineering</td>
</tr>
<tr>
<td></td>
<td>d) Supply chain/Logistics</td>
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<tr>
<td></td>
<td>e) IT/MIS</td>
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<td></td>
<td>f) HR/Admin</td>
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<td></td>
<td>g) R &amp; D</td>
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<tr>
<td></td>
<td>h) Purchasing/procurement</td>
</tr>
<tr>
<td></td>
<td>i) Others …………………….. (Please Specify)</td>
</tr>
<tr>
<td><strong>1.7</strong></td>
<td>How long you had supply chain initiative (i.e. practicing supply chain or maintaining relationships with customers and suppliers) in your company.</td>
</tr>
<tr>
<td></td>
<td>a) Less than 1 Yr.</td>
</tr>
<tr>
<td></td>
<td>b) 1-3 Yrs.</td>
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<tr>
<td></td>
<td>c) 3-5 Yrs.</td>
</tr>
<tr>
<td></td>
<td>d) Greater than 5 years.</td>
</tr>
</tbody>
</table>
The following part of the questionnaire is related to the factors or interventions the organization undertake for improving/fostering integration within a company through job rotation, training of managers/employees regarding other departments, emphasis of management for integration, use of Information technology and sharing of knowledge/information within a company. 

Please Tick mark the appropriate box against each statement, according to the degree of your agreement on the basis of given scale.

5 = Strongly Agree (SA), 4 = Agree (AG), 3 = Uncertain (UC), 2 = Disagree (D), 1 = Strongly Disagree (SD)

<table>
<thead>
<tr>
<th>JR</th>
<th>Job Rotation</th>
<th>Your Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR_1</td>
<td>In my company planned job rotation of employees and managers is emphasized as a device for developing their capabilities.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>JR_2</td>
<td>We rotate employees across functional areas such as R&amp;D, Manufacturing and Marketing etc.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>JR_3</td>
<td>We use job rotation as a tool for better communication/understanding among departments.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IDT</td>
<td>Interdepartmental Training (Training regarding other departments)</td>
<td></td>
</tr>
<tr>
<td>IDT_1</td>
<td>My organization encourages employee-training regarding their own and other departments.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IDT_2</td>
<td>My organization promotes employees to understand the functioning of other departments through formal training (Without relocation).</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IDT_3</td>
<td>People from different departments (e.g. Marketing, Sales etc.) jointly participate in cross-functional training programs.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>MC</td>
<td>Management Commitment (Management support for integration)</td>
<td></td>
</tr>
<tr>
<td>MC_1</td>
<td>Our management formally promotes and encourages cross-functional teamwork.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>MC_2</td>
<td>Our management sets clear objectives and high standards for teamwork.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>MC_3</td>
<td>Our organizational structure facilitates cross-functional cooperation and collaboration</td>
<td></td>
</tr>
<tr>
<td>MC_4</td>
<td>Our management requires that we get a consensus on all new product decisions.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IOKS</td>
<td>Intra-organizational Knowledge Sharing</td>
<td></td>
</tr>
<tr>
<td>IOKS_1</td>
<td>Our top management repeatedly emphasizes the importance of knowledge sharing in our company.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IOKS_2</td>
<td>In my company there is a good deal of organizational conversation that keeps alive the lesson learned.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IOKS_3</td>
<td>In my company we always analyze unsuccessful organizational endeavors and widely communicate the lessons learned.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>IOKS_4</td>
<td>My company has specific mechanism for sharing the lessons learned in organizational activities from department to department (unit to unit, team to team).</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>SIT</td>
<td>Supporting Information Technologies</td>
<td></td>
</tr>
<tr>
<td>SIT1</td>
<td>In my company managers use electronic mail (e-mail), video conferencing etc. to communicate with different people across the organization.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>
In my organization managers access information and data from other parts of the firm via supportive information technologies.  

In my organization managers use electronic means to exchange information with manufacturing, engineering, and other functional areas.  

In my organization intra-organizational coordination is achieved using electronic links  

We use information technology –enabled transaction processing.  

In my company top management develops companywide consensus on strategy.  

My organization focuses on mutual understanding of shared companywide strategy to all the functions.  

All employees are committed to the goals of the organization.  

Managers and employees in my organization have a common objective.  

SECTION III  
In this part of the questionnaire we are interested in measuring aspects of internal integration (i.e. integration among departments within your company). Please circle the number that best reflects your views on the question at hand regarding your company.  

5 = Strongly Agree (SA), 4 = Agree (AG), 3 = Uncertain (UC), 2 = Disagree (D), 1 = Strongly Disagree (SD)  

<table>
<thead>
<tr>
<th>Internal Integration</th>
<th>Your Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interaction</strong></td>
<td><strong>Your Response</strong></td>
</tr>
<tr>
<td>Int_I1 We interact with each other through meeting or phones or e-mails.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I2 We interact with each other through exchange of forms, reports or documents.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td><strong>Collaboration</strong></td>
<td><strong>Your Response</strong></td>
</tr>
<tr>
<td>Int_I3 We share ideas, information and/or resources among departments</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I4 We try to achieve goals collectively</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I5 We informally work together as a team</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I6 We informally work together</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I7 We believe in developing mutual understanding and shared responsibilities.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I8 We conduct joint planning to anticipate and resolve operational problems.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cross functional Teams</th>
<th><strong>Your Response</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Int_I9 We use cross functional teams in process improvement</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Int_I10 We use cross functional teams in new product development.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>
SECTION IV
This section measures the extent of external integration the company has with suppliers and customers. Please circle the number that best reflects your views on the question at hand regarding your company. 
$5 = $Strongly Agree (SA), $4 = $Agree (A), $3 = $Uncertain (UC), $2 = $Disagree (D), $1 = $Strongly Disagree (SD)$

