# MICRO ANTECEDENTS OF ABSORPTIVE CAPACITY: IMPLICATIONS OF SOCIAL CONTEXT IN JOINT PROJECT TEAMS IN NIGERIAN UPSTREAM OIL INDUSTRY

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## DECLARATION

I hereby declare that the work has been done by myself and no portion of the work contained in this Thesis has been submitted in support of any application for any other degree or qualification of this or any other university or institution of learning.

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**Adedapo Oluwaseyi Ojo**

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To my wonderful parents Bayonle and Olusayo, adoring and supportive wife Oluwayomi and our precious gifts Mojoyinoluwa and Mojolaoluwa.

## ABSTRACT

This study provides empirical response to recent calls for clarification on the micro-foundation of absorptive capacity (ACAP). ACAP originates in Cohen and Levinthal's seminal work to explain firm's incentive for learning, which is the ability to recognize the value of new knowledge, assimilate it and commercially apply it. Thus advancing the extant assertion on conceptual affinity, this study synthesizes socio-psychological theory in creativity and organisational learning to delineate the specific antecedents for each dimension of ACAP. The individual's prior experience, need for cognition, learning and performance approach goal orientation are hypothesized as predictors of an individual's ability to recognize the value of a foreign partner's knowledge and assimilate it. And based on strategic alliance literature, the effects of social context in terms of trust in and support from foreign partners are proposed on the individual ability to recognize, team shared cognition and ability to utilize foreign partner knowledge. The data was collected from a cross sectional survey of local individual members of joint project teams (n=248) in the Nigerian upstream oil industry. And statistical analyses were conducted with the aid of SPSS and SEM (i.e., AMOS) software packages.

The findings demonstrated the relationships among the micro antecedents, social context and multidimensional ACAP. As hypothesized, the individual performance approach goal orientation and need for cognition were positive determinants of the ability to recognize the value of partner knowledge. While the ability to assimilate the knowledge was found to be dependent on individual prior experience, need for cognition and learning goal orientation. The revised structural model supported the positive effect of prior experience on team ability to utilize knowledge. Moreover, the relationships between the social context and the ACAP dimensions were supported. Finally, the full mediating effect of shared cognition on relationship between ability to assimilate knowledge and ability to utilize knowledge was supported. The main theoretical contribution of this study is the validation of the specific antecedents for each dimension of ACAP. Thus, managerial implications are offered to guide the selection of team members and the design of joint project teams.

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## ABBREVIATIONS

**ACAP –** Absorptive Capacity

**FEED** – Front End Engineering Design

**FPSO** – Floating, Production, Storage, and Offloading

**IJVs** – International Joint Ventures

**IOC** – International Oil Companies

**IOL-** Inter-Organisational Learning

**IOSFs** – International Oil Servicing Firms

**JV –** Joint Venture

**LOSFs** – Local Oil Servicing Firms

**MNCs -** Multinational Oil Companies

**NCDMB** – Nigerian Content Development and Monitoring Board

**NETCO** – National Engineering and Technical Company Limited

**NNPC** - Nigerian National Petroleum Corporation

**NOGIC JQS** - Nigerian Oil and Gas Industry Content Joint Qualification System

**OSFs** – Oil Servicing Firms

**R&D** - Research and Development

# CHAPTER 1

# INTRODUCTION

## 1.1 Background of Study

Despite the abundance of natural resources, most developing economies depend on multinational corporations (MNCs) from developed economies in driving their extractive industries as well as gaining access to the international market. Such dependence is prominent in the Nigerian oil industry (Chima, Owioduokit and Ogoh, 2002; Ijose, 2010; Oyejide and Adewuyi, 2011). Globally, the oil industry is characterized by rising demand, high level of difficulty and complexity in accessing newer deposits mostly in deep-water offshore location, and growing interest in alternative energy sources (Cassiani, 2007). Thus, competitiveness is shaped by operator's ability to maximize returns from existing fields, while prospecting for newer deposits. Indeed, operators are aligning their capabilities in deploying newer technologies, training and retaining highly skilled human capital, fostering investment in research and development (R&D), leveraging collaborative work processes and strategic partnership in driving knowledge intensive upstream activities (Dantas and Bell, 2011; Cassiani, 2007). Evidently, unlike the Nigerian firms, the international oil servicing companies (IOSCs) have the resources, technologies, capabilities, expertise and managerial know-how and are better positioned to attract the high end knowledge intensive upstream projects (Oyejide and Adewuyi, 2011).

Earlier attempts at reducing dependence in the Nigerian oil sector dated back to the 1960s, when locals were exposed to specialized technical education and training aimed at creating the absorptive capacity (ACAP) necessary for acquiring relevant technology and knowledge (Chima *et al.,* 2002). The concept of absorptive capacity was coined in Cohen and Levinthal's (1990) seminal article as firm's incentive for learning through investment in R&D. According to them, ACAP is underpinned by prior related knowledge, thereby facilitating a firm's ability to

recognize the value of related external knowledge, assimilate and commercially apply it in enhancing performance.

Equally, Biersteker (1987) described the Nigeria Enterprise Promotion decrees of 1972 and 1977, which made it mandatory for MNCs to make between forty to sixty percent of their equity available to Nigeria, as one of the most elaborate attempts by any developing country to increase local participation. Nevertheless, the prevailing situation in the industry is a total departure from the envisaged outcomes. Decrying the effect of low local participations on the nation's economy, the Minister of Petroleum Resources, Alison Madueke at a recently organised energy conference in Nigeria stated that, "the cumulative effect of operating this model for so long is that in an industry that currently spends an average sum of $20 billion per annum, less than $2 billion is retained in the national economy and over $300 billion has been lost to capital flight in this way" *(*Amanze-Nwachuku, 2011*).*

In an attempt to reverse such trends, the Nigerian oil and industry content act 2010, specifically mandates IOCs to allocate additional funds to training local employees, while also ensuring that at least 70% of the total upstream engineering projects are handled in-country and contracted to local oil servicing firms (LOSFs) or their joint ventures (JVs). The main focus of this initiative is competence/capability building through inter-organisational learning (Chima *et al.*, 2002; Bakare, 2011; Ihua, 2010). Both industry and business publications (Adebola, Okoro and Nwasike, 2006; WoodGroup, 2010) have documented evidence of increasing engagement of local firms through JVs with foreign partners. Nevertheless, empirical enquiries are needed, in order to understand the factors underlying knowledge acquisition, i.e. ACAP, with emphasis on the role of individuals engaged in the joint project with the expatriate from the foreign partner.

Researchers (Lyles and Salk, 1996; Lane *et al.*, 2001; Chima *et al.*, 2002; Kale and Anand, 2006; Park, 2011) have demonstrated ACAP as the main constraint to knowledge acquisition from international joint ventures (IJVs) in non-developed countries. This is because most of the firms in the non-developed economies lack the

technological capabilities, highly skilled workforce as well as extensive R&D engagement, which could enhance their internal capabilities for acquiring external knowledge. Interestingly, Cohen and Levinthal (1990) considered a firm's intensity of investment in R&D as a proxy for absorptive capacity. Nevertheless, the time differential between learning and its resultant effect in putting it into practice what has been learned might discourage firms from building knowledge or capability through internally directed R&D effort (Dierickx and Cool, 1989). Perhaps, firms could leverage inter-organisational relationships, especially with competent partners in fast tracking capability development and reducing R&D cost (Grant and Baden-Fuller, 1995). Thus, in a bid to clarify the implication of learning context, Lane and Lubtakin (1998) suggest relative absorptive capacity, which asserts that a firm's ability to absorb its partner's knowledge is dependent on the extent of similarity in their characteristics, as well as structural and incentive mechanisms.

In practice, learning within an intra/inter organisational context encompasses both individual and collective components (Zhao and Anand, 2009). Individuals can learn independently, while collective learning allows the interactive engagement of multiple actors within the organisational context (Argote, 1999; Crossan, Lane and White, 1999). However, such a multilevel approach on learning has been less explored in extant literature (Antonacopoulou, 2006). Not surprisingly, Cohen and Levinthal's theoretical proposition on ACAP drew mainly from individual cognition and behavioural theories in explaining the firm level phenomenon. According to them a firm's ACAP depends on its individual members, although not necessarily as direct additions, yet most studies have overlooked such, but progressed to build on the firm (macro) level (Lane et al., 2006). Rather, compelling theoretical argument on ACAP requires a multilevel perspective, wherein the underlying dimension for a specific level of analysis is clearly identified (Zahra and George, 2002; Volberda, Foss and Lyles, 2010; Nemanich et al., 2010).

Succinctly, scholars (Lane *et al.*, 2006; Easterby-Simth, Lyles, and Tsang, 2008; Volberda *et al.*, 2010; Lewin, Massini, and Peeters, 2011) have canvassed for more clarifications on the micro-foundational antecedents of ACAP in order to

deepen understanding on its multilevel existence. Also the significance of conceptualizing ACAP as a multidimensional construct has been underscored (Zahra and George, 2002; Lane *et al.*, 2001; Todorova and Durusin, 2007; Nemanich *et al.*, 2010). Earlier critics of a unidimensional construct, Zahra and George (2002) suggest two components: potential capacity (i.e., abilities to recognize and assimilate) and realized capacity (abilities to transform and exploit). Among other conditions for the rejuvenation of absorptive capacity, Lane *et al.*, (2006) implore empirical study to investigate the impact of structural factors on the efficiency of applying assimilated knowledge at the collective level.

In response, this study extends Cohen and Levinthal's (1990) proposition on the conceptual affinity that ACAP shares with creative capacity and organisational learning. Thus, the conceptual model draws on the socio-psychology theories of creativity and organisational learning, with the incorporation of strategic alliance literature in order to explain the effect of the joint team social context. Drawing analogy from creativity theory (Amabile, 1983) and learning processes across organisational level (Crossan *et al.*, 1999), this study advances extant conceptualization (Zahra and George, 2002; Nemanich *et al.*, 2010; Silva & Davis, 2011) by proposing individual and contextual antecedents for relevant dimensions of ACAP.

Following Nemanich *et al.* (2010) exposition on Crossan *et al*. (1999) model on organisational learning, this study delineates ACAP into four conceptually distinct dimensions of individual ability to (i) recognize the value of and (ii) assimilate foreign partner knowledge, and team (iii) shared cognition and (iv) ability to utilize partner knowledge. And drawing on Amabile's (1983) componential theory on creativity, the individual antecedents of ACAP are expressed as prior experience, need for cognition, and goal orientation, to predict the ability to recognize the value of a foreign partner's knowledge, and assimilate it. Cognizant joint project team context and need to elucidate the social mechanism, as posited by Zahra and George (2002), strategic alliance literature was examined to postulate partner support and trust as contextual antecedents for the relevant dimensions of ACAP (i.e., individual

ability to recognize the value of knowledge, shared cognition and team ability to utilize foreign partner's knowledge).

## 1.2 Study Context

Historically, oil prospecting activity was first initiated in Nigeria (i.e. Araromi, West of Nigeria, now in Ondo State) by the German Bitumen Corporation in 1908. However, further activity was suspended at the dawn of the First World War in 1914 (NNPC, 2012). Consequently, the Anglo-Dutch consortium, Shell D'Arcy (now known as Shell Petroleum Development Company) took over in 1937, and by 1956 discovered crude oil in commercial quantity; thereby moving the country into the league of oil producing nations (Chima et al., 2002; Oyejide and Adewuyi, 2011). Shell pioneered oil production and exportation from the Oloibiri field (Bayelsa State) in 1958. However, the exclusive exploration rights was repealed in 1959, paving the way for the entry of other international oil companies, IOCs (e.g. Mobil, Gulf, Agip, Elf, Chevron / Texaco), in an attempt to increase exploration pace and also eliminate overdependence on a single company (NNPC, 2012). Geographically, the Niger Delta region accounts for the total oil and gas resources and concentration of upstream activities in Nigeria; spreading over 70,000 $km^2$, which constitute 7.5% of the country's landmass (Adebola et al., 2006).

Initially, the Nigerian government involvement in the oil industry was limited to the regulatory roles and collection of royalties and other dues, from the IOCs. However, by the time the Nigerian civil war ended in 1970, oil had become the major driver for economic activities, with corresponding review of government roles (NNPC, 2012). To this end, in 1971, Nigeria joined the organisation of oil exporting countries (OPEC) as the eleventh member, and also established the Nigerian National Oil Company, which was replaced by the NNPC in 1977. Today, NNPC has evolved into an integrated national oil and gas enterprise, with eleven subsidiaries, and saddled with policy formulation and regulatory functions, as well as transforming the economic and industrial base, through technological development and creation of

local capacities and self-reliance across the upstream and downstream sectors (Nwokeji, 2007).

In terms of oil production, Nigeria through the NNPC is the largest in Africa and 10th in the world, while the nation continues to depend primarily on the industry as sources of foreign exchange earnings and government revenue (Oyejide and Adewuyi, 2011). The bulk of this revenue and activities originate from the upstream sector, which holds about 36.22billion barrels, corresponding to 3% of proven oil reserves in the world, as at the end of 2007 (Oyejide and Adewuyi, 2011; Bakare, 2011). While the downstream sector is mostly made up of four refineries, with installed capacity of 438, 750 barrels per day, but due to several internal and external factors, hardly operate at 40% capacity utilization level (NNPC, 2012).

While NNPC is saddled with the exploration and production of Nigeria's oil resources, the corporation operates through a concessional system in the form of joint operating agreements with the IOCs as the operators (Nwokeji, 2007). Thus, the main source of revenue is the proceeds of crude oil allotment to the NNPC from the IOCs, who are the main operators of the joint ventures consortium with the NNPC. Until 2004, the IOCs through their JVs with the NNPC were responsible for the production of 90% of crude oil in Nigeria. However, from the early 2000s', there has been an increasing engagement of more indigenous companies (i.e., Concoil, Oando, Seplat, etc.) as well as non-western IOCs (from China, Korea, India, etc.) in such JV agreements with the NNPC (Nwokeji, 2007).

### 1.2.1 International Joint Ventures in Nigerian Oil Industry

Joint ventures and partnerships agreements between Nigerian and foreign oil firms date back to 1971, a few years after crude oil was discovered in commercial quantities (Chima *et al.*, 2002). However, it had been mostly limited to the state owned Nigerian National Petroleum Corporation (NNPC); until the late 1980's when indigenous and privately-owned oil firms started forming alliances with IOCs. Traditionally, through JV arrangements, NNPC enters into production partnerships

with major IOCs. These entail equity funding, with NNPC owning at least a 57% stake in the upstream JV operations and the IOCs as the main operator. With the growth of exploration in the harsh and capital intensive offshore locations, the production sharing contract (PSC) is becoming more prevalent, wherein the IOCs bear the full risk, with no equity contribution from the NNPC (Nwokeji, 2007).

Chima *et al.* (2002) investigated NNPC's JVs with major IOCs (i.e. Shell, Mobil, Chevron, Agip, Total) and found evidence of inter-organisational learning in exploration and production activities. Although, NNPC was able to acquire capabilities in production, investment, minor change, linkage and strategic marketing, substantial gaps still exist in major capabilities. They attributed such occurrence to divergence of interest, wherein in a bid to permanently secure access to the local market, IOCs intentionally prevent the actual transfer of technological capabilities or knowledge to local firms. Recent reforms aimed at repositioning the NNPC through local capacity building has resulted in the adoption of service contract agreements with IOC. Contrary to PSC, the Nigerian Petroleum Development Company (a subsidiary of NNPC) joins the IOCs as joint operators (NNPC, 2012). For instance, NNPC signed a service contract agreement with Agip in 2006, with the exploration operations involving the participation of technical and support personnel from the NNPC.

In the late 1980s, the National Engineering and Technical Company Limited (NETCO) was formed as joint ventures (JVs) between the NNPC and American Bechtel Inc., with the main objective of developing local engineering capability. Before 1997, when NNPC fully acquired Bechtel's shares in the JV, more than 50 technologically advanced engineering projects were jointly completed (Adebola *et al.*, 2006). Now, as a wholly owned subsidiary of the NNPC, NETCO has executed major projects. NETCO, leading a group of other indigenous engineering firms in conjunction with Korean Daewoo Shipping and Maritime Engineering (DSME), successfully completed the Agbami FPSO topside engineering design, which is one of the largest single deep-water fields in West Africa (Adebola *et al.*, 2006).

Having recognized the socioeconomic and political significance of substantial local content in knowledge intensive activities in the oil industry, the Nigerian oil and gas industry content act was signed to law in 2010. The act specifically prohibits the approval of projects by IOCs without the detailed plan on the engagement of local personnel and firms. To enforce the act, the Nigerian content development and monitoring board (NCDMB) was established and saddled with creating the necessary guidelines, and implementing, monitoring and coordinating all local content related issues. Notwithstanding the drought of empirical investigation on capability building through joint projects in the Nigeria oil industry, scholars have acknowledged the marginal engagement of local firms in knowledge intensive and value adding activities like engineering design (Oyejide and Adewuyi, 2011; Bakare, 2011; Ariweriokuma, 2009).

The IOCs are expected to allocate additional funds to training locals, while also ensuring that at least 70% of the total upstream engineering projects are handled in-country and contracted to LOSFs or their JVs with IOSFs. In support of the local content initiative, major IOCs in Nigeria have introduced several strategies. For instance Chevron, in 2006, launched the "Detailed Nigerian Content Scope Program" to ensure the award of contracts to local firms or their IJVs. Exxon Mobil has committed $5million to the Nigerian Content Support Fund (NCSF), which indigenous firms can access in financing capital projects in the oil and gas sector. Shell built the $15million front end engineering design (FEED) centre, to support the training and development of local engineering capabilities. Total and Statoil have incorporated local content as part of their social corporate responsibilities.

Interestingly, major local engineering firms like Dorman-Long, Cakasa, Delta-Afrik, Dover, etc., have recognized the relevance of JVs in building their capabilities for handling advanced engineering projects. At the recent commissioning of the world class Oyot platform for Exxon Mobil/NNPC JVs, the Vice Chairman of the Dorman-Long, Chukwuma Henry Okolo, noted that; "The feat achieved by Dorman Long in the fabrication of the oil facility platform was as a result of the government's local content policy which has empowered Nigerian companies to

participate in local fabrication of mega facilities used in the oil and gas sector" (Alike, 2012).

### 1.2.2 Overview on Upstream Engineering Project in Oil Industry

The oil industry can be categorized into two main activities: (i) upstream, mainly constituted by exploration and production, and (ii) downstream, which incorporates transportation, refining and gas processing, and marketing and distribution (Grant and Cibin, 1996). The former is characterized by high levels of uncertainty and risk (Baddour, 1997; Berends, 2007; Cassiani, 2007; Bartram and Wood, 2009). As Baddour (1997) observed, there is a high level of uncertainty in generating accurate figures on the remaining recoverable volume of oil from the production field. Likewise, there is no absolute guarantee that the huge financial outlay on upstream activities will produce corresponding value in terms of recoverable oil and gas reserves (Hultzsch, Lake and Gilbert, 2007). On these peculiarities, the oil industry has been adjudged as one of the most knowledge-intensive in the modern economy (Bartram and Wood, 2009).

The upstream sector is further divided into four stages of activities: exploration, appraisal, development and production (Higgins, 1993; Hultzsch *et al.*, 2007); at the heart of these is engineering design and fabrication, which encompasses the process underlying the creation of facilities/platforms to support the activities. Generally, engineering design and fabrication projects could be delineated into two: (i) front end engineering design (FEED) and (ii) implementation (Berends, 2007). The former entails feasibility studies, conceptual design, cost estimation, environmental assessment, surface and subsurface modelling, while the latter includes procurement, fabrications and commissioning; complexities. The financial outlay is highly for hydrocarbon located in the deep-water offshore.

The above requires highly specialized engineering capabilities, with huge financial outlay, and it is critical to overall performance; thus, operators take extra

care in selecting service providers. Berends (2007) highlights the risky nature of engineering design project in the upstream sector (see Table 1.1).

**Table 1.1:** Risky Nature of Upstream Engineering Project (Berends, 2007:4261)

| |
|---|
| • The large investment yields no revenue until after implementation;<br>• The facility is indivisible with limited possibilities to reduce exposure through breaking up the scope of work;<br>• Transferring the facility to another location is generally not feasible with limited options for redeployment of equipment; and<br>• Development and implementation times are long typically 2-3 years and 3-5years, respectively. |

Consequent on the substantial level of risk associated with an upstream engineering project, the incorporation of risk management becomes inevitable. To this end, the project is executed in phases, with the FEED as the main determinant for the implementation phase and constituting about 3% of the overall facility installation cost (Berends, 2007). Besides the huge financial outlay and need for specialized knowledge, another cause of complexity in the upstream oil industry is the engagement of project teams, constituted by employees from diverse organisations in task execution (Finch, 2002; Acha, 2002). According to Finch (2002) such organisational arrangements can facilitate interaction among individuals, which in turn enhances access to one another's capabilities.

Indeed, an upstream engineering project is dynamic in nature and characterized by diverse stakeholders, with a successful outcome hinging on the coordination mechanisms. Stakeholders could consist of the facility owner/operator; servicing firms/contractors; authorities (government/community); customers and suppliers (Berends, 2007). In the present study, the coordination mechanism is the joint venture arrangement between local oil servicing firms (LOSFs) and foreign partners, with investigation focused on the implication of individuals' heterogeneity (i.e. local individual members) in the execution of the joint project.