<table>
<thead>
<tr>
<th>Cust_I</th>
<th>Customer Integration</th>
<th>SA</th>
<th>AG</th>
<th>UC</th>
<th>DA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cust_I1</td>
<td>My company regularly follow up the customers for feedback</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I2</td>
<td>My company is linked with our major customers through information/computer network.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I3</td>
<td>Our major customers share market information with us.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I4</td>
<td>Our company has established a quick ordering process with our major customers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I5</td>
<td>Our major customers share point of sale (POS) information with us.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I6</td>
<td>Our major customers share demand forecast with us.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I7</td>
<td>We share our available inventory with our major customers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cust_I8</td>
<td>We share our production plans with our major customers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suppl_I</th>
<th>Supplier Integration</th>
<th>SA</th>
<th>AG</th>
<th>UC</th>
<th>DA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppl_I1</td>
<td>My company exchanges information with suppliers through information Technology.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I2</td>
<td>My company has strategic partnership with suppliers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I3</td>
<td>My company has stable procurement process with our major supplier.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I4</td>
<td>Our major suppliers participate in the design stage of the product.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I5</td>
<td>Our major suppliers share production schedule with us</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I6</td>
<td>Our major suppliers share their production capacity with us.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I7</td>
<td>Our major suppliers share available inventory status with us.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I8</td>
<td>We share our production plans with our major suppliers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I9</td>
<td>We share demand forecast with our major suppliers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Suppl_I10</td>
<td>We share our inventory level with our major suppliers.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

* Deleted Items
**SECTION V**

*(Supply Chain performance and Organizational Performance)*

This section measures supply chain performance with respect to cost containment, reliability and flexibility performance dimension and overall organizational performance.

<table>
<thead>
<tr>
<th>SCP</th>
<th>Supply chain Performance</th>
<th>Your Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td><strong>Cost Containment Performance</strong></td>
<td></td>
</tr>
<tr>
<td>CP1</td>
<td>Our supply chain reduces inbound and outbound costs</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>CP2</td>
<td>Our supply chain reduces warehousing costs</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>CP3</td>
<td>Our supply chain system reduces inventory holding cost</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>CP4*</td>
<td>Our supply chain system increases assets turnover.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td></td>
<td><strong>Reliability performance</strong></td>
<td></td>
</tr>
<tr>
<td>RP1</td>
<td>Our supply chain system increases our order fill rate</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>RP2</td>
<td>Our supply chain system increases our inventory turns or turnover¹</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>RP3</td>
<td>Our supply chain system reduces safety stocks</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td></td>
<td><strong>Flexibility Performance</strong></td>
<td></td>
</tr>
<tr>
<td>FLP1</td>
<td>My company has the ability to change the output level of products produced. Or The ability to quickly and efficiently adjust output to match demand fluctuations.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>FLP2</td>
<td>My company has the ability to change the planned delivery dates</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>FLP3</td>
<td>My company can quickly respond to changes in the demand market</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>FLP4</td>
<td>My company has ability to respond to and accommodate new products, new markets or new competitors</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td></td>
<td><strong>Organization Performance</strong></td>
<td></td>
</tr>
<tr>
<td>Org_perf1</td>
<td>My company’s overall market share represents a significant share in the industry.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Org_perf2</td>
<td>My company’s return on investment increases from previous year.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Org_perf3</td>
<td>The market share of our company increases significantly from the previous year.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Org_perf4</td>
<td>My company’s sales growth grows significantly from previous year.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Org_perf5</td>
<td>The profit margin on sales significantly increases with respect to previous year.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Org_perf6</td>
<td>The overall competitive position is improved.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

¹ Deleted Item
SECTION VI

This section measures the aspects of socialization your company have with its major customer and supplier. Moreover this section also intends to measure the prevailing culture of your organization.

<table>
<thead>
<tr>
<th>Social</th>
<th>Supply Chain Socialization</th>
<th>Your Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social_1</td>
<td>My company conducts/holds team building exercises with customers and suppliers</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Social_2</td>
<td>My company holds joint meetings/workshops with customers and suppliers.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Social_3</td>
<td>My company regularly visits the customers and suppliers’ sites</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Social_4</td>
<td>My company participates regularly in customers/suppliers conferences.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>Social_5</td>
<td>My company participates in social events with customers and suppliers to stimulate interaction and communication.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OC</th>
<th>Organization Culture</th>
<th>Your Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhocracy Culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OC_1</td>
<td>In my company there is emphasis on acquiring new resources and ideas.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>OC_2</td>
<td>In my company innovation and change are encouraged.</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>OC_3</td>
<td>The working environment is flexible and decentralized in my company.</td>
<td>5 4 3 2 1</td>
</tr>
</tbody>
</table>

| Market Culture | | |
| OC_4 | My company’s product reflects excellence and quality. | 5 4 3 2 1 |
| OC_5 | My organization is efficient, productive and economic. | 5 4 3 2 1 |
| OC_6 | We have clear direction, objective setting and goal clarity. | 5 4 3 2 1 |

Any Comments, Observations or Suggestions

............................................................................................................................................................................................................................................................
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..............................................

Thanks for your Cooperation....
Appendix-B

Histograms and Q-Q plots of the constructs under study

1. Job Rotation

![Graph of Job Rotation]

2. Interdepartmental Trainings

![Graph of Interdepartmental Trainings]
3. Management Commitment

4. Intraorganizational Knowledge Sharing
5. Supporting Information Technology

6. Strategic Consensus
7. Customer Integration

8. Supplier Integration
9. Supply Chain Performance

![Histogram and Q-Q Plot for ICP]

10. Organization Performance

![Histogram and Q-Q Plot for Org Prof]
11. Socialization

12. Adhocracy Culture
13. Market Culture

14. Internal Integration