## 1.3 Problem Statement

Due to growth in the engagement of IJVs in handling knowledge intensive activities like engineering projects in the Nigerian oil industry, the need to deepen understanding on inter-organisational learning has become inevitable. Consistent with this, scholarly attempts have investigated the role of JVs in capability building in the state owned oil company, the NNPC (Chima *et al.*, 2002; Nwokeji, 2007) and IOCs, most especially Shell (Zalik, 2004; Omoweh, 2005, Ijose, 2009; Ijose, 2010); linkage with other industries (Oyejide and Adewuyi, 2011); and impact of local content policy on capability building (Bakare, 2011; Ihua, 2010). However, with the exception of Chima *et al.* (2002) and Ijose (2010) investigations on NNPC and Shell, respectively, very limited empirical attempts have examined the implication of ACAP in the acquisition of knowledge from IJVs in the Nigerian oil industry.

Scholars (Kale and Anand, 2006; Hitt *et al.*, 2000; Lyles and Salk, 1996; Lane *et al.*, 2001; Park, 2010; Dantas and Bell, 2011) who investigated IJVs in non-developed economies have established ACAP as main the constraint for knowledge acquisition through inter-organisational learning. Despite conceptualizing ACAP from individual level theories, Cohen and Levinthal (1990) and other subsequent researchers (Zahra and George, 2002; Jansen *et al.*, 2005; Todorova and Durisin, 2007) concentrated on explicating the link from firm (macro) level to outcomes in terms of capability/performance/innovation. Following similar trends, Ijose (2009, 2010) investigated the effect of institutional theory and IJVs ACAP on the absorption of foreign parent knowledge within IJVs in the Nigerian oil industry.

However, contrary to such macro perspectives are the burgeoning intellectual discourses on multilevel constructs to explain the emergence of macro-level phenomena from micro-level heterogeneity (Rousseau, 1985; Crossan *et al.*, 1999; Kozlowski and Klein, 2000; Hitt, Beamish, Jackson, and Mathieu, 2007; Ployhart and Moliterno, 2011; Chadwick and Raver, 2012). Micro-level explains the direct link from individual attributes (i.e., cognitive and behavioural) to individual performance effectiveness, while the macro-level aggregates such attributes into unit-

level resources or as proxy constructs in order to predict the effect on firm performance (Ployhart and Moliterno, 2011). Surprisingly, extant empirical study on absorptive capacity is yet to fully incorporate these contributions in their conceptualization (Nemanich *et al.,* 2010; Volberda *et al.,* 2010; Chadwick and Raver, 2012).

In spite of the lack of generally accepted operationalized construct for ACAP (Volberda *et al.,* 2010) several theoretical expositions have underscored its multidimensional nature (Zahra and George, 2002; Todorova and Durusin, 2007; Nemanich *et al.,* 2010) and multi-level antecedents (Lane *et al.,* 2006; Zhao and Anand, 2009). Zhao and Anand (2009) compared individual and collective teaching/ACAP, and found collective constructs to be more effective for transferring collective and individual knowledge from foreign partners to Chinese operations. Besides operationalizing ACAP as a unidimensional construct, Zhao and Anand's (2009) choice of a proxy measure for the individual level, is an oversimplification of its micro-foundation. While Nemanich *et al.* (2010) advanced the multilevel antecedents for the absorptive capacity multidimensional construct; they did not make any explicit attempt to explicate the effect of individual differences on the related dimensions.

Undoubtedly, clarification on the origin and nature of firm ACAP is presupposed by the clear delineation of the micro-foundation (Lane *et al.,* 2006; Abell *et al.*, 2008; Felin and Hesterly, 2007; Teece, 2007) and the implications of the social context in which the individuals are located (Volberda *et al.,* 2010). Thus, to bridge the extant gaps, this study addresses the following research problem:

**There is a lack of clear understanding on the effects of individual differences with the social context of joint project teams on multidimensional ACAP.**

## 1.4 Research Questions

- To what extent do micro-level antecedents influence the ability to (i) recognize the value of a partner's embedded knowledge and (ii) assimilate it?
- Of what significance is the social context on the multidimensional construct of ACAP?
- What is the significance of individual ability to recognize the value of partner knowledge on the ability to assimilate it?
- What is the significance of individual ability to assimilate knowledge on joint team ability to utilize it?
- Does shared cognition within the joint team mediate the effect of individual ability to assimilate knowledge on joint team ability to utilize knowledge?

## 1.5 Research Objectives

The main objective of this study is to examine inter-organisational learning within the context of joint project teams from the perspective of the capacities to acquire and utilize knowledge, i.e., ACAP. Basically the study investigates the micro-level antecedents for the ability to absorb a foreign partner's knowledge and implications of social context on the team ability to utilize foreign partner knowledge. The specific objectives are as follow:

- To clarify the effect of micro-level antecedents on the ability to (i) recognize the value of a partner's knowledge and (ii) assimilate it.
- To investigate the effects of social context on the multidimensional construct of ACAP.
- To examine the influence of individual ability to recognize the value of partner knowledge on the ability to assimilate it.
- To analyse the effect of individual ability to assimilate knowledge on joint team ability to utilize such knowledge.
- To ascertain if shared cognition mediates the effect of individual ability to assimilate partner knowledge on joint team ability to utilize knowledge.

## 1.6 Significance of Study

ACAP originates in Cohen and Levinthal's (1990) seminal research to explain a firm's incentive for learning through investment in R&D. Even though this concept has been extended to explain a firm's ability to acquire knowledge through an inter-organizational relationship particularly with competent partners (Lyles & Salk, 1996; Lane *et al.*, 2001; Zhao and Anand, 2009; Park, 2011), extant conceptualizations have not fully built on its multifaceted nature. Originally, Cohen and Levinthal (1990) drew on individual cognition and behavioral theories in explaining it as a firm-level phenomenon, however very few researches have revisited this concept. Leading scholars (Lane *et al.*, 2006; Easterby-Smith *et al.*, 2008; Volberda *et al.*, 2010; Lewin *et al.*, 2011) have canvassed for more clarification on the micro-foundational antecedents of ACAP in order to deepen understanding on its multilevel existence. This study thereby offers a conceptual and empirically validated model to explain these micro antecedents and implications of the social context. Consequently, the pertinent contributions of this study to both theory and practice are enumerated as follows.

### 1.6.1 Theoretical Contributions

Theoretically, this study advances understanding of the need for multilevel conceptualization of ACAP by situating the role of individuals in the acquisition of knowledge through joint engineering project teams. Scholars have acknowledged individual ACAP as the foundation for the firm-level construct (Cohen and Levinthal, 1990; Zahra & George, 2002). However, the exact relationship underlying this remains unclear (Volberda *et al.*, 2010). This study offers clarification by conceptualizing the relationships among the micro-level antecedents, multidimensional ACAP and social context, thereby contributing to extant theoretical understanding.

First, in an attempt to clarify the specific level for each dimension of ACAP, the individual and collective components are demarcated. The first two dimensions,

i.e., abilities to recognize the value of and assimilate foreign partner knowledge are associated with the individual, while the shared cognition and ability to utilize foreign partner knowledge are associated with the team. Aside from the validation of these dimensions, the empirical assessment also demonstrates the significance of shared cognition in the integration of individuals' abilities at the team level. Although scholars suggest the need to consider the effect of social integration mechanisms on the ability to integrate and utilize the assimilated knowledge (e.g. Zahra and George, 2002; Lane *et al.*, 2006), limited attempts have been advanced. Therefore, consistent with multilevel theory in organizational learning (Crossan *et al.*, 1999), shared cognition was established as the integration mechanism through which individual ability to assimilate knowledge is transformed into collective ability to utilize knowledge at the joint team level.

Second, this thesis aims to advance socio-psychological theory to define the predictability of the micro-level antecedents (i.e., prior experience, need for cognition, and learning and performance goal orientation) on the ACAP dimensions. As noted by Volberda *et al.* (2010) clarification of individual differences is significant to developing unambiguous understanding of the role of individuals in ACAP. Thus, the empirically validated SEM model supported prior experience and learning goal orientation as predictors of individual assimilating ability, while the ability to recognize the value of partner knowledge is underpinned by the performance approach goal orientation. Moreover the effect of need for cognition resonates on both dimensions, while the prior experience was related to the team ability to utilize knowledge.

Third, based on the extant conceptualization of ACAP in the strategic alliance literature, the social context was expressed in terms of the trust in a foreign partner and level of support (Lyles and Salk, 1996; Lane *et al.*, 2001; Park, 2010). As hypothesized, both the individual ability to recognize the value of knowledge and team ability to utilize knowledge was related to partner support, respectively. Likewise trust in partner was found to be related to both the individual ability to recognize the value of knowledge and shared cognition, respectively. Thus, the

significance of individual team members' perceptions on trust and partner support was demonstrated in predicting the associated dimensions of ACAP.

Fourth, this study contributes to knowledge management literature within the international business context, by empirically investigating the notion of ACAP in IJVs from the perspective of a developing economy. Empirical analysis of inter-organisational learning (IOL) from developed and developing economies report conflicting results (Dyer and Nobeoka, 2000). Nevertheless, most studies on IOL in developing economies (Chen and Chen, 2003; Liu, Ghauri and Sinkovics, 2010) adopt firms from developed economies as the unit of analysis, taking limited account of partners from the developing economy. Most especially, there is a general drought of empirical analyses from sub-Saharan African countries (Narteh, 2008). Apparently, in order to expand the scope of global management knowledge, more research is needed from developing economies, which will explicate the effect of contextual issues in organizational phenomena so as to deepen the understanding of international managers on the implications of relevant cross context issues (Meyer, 2007; Zhao *et al.*, 2009).

This study bridges the above gaps by demonstrating the effect of individual differences on both the individual and collective components of ACAP, as well as validating the impact of social context on the hypothesized dimensions of ACAP.

### 1.6.2 Practical Implications

Strategic alliances or joint ventures (JVs) create learning opportunities for partnering firms. Firms in developed economies mainly partner with others in an attempt to assess their specialized knowledge, while less competent firms from non-developed economies consider JVs as a platform for acquiring competent partner's knowledge (Grant and Baden-Fuller, 2004; Buckley, Glaister, Klijn, and Tan, 2009). As previously noted, the main constraint for successful acquisition in the latter's context is ACAP. Thus, given the significance of ACAP in the acquisition of capabilities, managers of less competent firms need to develop awareness on its

antecedents, in order to enhance knowledge acquisition from competent partners. This study offers some practical insights to management in the designing of joint project teams with competent partners.

Further to the collective level construct, there is an individual level perspective to ACAP (Zahra and George, 2002). This study addresses such by conceptualizing ACAP as a multidimensional construct and demonstrates the specific antecedents for each dimension. Thus, the conceptual model advances ACAP by proposing the psychological and social contexts for the pertinent dimensions of the construct. Based on the empirically validated model, practical suggestions are offered on the selection of team members and the overall design of joint project teams.

The management of local partner firms should ensure that the selected team members have related prior experience as well as possess high disposition toward thinking and learning. Learning is cumulative, and knowledge gained through prior experience could create the required foundation for further learning. Therefore, team members with related experience to the joint project should be engaged. Considering the empirical support for dual goal orientation, teams should be constituted by individuals who are both learning and performance oriented towards the task. The starting point of knowledge acquisition is the recognition of need and performance approach goal orientation propensity for short term evaluative advantage. The ability to assimilate external knowledge requires the development of deep insight, which is evident in the mastery of procedures / methods underlying the task. Thus, team members engaged in a joint project must be simultaneously driven to demonstrate performance and mastery in order to be able to recognize and assimilate partner knowledge. Equally, individuals with strong disposition towards thinking are well suited to expend the effort necessary for the acquisition of knowledge. Individuals with the above characteristics are expected to demonstrate high ability in recognizing the value of and assimilating partner's knowledge, both of which constitute individual's ACAP.

Given the significance of shared cognition on the integration of individual and team ACAP, management should ensure that the selected team members are adequately trained for engagement in collective dialogue. The focus of training programmes should be on the development of skills for effective communication and decision making through dialogue. Evidently, engineering projects involve huge interdependence and interaction among individuals, thus task performance is facilitated through integration of perspectives and consensus on appropriate solutions. Accordingly, team members' capacities for dialoguing and consensus building could be enhanced through focused training; thereby creating the appropriate climate for the integration of individual's assimilated knowledge at the collective level. Team members should also be exposed to tasks in other functional areas through job rotation in order to gain wide perspectives. Also, the right incentive should be devised to encourage networking across team and firm boundaries. In addition, the project team should be designed to accommodate formal procedures which can facilitate and guide the exchange of knowledge among team members.

With respect to the implication of social contexts in practice, the less competent partner should ensure that the contractual agreement with the competent partner explicitly state the level of support to be provided to local individual team members. Inter-personal relationships should be encouraged among team members to facilitate the building of mutual trust. Equally, management should be aware that trust extends beyond individual perceptions, thus institutional trust could be facilitated by developing sanctions, polices, and regulations to guide team members' engagement in the project.

## 1.7 Scope of Study

The study investigates the multidimensional construct of absorptive capacity (ACAP) in IJVs through the lens of inter-organisational learning in the joint upstream engineering projects in the Nigerian oil industry. Specifically, this study examines the cognitive and behavioural antecedents of the local individual team members, and the effect of the joint team social context on the multidimensional

construct of ACAP. Thus, the main unit of analysis in this study was the local individual members (managers, engineers, technicians) of joint engineering projects in the Nigerian upstream oil industry, while social context was examined in terms of their perceptions of support provided by and trust in the foreign partners.

## 1.8 Overview of the Research Methodology

This study was based on the cross-sectional survey of local individual team members of joint engineering projects in the Nigerian oil and gas industry. The survey was administered on site by the researcher between November, 2012 and February, 2013. Given the lack of dedicated database on individual team members of joint projects in the industry, two stages sampling framework based on purposive technique was employed. At the first stage, engineering firms with foreign partners were identified, while the second stage involved the selection of individual members, based on certain criteria (see Section 3.4.4).

For the analysis of data, two major statistical packages (i.e., statistical package for social sciences, SPSS and analysis of moment structures, AMOS) were employed. With the aid of SPSS preliminary analyses were conducted to generate the descriptive statistics, reliability and exploratory factors for the investigative variables. AMOS was employed in conducting the confirmatory assessments, based on which the measurement models were revised. Furthermore, the multivariate technique of structural equation modelling was also conducted with the aid of AMOS to generate the simultaneous estimation of path relationships among variables.

## 1.9 Outline of Study

The thesis consists of five chapters, as briefly described below;

The first chapter introduces the study by briefly exposing the background, context, research problem, questions and objectives, as well as the scope, findings, implications, research methodology and operational definition of terms.

The second chapter presents a comprehensive review of theoretical and empirical literature, with critical assessment of the state of art, to identify extant gaps in knowledge. Also, relevant propositions on the nature of relationships among the variables are discussed.

The third chapter examines the research process, with the development of the conceptual model, survey instruments and operationalization of constructs. In addition, the procedure for data collection and analyses are fully explored.

Chapter four reports the results of the analyses on the preliminary statistical tests, assessment and validation of models, as well as other findings of the study.

Chapter five summarizes the research process, and discusses the findings of the study, as well as concludes on the contributions, implications, and limitations, with suggestions of areas for future research and a final recap of the study.

## 1.10 Operational Definition of Terms

**Joint Project Team:** team constituted by local and foreign partners employees for the execution a of complete set of activities covering engineering design, procurement and construction of oil and gas facilities like floating, loading, storage and platform.

**Micro-Level Antecedents:** The distinct attributes (i.e., prior experience, need for cognition and learning and performance approach goal orientations) which underpin individual capability for learning new things.

**Prior Experience:** The distinctive knowledge possessed by an individual about a subject matter, which enables him or her to identify learning opportunities (Venkataraman, 1997; Shane, 2000).

**Need for Cognition:** The individual's tendency to engage in and enjoy thinking within the project domain (Cacioppo and Petty, 1982).

**Learning goal orientation:** The individual's disposition towards committing the necessary effort for the mastery of a given task (VandeWalle, 1997).

**Performance approach goal orientation:** The individual's motivation towards a task based on the opportunity to demonstrate competency (VandeWalle, 1997).

**Absorptive Capacity:** The ability of local individual members of a joint project team to recognize the value of a partner's knowledge and assimilate it, and the shared cognition underpinning the team ability to utilize such knowledge in the joint project team (Ojo, Raman, Chong, and Chong, 2014).

**Ability to Recognize Value of Knowledge:** The ability of a local individual team member engaged in the joint project to accurately assess the most valuable partner's knowledge to target for assimilation (Zahra and George, 2002).

**Ability to Assimilate Knowledge:** The ability of a local individual team member engaged in the joint project to learn, interpret and develop a deep understanding of partner's knowledge (Nemanich *et al.*, 2010).

**Shared Cognition Ability:** The mechanism through which the team reaches a common understanding of the individually acquired and embedded knowledge (Nemanich *et al.*, 2010).

**Ability to Utilize Knowledge:** The ability of the team to apply the knowledge embedded in the foreign partner practice in the execution of the joint project.

**Social Context:** The perception of local individual team members of the trustworthiness of foreign partner's employees and the level of support provided by partner in the course of project execution.

**Partner Support:** The perception of local individual team members of the extent of support provided by the foreign partner in the course of project execution.

**Trust in Partner:** The perception of local individual team members of the trustworthiness of foreign partner individual team members in the course of project execution.

## 1.11 Summary of the Chapter

This chapter introduced the study with a brief description of the background and context, i.e., the Nigerian upstream oil industry. It provided a brief exposition of pertinent literature and identified the gaps, and presented them in the statement of the problem, which was further expressed as questions with corresponding objectives. Thereafter, the significances of the study to both theory and practice were discussed. The latter sub-sections of this chapter considered the scope of study, overview of research methodology, study outline, and the operational definition of terms used in the research.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 Introduction

The review of literature considers the theoretical and empirical studies, pertinent to the main concepts underlying the proposed study. First, this chapter reviews the origin of absorptive capacity, and its extant status in organisational studies. Second, scholarly discourses on the micro-foundational antecedents are presented. The next subsection discusses the implications of the social context, followed by a detailed exposition of the multidimensional ACAP construct.

### 2.2 Expositions on Absorptive Capacity

#### 2.2.1 Origin of Absorptive Capacity

Following a series of Cohen and Levinthal (1989 and 1990) established the concept of absorptive capacity. In the 1989 paper, they introduced ACAP as another explanatory factor, thereby advancing the traditional economic theory, which posits market level constructs like industry appropriability, technology opportunity and demand conditions as determinants of firm's investment in R&D. The novelty of this proposition emanates in the conceptualization of a firm's ability to recognize the value of external knowledge, and assimilate and commercially utilize it, as the main incentive for learning, which in turn leads to the firm's performance or innovation. Thus, by investing in R&D, a firm generates two values: new knowledge (traditional purpose) and ability to assimilate and exploit externally available knowledge (Cohen and Levinthal, 1990).

According to Cohen and Levinthal (1990) there is a dynamic relationship between a firm's choice to invest in learning and capability growth through R&D engagement. As a result, they considered a firm's intensity of investment in R&D activities as the proxy for absorptive capacity, in their empirical analysis aimed at relating the knowledge underpinning technological change with absorptive capacity. Findings revealed that when the targeted external knowledge is closely related to firm activities, absorptive capacity could be a side-effect of the firm's investment in R&D. However, in the absence of this condition, R&D investment might not have any significant impact on absorptive capacity. Fundamentally, firm investment in R&D generates learning capability for absorbing externally related knowledge (i.e. absorptive capacity).

The main theoretical ground for their propositions originates from individual cognitive and behavioural theories by relating memory development to absorptive capacity. "Research on memory development suggests that accumulated prior knowledge increases both the ability to put new knowledge into memory, what we would refer to as the acquisition of knowledge, and the ability to recall and use it" (Cohen and Levinthal, 1990:129).

As above, there is a path dependent relationship between an individual's prior learning and subsequent performance. Specifically, a firm's ability to recognize and acquire external knowledge is a function of prior related experience. March and Simon (1958) emphasize that firms rarely invent but mostly borrow innovation from external sources, while the main pre-condition for acquiring and utilizing knowledge from external sources is the extent to which these relate to employees' prior knowledge (in Cohen and Levinthal, 1990). Invariably, firm absorptive capacity can be traced to the individual members, but not necessarily the direct addition of individuals' absorptive capacity. "At the most elemental level, this prior knowledge includes basic skills or even a shared language but may also include knowledge of the most recent scientific or technological developments in a given field" (Cohen and Levinthal, 1990: 128).

Furthermore, they contend that effective absorptive capacity does not strictly depend on prior knowledge, but also on the intensity of effort. The level and extent of knowledge held by employees is critical, while the construct is appropriately expressed by demarcating the components distinct to each organisational level (Cohen and Levinthal, 1990). To this end, a firm's absorptive capacity extends beyond the absorption of external knowledge, but also incorporates the ability to exploit it. At the absorption stage, external knowledge is brought into an organisation through the individuals that interface with the external source, while the exploitation of such knowledge depends on its diffusion, which is farther from the initial entry location (Cohen and Levinthal, 1990). Thus, two factors are critical to the construct of absorptive capacity; (i) the communication systems at the interfaces between the firm and its external knowledge source, which could also be across the firm's subunits (ii) the specialized actors at these interfaces (Cohen and Levinthal, 1990).

In spite of the detailed exposition on the individual level origin of absorptive capacity, Cohen and Levinthal (1990) progressed to measure the construct as a firm level phenomenon, while subsequent studies motivated by their work have implicitly assumed the individual as homogeneous and malleable (see Felin and Hesterley, 2007; Lewin *et al.*, 2011; Pandza and Thorpe, 2009; Easterby-Smith *et al.*, 2009). Not surprisingly, most of the subsequent attempts to advance the role, effect and process of absorptive capacity have been at the organisational level (Jansen *et al.*, 2005; Lichtenthaler, 2009; Zahra and George, 2002; Todorova and Durisin, 2007). Another issue is the use of proxy construct in representing ACAP. Mowery and colleagues acknowledge the low explanatory power of such a proxy construct - wherein R&D intensity only relates to the input, but overlooks the ensuing change in capability (Mowery et al., 1996). Basically, such perspective overemphasizes knowledge content at the expense of the processes underlying a firm's ability to exploit the knowledge in innovation as well as develop new capabilities and competences.

**Table 2.1:** Origin and Evolution of ACAP

**ACAP – R&D**

**Relational Capability**

Lyles and Salk (1996): organisational characteristics, structural mechanisms and contextual issues influence learning capacity and IJV performance.

Lane and Lubatkin (1998): extent of similarities in knowledge, organisational structural and dominant logic on acquisition/performance.

Dyer and Singh (1998): like Lane/Lubatkin, but emphasizes bi-directional learning

Others: Lane et al. (2001); Inkpen, (2008); Zhao and Anand, (2009); Benson and Ziedonis, (2009)

**Dynamic Capability**

Van d. Bosch et al. (1999): knowledge base / external factors triggers adaption / learning, & are constrained by efficiency, scope / flexibility.

Zahra/George (2002): organisational efficiency is the ratio of potential capacity (acquire/assimilate) to realized capacity (transform/exploit), with social integration mechanisms linking effect.

Others: Matuski *et al.* (2005); Jansen *et al.* (2005); Jones, (2006); Lane *et al.* (2006); Todorova and Durisin (2007); Lichtenthaler (2009); Easterby-Smith *et al.* (2008); Nemanich *et al.* (2010); Silva and Davis, (2011)

**Integrating Perspective**

Ojo *et al.* (2014)

Basically, extant studies on absorptive capacity have emerged from two perspectives (see Table 2.1). First, Lane and Lubatkin's (1998) notion of relative absorptive capacity underscores the inter-organisational processes that facilitate a firm's ability to recognize and acquire knowledge within a collaborative network. The other perspectives based on dynamic capability emphasize the organisational routines and processes which facilitate the absorption and integration of new knowledge (Zahra and George, 2002). The subsequent sub-sections explicate further on the concept of absorptive capacity, with emphasis on its evolution and present status in contemporary scholarly discourse.

### 2.2.2 Re-conceptualizations of Absorptive Capacity

Based on Thomson ISI (Institute for Scientific Information) citations count, the two most influential contributions subsequent to Cohen and Levinthal's concept of ACAP are Lane and Lubatkin (1998) and Zahra and George (2002) (Lane *et al.*, 2006). The former's proposition on relative absorptive capacity offers an explanation outside the R&D context by theorizing on the inter-organisational processes that underlie a firm's ability to recognize and acquire knowledge within a collaborative network. Due to the time differential between learning and the resultant effect of putting it into practice what would be learned, firms might be discouraged to build knowledge or capability through internally directed R&D (Dierickx and Cool, 1989). Perhaps, the cost structure for internal R&D might limit firms, most especially from developing markets, in pursuing the R&D option; rather, inter-organisational relationships with competent partners could aid in fast tracking capability development (Grant and Baden-Fuller, 1995).

Therefore, in an attempt to understand how a firm's capability evolves, Lane and Lubatkin (1998) conceptualized learning in a strategic alliance from Cohen and Levinthal's notion of absorptive capacity. However, the core of their proposition is the learning context, which should not necessarily be measured in terms of R&D spending. They hypothesized "relative absorptive capacity", which is a firm's ability to learn from another. This depends on how similar both firms are in terms of their

"underlying knowledge, organisational structure, and dominant logics" (Lane and Lubatkin, 1998:461). Based on 69 R&D alliances involving pharmaceutical and biotechnology firms, they empirically validated the existence of relative absorptive capacity. Findings suggest the need for a firm to be fully aware of its knowledge bases, and the processes underlying their conversion to capabilities as well as the capacity of such capabilities to meet the external demands for knowledge. Nonetheless, they did not account for how such processes are expressed within the firm boundary.

Van den Bosch *et al.* (1999) corroborate that Cohen and Levinthal's notion of the co-evolutionary link between absorptive capacity and learning is mediated by the context in which the firm operates and how the firm copes with it. Thus, absorptive capacity evolves through a dynamic process, whereby an increase in firm's a knowledge base or even changes in the external environment could trigger the adaption of existing knowledge or learning of new things. Furthermore, the interaction between learning new things and exploiting what has been learned is constrained by efficiency, scope, and flexibility. In a stable environment, the latter is presupposed by high efficiency, but low scope and flexibility, while a turbulent environment enact the exploration of new things, with reverse factors magnitude (Van den Bosch *et al.*, 1999). Thus, their proposition on dynamic capability reinforces March's (1991) notion on knowledge exploration and exploitation.

Zahra and George (2002) integrated three commonly cited conceptual frames (Cohen and Levinthal, 1990; Mowery and Oxley, 1995; Kim *et al.*, 1998) on absorptive capacity to theoretically establish how dynamic capability, which is embedded in organisational routines and processes influences a firm's ability to acquire, assimilate, transform and apply external knowledge. Specifically, they suggest ability to transform knowledge as an additional dimension to Cohen and Levinthal's initial concept and re-categorize the construct into potential capacity (ability to recognize and assimilate external knowledge) and realized capacity (ability to transform and exploit external knowledge). The main logic underlying their proposition is that an organisation needs to first acquire and assimilate external

knowledge before effort could be concentrated towards the exploitation of such knowledge.

Contrary to the dominant unidimensional construct, Zahra and George (2002) championed the multidimensional perspective on absorptive capacity. They defined "efficiency factor" has the ratio of realized absorptive capacity to that of potential absorptive capacity, with values ranging between zero and one. Consequently, the two components are impacted by different sets of antecedents', and the successful firm level outcome is dependent on the complementary relationship between these components. By considering knowledge transfer across units within a large financial service firm, Jansen *et al.* (2005) empirically validated Zahra and George's model. Jansen *et al.* (2005) found that coordination capabilities like cross-functional interfaces, job rotation, and participation positively impact potential absorptive capacity, while socialization capabilities (connectedness and socialization) are associated with realized absolute capacity. Likewise, Zahra and George's model has motivated other influential contributors (Lane *et al.*, 2006; Lichtenthaler, 2009; Todorova and Durisin, 2007).

Based on rigorous analysis of 289 peer reviewed journal articles on absorptive capacity, Lane *et.al* (2006) clearly argued for the reification of absorptive capacity. According to them, most intellectual discourses on the construct lack clear articulation of the underlying assumptions and relationships. Specifically, 78% of the reviewed papers made just passing reference to Cohen and Levinthal's construct, and of the remaining 22%, only four (i.e., Dyer and Singh, 1998; Lane and Lubatkin, 1998; Van den Bosch *et al.*, 1999; Zahra and George, 2002) contributed to advancing it (Lane *et al.*, 2006). As earlier noted, Lane and Lubatkin (1998) extended the construct outside the R&D context, and proposed relative absorptive capacity to capture how partners' similarities facilitate the absorption of knowledge in inter-firm relationships. Dyer and Singh (1998) put forward a similar proposition, but unlike Lane and Lubatkin's one-way learning (i.e. teacher to student), they argue for bi-directional learning. The former's notion is more relevant in the context of

partnership motivated by the need to access a partner's skills, assets or attributes. The other two scholarly contributions have been previously examined in this section.

Consequent on in depth analysis, with emphasis on Cohen and Levinthal's initial construct, Lane *et al.* (2006) identified five main limiting assumptions prevalent in extant literatures (see Table 2.2).

**Table 2.2:** Assumptions Limiting Progress of ACAP Research (Lane et al., 2006)

- Absorptive capacity is relevant to only R&D related context.
- Firms develop absorptive capacity in response to the existence of valuable external knowledge.
- Relevant prior knowledge equals absorptive capacity.
- A firm's competitive advantage is based on Ricardian[a] rents rather than efficiency rents.
- Absorptive capacity resides in firm level only.

In an attempt to invigorate the construct, Lane *et al.* (2006) implore researchers to de-emphasize the narrow R&D context and external determinant. Also, ACAP should be exposed to consider the role of individuals in addition to prior relevant knowledge. Accordingly, empirical investigations should not only focus on the knowledge content, but encompass the processes underlying the evolution and exploitation of ACAP (Lane *et al.*, 2006). Putting these together, they re-conceptualized absorptive capacity as a multidimensional construct made up of exploratory, transformative and exploitive learning processes.

Todorova and Durisin (2007) acknowledged the need for a multidimensional view of absorptive capacity, but challenged Zahra and George's notion on realized and potential capacity. Responding to Lane and colleagues' (2006) argument on reification and call to revisit the original dimensions of absorptive capacity, they describe Zahra and George's model as a confusing and incomplete extension of Cohen and Levinthal's concept. Thus, based on a careful re-examination of the former's model, from the latter's original concept as well as extant empirical

literature, they suggested and clarified three issues which Zahra and George (2002) failed to capture.

Drawing from learning theory and in support of Cohen and Levinthal's initial construct, they reinstated the ability to recognize the value of external knowledge as the first dimension. Also, the demarcation between potential and realized dimensions was eliminated by considering a firm's ability to transform external knowledge as another expression for assimilation, which is relevant in the condition where the target external knowledge is not related to a firm's existing knowledge base. Secondly, they argued that the impact of social integration extends beyond knowledge transformation to other components of absorptive capacity. Likewise, they introduced "power relationship" as another factor with influence on the exploration and exploitation of external knowledge. The most significant contribution is the explication on the dynamics and complexity of absorptive capacity by arguing its evolutionary path, which Zahra and George's model could not capture (Todorova and Durusim, 2007).

Notwithstanding Todorova and Durusin's (2007) critique, Zahra and George's model has continued to influence enquiries on the absorptive capacity construct (Lichtenthaler, 2009; Silva and Davis, 2011). Focusing on the outcomes of absorptive capacity, Lichtenthaler (2009) incorporated Zahra and George's model with Lane and colleague's (2006) contributions on learning processes. Further empirical study on 175 medium and large industrial firms in Germany, revealed that environmental turbulence in terms of technological and market knowledge moderate the interaction between absorptive capacity and organizational performance in developing new products.

Expectedly, scholars have advanced the multidimensional components of absorptive capacity (Zahra and George, 2002; Jansen *et al.*, 2005; Todorova and Durusin, 2007) and established how these link with specific learning processes (Lane *et al.*, 2006; Lichtenthelar, 2009). However, only few empirical studies have considered ACAP dimension(s) associated with a specific level; rather the collective

level has been over-emphasized at the expense of the micro-foundational antecedents (Lane *et al.*, 2006; Volberda *et al.*, 2010; Lewin *et al.*, 2011).

Thus, consistent with Cohen and Levinthal's original concept, this study considers absorptive capacity as a four dimensional construct of individual abilities to recognize the value of knowledge and assimilate it, and team shared cognition and ability to utilize the knowledge. Based on extant contributions (Zahra and George, 2002; Lane *et al.*, 2006; Todorova and Durusin, 2007), the first two dimensions constitute knowledge absorption, dominant at the individual level, while the last two consider the collective ability to integrate individually assimilated knowledge in order to enable collective performance through knowledge utilization. Table 2.3 summarizes some of the extant scholarly conceptualizations of ACAP.

**Table 2.3:** Overview of Extant Conceptualization of ACAP

| Study | Theoretical Background | Empirical Outcome |
|---|---|---|
| Mowery *et al.* (1996) | Antecedents for transfer of technological capabilities in strategic alliances. | Equity JV enhances transfer; ACAP impacts extent of transfer. |
| Lyles and Salk (1996) | Antecedents/consequences of knowledge acquisition from foreign partners. | Acquisition of managerial knowledge impacts performance; employees' ACAP impact extent of acquisition/performance; cultural conflicts moderate such effects. |
| Lane and Lubatkin (1998) | Relative ACAP promotes inter-firm learning. | Learning is facilitated by extent of similarities in knowledge base, incentive practices/organisational structure. |
| Lane *et al.* (2001) | Trust, learning structure, strategy/ training competencies impact on ACAP dimensions (ability to understand, assimilate & apply) to explain learning / performance in IJV. | Ability to understand impacts learning, collective assimilation enhances ability to apply to generate performance; trust/support facilitates performance. |

**Table 2.3:** Overview of Extant Conceptualization of ACAP (…Continued)

| Study | Theoretical Background | Empirical Outcome |
|---|---|---|
| Anh *et al.* (2006) | ACAP influence knowledge acquisition/ performance. | Training, individuals' ability & joint participation influence acquisition; acquisition impacts performance. |
| Park *et al.* (2008) | Antecedents for acquisition of management skill from foreign partners. | Foreign support critical for the learning of tacit management knowledge. |
| Zhao and Anand (2009) | Multilevel perspective to knowledge transfer and corresponding effect of absorptive/teaching capacity. | As compared to individual, collective level absorptive/teaching capacity more significant for the transfer of individual/collective knowledge. |
| Nemanich *et al.* (2010) | Identified specific level of organisation associated to each dimension of ACAP within R&D project team. | Individual ability to recognize the value of external knowledge is related to ability to assimilate it; individual/collective ability to assimilate knowledge impact on collective utilization capability, with social context moderating the effect. |
| Silva and Davis (2011) | Micro-level antecedents for knowledge absorption contextual issues moderate effect on outcome. | Suggest pertinent propositions on the relationships among ACAP and individual differences. |
| Kankanhalli *et al.* (2012) | Learning has individual cognitive & situated cognitive dimensions. | Individual differences impact learning effectiveness; social context moderates the effects. |

The next section examines extant literature on the antecedents of absorptive capacity with a focus on its micro-foundation and the implications of the social context.

## 2.3 Antecedents of Absorptive Capacity

As demonstrated by Roussea (1985), most organisational phenomena are multilevel, yet the dominance of single level conceptualizations subsist (Ployhart and Moliterno, 2011; Chadwick and Raver, 2012). Micro level studies support the direct

link from individual attributes (i.e., cognitive and behavioural) to individual performance, while macro level scholars aggregate such attributes into unit-level resources or as proxy construct in order to predict firm performance (Ployhart and Moliterno, 2011). Although conceptualized as multilevel, however aligning with single level tradition, Cohen and Levinthal advanced to empirical investigation based on the macro-level. Expectedly, subsequent studies have adhered to a macro-level perspective without attempting to unravel the underlying micro level antecedents (Lane *et al.*, 2006). Not surprisingly, recent scholarly discourse (Volberda *et al.*, 2010) associates advancement of the absorptive capacity construct, on a multilevel conceptualization, which will entail situating the role of individual within the macro level.

In pushing for multilevel conceptualization of organisational outcomes, Roberts *et al.* (1978 in Hitt *et al.*, 2007) postulated that the underlying predictors for criterion variance are likely to be related across levels. Invariably, each level of analysis is associated with a specific dimension, while the aggregate dimension across levels may be linked through a common criterion variance. Consequently, studies have investigated organisational performance, by examining the simultaneous effects of industry level factors and firm level actions (see Ruefli and Wiggins, 2003; Bou and Satorra, 2007). Also, the effects of collective and individual related attributes on firm level outcomes have been investigated (Bommer, Dierdorff, and Rubin, 2007; Marrone, Tesluk, and Carson, 2007; Ployhart and Moliterno, 2011; Chadwick and Raver, 2012).

To fully explicate the role of an individual within an organisational unit, it is imperative to consider earlier theoretical contributions on the growth of the firm. Although, absorptive capacity has advanced understanding on the impact of prior related external knowledge in organisational learning, the significance of the knowledge construct can be traced to the evolutionary perspective of the firm, as championed by Penrose (1959). Penrose (1959) argues that the neo-classical economic approach to the firm is not adequate in understanding the growth of the firm in the real world. Thus, her book "*Theory of the Growth of the Firm",* suggests

that a firm's growth is the outcome of interaction between resources (human and non-human) and the services they convey.

Penrose specifically traced the growth of firms to the ability of a particular group of individuals, a management team to perceive and act. In essence, the managerial antecedent for a firm's capability lies in matching the external opportunities with accessible resources. This has equally motivated contemporary thoughts on sustainable competitive advantage as typified by the resource based view (RBV) (Barney, 1991) and dynamic capability view of the firm (Teece and Pisano, 1994). For instance, RBV argues that firm performance is the outcome of proficiency in developing or making resources valuable within the firm. However, by aggregating employees' attributes as firm resources, the firm assumes the collective mechanism for shaping outcomes.

Explicating on Penrose's proposition, Garnsey (1998: 537) argues that "Growth is limited by the rate at which new members can be assimilated, acquire experience in the firm and learn to solve problems together effectively". Thus, individuals are not merely resources possessed by the firm; they are the enabler of the process for the firm's transformation. Earlier research on innovation acknowledged the role of an individual in learning from internal sources. Proponents of innovation theory (Nelson and Winter, 1977; Allen, 1977), contend that a firm's R&D expenditure can be considered as investment in building employees' capability to search for internal technological and organisational knowledge.

Indeed, Cohen and Levinthal (1990) built on a similar premise, by considering absorptive capacity as a multilevel construct, which originates from the individual level and manifests across the organisational level. An excerpt from their argument perfectly captures this multilevel perspective, as stated in Table 2.3.

**Table 2.4:** Cohen and Levinthal's (1990) Multi-level Perspective on ACAP

| |
|---|
| Research shows that firms that conduct their own R&D are better able to use externally available information…other work suggests that absorptive capacity may also be developed as a by-product of a firm's manufacturing operations… Firms also invest in absorptive capacity directly, as when they send personnel for advanced technical training. (p.129) |

Zhao and Anand (2009) explored knowledge transfer from the multilevel perspective of individual and collective constructs. Empirical enquiry on the transfer of engineering capabilities from multinationals to their local partners in the Chinese automotive industry established collective teaching activity and absorptive capacity as more effective compared to the individual construct in the transfer of both collective and individual knowledge (Zhao and Anand, 2009). Although, they did advance the multilevel perspective on absorptive capacity, the premise for their findings is limited due to the proxy construct of individual absorptive capacity, as well as lack of clear boundaries across the different components of absorptive capacity, which suggests that the issue of knowledge content has been overemphasized at the expense of the processes underlying its utilization.

To underscore the imperativeness of multilevel conceptualization, scholarship on macro-level phenomena (Abell *et al.*, 2008; Felin, Foss, Heimeriks, and Madsen, 2012; Teece, 2007) acknowledges that such phenomena emerge from lower level psychological and behavioural mechanisms. To this end, they contend that successful attempt to clarify the origin and effect of macro level phenomena like absorptive capacity will emanate from the clear delineation of the micro-foundational antecedents. Thus, the next section examines the micro-level antecedents of absorptive capacity.

### 2.3.1 Micro Level Antecedents of Absorptive Capacity

At the individual level, the concept of absorptive capacity is aptly captured from the individual learning perspective (Van den Bosch, Van Wijk and Volberda,

2003), with knowledge related activities of acquisition, assimilation and utilization as essential components of learning (Edmondson, 1999; Savelsbergh, Van der Heijden and Poell, 2009). One of the most profound contributions to organisational studies is the realization that absorptive capacity facilitates learning; the new knowledge acquired through learning builds on initial absorptive capacity (Cohen and Levinthal, 1990; Van den Bosch *et al.*, 1999). Organisational knowledge can be embedded in people, routines, processes, tasks or tools; likewise, it can also be located within the sub-networks of people, tasks and tools. Further, people's ability in adapting knowledge across different context is exceptional and unique (Argote, Ingram, Levine and Moreland, 2000). Thus, the individuals and the nature of their engagement are central to the transformation of firms.

As Cohen and Levinthal (1990) noted, absorptive capacity originates at the individual level and evolves across the organisational level. Theorizing on an individual level, Abell *et al.* (2008) critique attempts attributing organisational phenomena (i.e., competitive advantage) to firm level constructs like organisational routines and capabilities; while implicitly assuming that individual members are homogeneous. Rather, individual differences influence organisational choice, interaction, learning and adaption (Jones, 2006; Argote, 1999; Felin *et al.*, 2012; Pandza and Thorpe, 2009; Easterby-Smith *et al.*, 2008).

Evidently, organisations learn through the individual members (Cohen and Levinthal, 1990; Simon, 1991; Crossan *et al.*, 1999). Theorists on learning psychology (Ackerman, 1996; Lubinski, 2000; Schmitt, Cortina, Ingerick, and Wiechmann, 2003) suggest behavioural and cognitive perspectives for learning at the individual level. The former relates to individual willingness to perform a given task and encapsulates motivational attributes; while the latter entails ability, which is the potential for task performance (Vroom, 1967). Exploring the distinction between them, Vroom (1967:199) emphasizes that "[an individual's] ability to perform a task refers to the degree to which he possesses all of the psychological attributes necessary for a high level of performance excluding those of a motivational nature".

Studies have explicated the effect of individual ability, motivation and opportunity on absorptive capacity (Argote, McEvily and Reagans, 2003; Minbaeva *et al.*, 2003). Also, scholars (Delaney and Huselid, 1996; Appelbaum *et al.*, 2000) have adopted ability, motivation and opportunity as mediating variables in testing the link between human resources (HR) practices and performance. Equally, knowledge sharing behaviour has been empirically established to be influenced by personality traits like conscientiousness and openness (Cabrera, Collins and Salgado, 2006; Wang and Yang, 2007; Matzler *et al.*, 2008) as well as goal orientation (Swift, Balkin, and Matusik, 2010). Studies on individual creativity have confirmed the effect of individual attributes on the ability to generate creative ideas/new knowledge, which in turn leads to innovation (Amabile, 1983, 1996; 2012; Feist, 1999; Oldham and Cummings, 1996; Silva and Davies, 2011; Kankanhalli *et al.*, 2012).

Amabile (1983) componential theory of creativity argues that individual creativity is the integration of psychological and social components. Accordingly, four main components are identified as domain-relevant skills, creativity-relevant processes, intrinsic motivation and social context. The first three components are psychological and dominant at the individual level with impact on creativity performance. Domain-relevant skills reflect the possession of expertise, knowledge and technical skills related to a specific domain, while creativity-relevant processes relate to thinking ability, which depends on an individual's cognitive style and personality. Intrinsic motivation is expressed through individuals' disposition towards the task, which is essentially the willingness to do something based on interest and internal drive, without any external compulsion (Amabile, 1996). The social context exerts higher level impact on the effect of such individual level attributes by enabling innovative performance (Amabile, 2012).

Extending the creativity and innovation link, Amabile (1988) describes innovation as the organisational outcome of successful execution of creative ideas that originate at the individual level. In clarifying the distinction between creativity and innovation, Axtell *et al.* (2001) argue that the former is an individual outcome,

while the latter encapsulates the organisational capability that facilitates the integration of individual's efforts. Evidently, Such conceptualization of creative capacity shares strong affinity with absorptive capacity as posited by Cohen and Levinthal (1990): "We argue that problem solving and learning capabilities are so similar that there is little reason to differentiate their modes of development, although exactly what is learned may differ: learning capabilities involve the development of the capacity to assimilate existing knowledge, while problem-solving skills represent a capacity to create new knowledge" (Cohen and Levinthal, 1990:130).

Indeed, both are facilitated through related preconditions and developmental process; either can be used in predicting innovation outcome (Amabile, 1996; Silva and Davies, 2011). Amabile (1996:1) noted that "successful innovation depends on other factors, as well, and it can stem not only from creative ideas that originate within the organisation but also from ideas that originate elsewhere (as in technology transfer)". However, despite the close affinity, very limited attempts have been made to advance one from the other's perspective (Silva and Davies, 2011).

Drawing on the analogous nature of creative capacity and absorptive capacity, Silva and Davies (2011) extend Zahra and George's (2002) model on absorptive capacity to theorize the link between a researcher's attributes and productivity in terms of research publications. Based on Zahra and George (2002), an individual's ability to recognize and assimilate external knowledge constitutes potential absorptive capacity, which is similar to creative performance. Realized absorptive capacity captures ability to transform and exploit such knowledge, which is closely related to innovative performance, as defined by Amabile (1983, 1988, and 1996). Although, Silva and Davies (2011) hypothesized the effect of individual attributes on individual level outcomes in terms of productivity, nevertheless, Amabile originally considers individual heterogeneity as a predictor of creative performance, while organisational level attributes account for innovative performance (Amabile, 2012).

### 2.3.2 Implications of Social Context on Absorptive Capacity

From a broader perspective, the context in which the alliance operates also exerts significant impact on partners' perceptions of the learning opportunities and outcomes (Beamish, 1985; Lyles and Salk, 1996; Beamish and Berdrow, 2003; Park, 2010). At the industry level, Beamish (1985) found that the characteristics of IJVs are influenced by the external environment in which they are located. Also, Lyles and Salk (1996) demonstrated the impact of contextual and structural antecedents on the IJVs' acquisition of knowledge from foreign partners. Generally, studies have underscored the imperativeness of social context in advancing empirical study on workplace learning (Lane *et al.*, 2001; Liu, 2011; Bryans and Smith, 2000; Korte, 2007).

With respect to IJVs in developing countries, Tsang (1999) attests to the existence of differential learning intention. While the foreign partner interest is on gaining access to and learning about the local market, the local partner is driven to acquire the former's embedded knowledge. Thus, knowledge acquisition could be constrained, due to divergence of interest, wherein in a bid to secure access to the local market, the foreign partner intentionally prevents the actual transfer of technological capabilities or knowledge to the local firms. Kale and Anand (2006) case study on MNCs in India revealed that most IJVs in developing countries are sustained through regulatory restrictions. Otherwise, the MNCs quickly opt out as soon as market knowledge is acquired from the local firms, except when there are other complementarity resources, like combinative capabilities (Van den Bosch et al., 1999; Jansen et al., 2005).

The competent partners from developed economies possess knowledge in the form of capability, which could be acquired by the local firm through interactive learning (Lane and Lubatkin, 1998). According to von Krogh, Roos and Slocum, (1994) the acquisition of the underlying knowledge is conditioned on socialization among members who engage in sharing experience and prior learning. This is because such knowledge is tacit, rare, costly, difficult to imitate, complex and

socially embedded in practice (Szulanski, 1996). Invariably, IJVs offer platform for inter-organisational learning through interaction, wherein both the learner and teacher are directly engaged in activities. By grafting (i.e. attaching external personnel to work with partner's employees) highly competent individuals from the partners, the employees of the less competent partners can access the knowledge embedded in the former (Huber, 1991; Lyles and Salk, 1996). Thus, considering the lowest unit of engagement as the joint project team, the expertise of the embedded expatriates from the foreign partner is accessible to the local team members through formal or informal interaction.

The joint project team is basically an organisational unit, through which employees from two or more firms relate and collaborate on given task. Strategic alliance literature suggests two main types of mechanisms for coordinating joint activities (Gulati, 1995; Doz, 1996; Uzzi, 1997; Das and Teng, 2002; Faems, Janssens, Madhok, and Van Looy, 2008). Structural mechanisms are a set of complex and clearly defined legally binding agreements between two or more parties, while relational mechanisms consider how collaborative processes evolve over time and transactions (Doz, 1996; Faems *et al.*, 2008; Dhanaraj et al., 2004). In realization of the effect of these mechanisms on learning (Doz, 1996; Das and Teng, 2002), a more integrated view has been advanced (Faems *et al.*, 2008). Accordingly, this study considers the structural mechanism in terms of the level of support provided by the foreign partner and the relational mechanism in terms of local partner's perception of trust in foreign partner. The associated hypotheses are discussed in Chapter 3 (see Section 3.3.2d).

## 2.4 Multidimensional Components of Absorptive Capacity

Zahra and George (2002) proponents of the macro-level perspective, acknowledge that there is an individual level of analysis for absorptive capacity. According to them in order to clarify and delineate this, research would need to isolate the specific level and the associated dimension. As previously noted,

absorptive capacity is synonymous to learning at the individual level (Van den Bosch *et al.*, 2003). At the individual level, learning encompasses self-started, directed and knowledge related activities geared towards enhancing knowledge, skills, capability and routines, which in turn impact organisational performance (Edmondson, 1999; Savelsbergh *et al.*, 2009).

Sun and Anderson (2010) described ACAP as a mode of organisational learning which is pertinent to understand the link from the firm to external knowledge sources. Absorptive capacity emphasizes the cumulative effect of learning wherein prior knowledge influences the ability to learn new things; as a result firms tend to exploit what has already been learned. On the other hand, as a dynamic capability, absorptive capacity can explain the drive towards learning new things. Firms might recognize the value of external knowledge, which is not closely related to its accumulated knowledge, thereby spurring the path to change (Sun and Anderson, 2010). Thus, in an attempt to gain strategic renewal, absorptive capacity can assist the firm to maintain the tension between exploration and exploitation. Also, building on the dynamic capability perspective, the main outcome of organisational learning could be identified as strategic renewal (Crossan *et al.*, 1999).

According to Crossan *et al.* (1999) organisational learning takes place across three levels (organisation, group, and individual) with the *4I's* (intuiting, interpreting, integrating and institutionalizing) as the processes through which these levels are linked together. Crossan *et al.* (1999) argue that individuals learn through intuition which enables the ability to recognize patterns related to prior experience. The learning process of interpreting cuts across individual and group levels through the creation of mental maps to connect and articulate disparity knowledge components. Thus, the processes of intuiting and interpreting presuppose learning at the individual level, and through the interactions among individuals the processes of interpreting and integrating are enacted at the group level. Furthermore, what has been learned at the lower levels could be routinized at the organisational level through the processes of integrating and instituting.

The core of Crossan and colleague*'s* (1999) model is the dynamic process underlying organisational learning. At one end is the feed forward, which entails the interpreting and integrating processes while the other end is the feedback, wherein institutionalized learning is collectively utilized through the integration of individuals' action. In practice, there is a tension between the feed forward and feedback processes. Through the latter, learning is initiated with the flow of knowledge, concepts and actions from the individual to the group to the organisation levels. This involves the shift from an individual's cognitive map to integrative shared understanding among group members; communicative ability essentially facilitates the explication and sharing of individual mental models. In addition, the generation of shared understanding encompasses experiential learning whereby individuals directly engaged in practice and learn by sharing the actions with others (Crossan *et al.*, 1999).

As the name suggests, the feedback process entails the stepping back of organisational institutionalized learning to an individual's intuitive domain of deliberation and actions (Crossan *et al.*, 1999). Therefore, an incumbent firm might exhibit substantial institutionalized learning with tension becoming dominant at the interface between the intuiting and instituting processes. The former underscores exploration for new things, concepts and ideas; while the latter enacts the routinization and exploitation of what has already been brought into the organisational context (Crossan *et al.*, 1999). In tandem with the theoretical premise for absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002), such tension delineates two components. Based on individual cognitive ability and intensity of effort, external knowledge is acquired and assimilated (feed forward), while the supportive structure is facilitator of the collective ability to utilize assimilated knowledge (feedback).

Recent literature (Nemanich *et al.*, 2010; Kankanhalli *et al.*, 2012) has adapted the multilevel perspective in attempts to understand the situated nature of learning. Nemanich *et al.* (2010) developed and validated a model to capture the multidimensional construct of absorptive capacity in an R&D project team. The

dimensions were identified as evaluate, assimilate, apply and shared cognition, with the specification of the associated level for each of the dimensions. The first two are dominant at the individual level. Ability to exactly recognize the most valuable knowledge to target for assimilation captures the capability to evaluate knowledge. Ability to assimilate is conveyed through an individual's ability to learn and acquire in-depth understanding of knowledge (Nemanich *et al.,* 2010). Further to the *4Is* model of organisational learning (Crossan *et al.,* 1999) collective assimilation through shared cognitive capability is posited as the mediator between individual and collective abilities to assimilate and utilize knowledge, respectively. In sum, the current proposition on ACAP differentiates individual ability to assimilate knowledge from the collective assimilating ability (i.e. shared cognition).

## 2.5 Summary of the Chapter

This chapter reviews earlier and extant conceptualizations of ACAP in attempts to clarify its micro-level antecedents and contextual effects. ACAP originates in Cohen and Levinthal's (1990) seminal as outcome of industry level factors, which motivate firm's learning through investment in R&D. Although it has been extended as firm's capability to acquire and exploit partner's knowledge through inter-organizational relationship (Lyles & Salk, 1996; Lane/Lubatskin, 1998; Lane *et al.*, 2001; Zhao and Anand, 2009; Park, 2011), yet its multifaceted nature has been under investigated. Specifically, contrary to the original notion, extant attempts have posited organisational & dyadic antecedents, thereby assuming individual homogeneity (Abell *et al.,* 2008; Volberda *et al.,* 2010; Felin *et al.,* 2012). Thus, based on the review of pertinent literature, this chapter posits the relationships among individual antecedents, social context of their engagements, i.e. joint project team and multidimensional ACAP.

Consistent with the original notion of ACAP, theories are synthesized from conceptually related constructs to explain the relationships of micro-level antecedents, multidimensional ACAP and social context. Cohen and Levinthal

(1990) original proposition leverages conceptually related concepts like creative capacity and organisational learning, thereby, justifying the present conceptualization. Also, the similarity between creative capacity and absorptive capacity bears on the multilevel existence of both phenomena. Like the former, proponents of the latter have argued for the need to specify the appropriate level for each of its dimensions (Cohen and Levinthal, 1990; Lane and Lubtakin, 1999; Zahra and George, 2002). Relatedly, Crossan *et al.* (1999) *4Is* model of learning delineates learning across organisational levels with the learning processes of intuiting, interpreting, integrating and instituting as the interfacing links. However, empirically directed investigations remain scarce (Nemanich *et al.*, 2010), while theoretical expositions (Silva and Davies, 2011) are single-level focused.

Specifically, drawing on the socio-psychological theories of creativity and organisational learning, as well as strategic alliance literature, the current study conceptualizes the psychological and social antecedents of ACAP. The psychological antecedents constitute individual differences in prior experience, need for cognition, learning and performance approach goal orientations that predict the ability to recognize the value of and assimilate external knowledge. The social context is expressed in terms of perceptions of foreign partner support and trust in the foreign partner, and is hypothesized to influence the relevant dimensions of the ACAP construct. The theoretical framework, associated hypotheses and conceptual model are further explored in Chapter 3 (see Sections 3.2 and 3.3).

# CHAPTER 3

## RESEARCH METHODOLOGY

### 3.1 Introduction

The research process underlying this study consists of eight (8) stages, as shown in Figure 3.1. This process is described in this section highlighting the activities involved stages in 3 to 7. The first stage is problem identification, which has been examined in chapter one of this study. The literature review constituted in stage 2, as detailed in the second chapter. Further to the review of literature, the stage 3 consists of the theoretical framework as discussed in Section 3.2, and the hypothesized relationships as explicated in the sub-Section 3.2.1 of this Chapter. This chapter also involves the development of the conceptual framework and model. Table 3.1 (see pg. 72) captures the pertinent research question corresponding to each of the hypothesized relationship. Stage 4 is the research design, and Stage 5 includes the operationalization of constructs, development of the survey instrument, instrument pre-test, and sampling technique. The fieldwork was performed in stage 6, which included the data collection strategy and administration of the final instrument. The techniques for data analyses were determined in stage 7. The final stage, 8, involves the presentation of findings and discussion, as considered in Chapter 4 and 5, respectively.

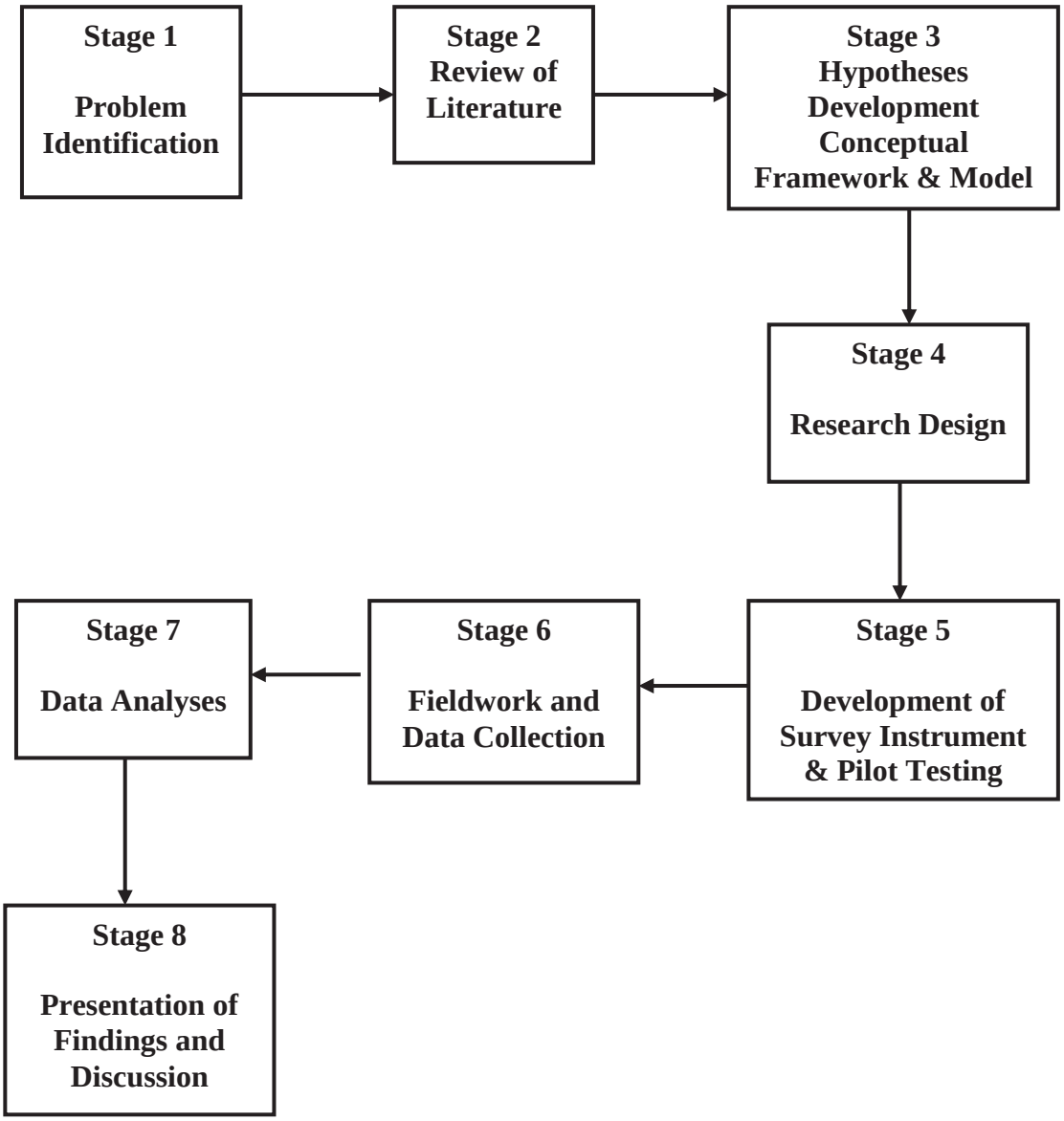


**Figure 3.1:** Research Process for the Study

## 3.2 Theoretical Framework

Researchers (Zahra and George, 2002; Abell *et al.*, 2008; Felin and Hesterly, 2007; Volberda *et al.*, 2010) suggest that clarification of the origin and role of ACAP depends on the clear delineation of the micro-foundational antecedents and contextual effects at the macro-level. Zahra and George (2002) delineate ACAP into potential and realized components, corresponding to individual and collective levels, respectively. Apparently, individuals act as gatekeepers by interfacing with external knowledge source and bringing in valuable knowledge into the firm. However, the diffusion of such knowledge evolves through collective utilization, which leads to performance/innovation at the firm level. Despite this, due to the complexity involved in developing empirically grounded analysis, the construct has consistently been investigated as a single level phenomenon. Thus, in an attempt to clarify the multilevel antecedents for the multidimensional construct of ACAP, this study considers concepts sharing close theoretical affinity to ACAP, as adduced by Cohen and Levinthal (1990).

One of the most profound models to delineate interaction among different levels of analysis is the organisational learning 4I's framework by Crossan *et al.* (1999). Both ACAP and organisational learning are mechanisms through which organisations maintain strategic renewal (Sun and Anderson, 2010). Consistent with Cohen and Levinthal (1990), Crossan *et al.* (1999) considered an organisation beyond the simple sum of individual members; rather it encompasses institutionalized non-human elements (i.e., processes, routines, rules, structure, etc.).

Pertinent to the dynamic mode of learning is the need to account for the role of the individual within the given context. To this end, Kozlowski and Klein (2000) postulate organisational learning as multilevel phenomenon, wherein the higher level outcome like firm performance/innovation is generated through the interaction of lower level phenomena, like cognition, behaviour, affect and other related individual level characteristics. However, rather than limiting learning to individuals' minds, this study examines individual learning within a joint engineering project by

theorizing the locus for the learning foreign partner's knowledge from local individual members' behavioural and cognitive abilities. Ruiz-Mercader *et al.* (2006) assert that capability building in knowledge intensive activities like engineering projects cannot be dissociated from learning at the individual level. Basically, value creation in an engineering project emanates from the integration and application of individually embedded specialized knowledge within and across workgroups (Grant, 1996; Tsoukas, 1996).

Studies on creativity explain the impact of individual differences on creative ability to assess new knowledge, which in turn leads to innovation (Amabile, 1983; Axtell et al., 2001; Oldham and Cummings, 1996; Silva and Davies, 2011). Amabile (1983) conceptualizes individual creativity as the integration of psychological (i.e., domain relevant skills, cognitive relevant processes and task motivation) and social context. Psychological components are individuals' attributes, which influence creative performance, while the social context exerts higher level impact on the effect of these attributes, thereby facilitating innovative performance. In clarifying the distinction between creativity and innovation, Axtell *et al.* (2001) argue that the former is individual driven, while the latter encapsulates the organisational capability that facilitates the integration of individual effort. Following Cohen and Levinthal's (1990) proposition, both creative capacity and ACAP share conceptual affinity and are facilitated through related preconditions and developmental processes. The former relates to problem solving skills, while ACAP captures the capability to learn new things, nevertheless either can predict innovation outcome (Silva and Davies, 2011).

Accordingly, by extending the theoretical notion of creative capacity to ACAP, this study advances micro-level attributes from the original antecedents of ACAP, i.e. prior experience and intensity of effort. Specifically, by synthesizing pertinent literature, as detailed in the review of literature, prior experience, need for cognition, learning and performance goal orientations are considered as predictors of the ability to recognize and assimilate new knowledge. The implications of the social context in terms of partner support and trust in a partner are purported for the

multidimensional ACAP construct. The ensuing conceptual model explicates the recent scholarly discourse (see Volberda *et al.,* 2010), which suggest a multilevel perspective to explain the origin of absorptive capacity by situating individual efforts within a defined organisational unit.

Basically, employees, who have acquired related knowledge, like those embedded with foreign partners, are more likely to have good awareness on valuable knowledge to target for assimilation. Also, the disposition of individuals towards learning new things could influence the eagerness to put in the necessary effort; while motivation towards task performance could influence the demonstration of competence. Cognitive disposition might influence the benefit that can be derived from the effort committed into searching for new knowledge. Furthermore, by interfacing with the foreign partner, individuals can access new sources of knowledge, and their abilities to recognize and assimilate this knowledge are predicted on the above identified attributes in addition to social context, expressed as their perception on the extent of support provided by partners and their trustworthiness. The diffusion of this knowledge is premised on the creation of shared understanding among the individuals, while its usefulness to the project is conditioned on the collective ability to utilize.

Consequent on the 4Is learning processes, the ability for developing shared understanding is considered at the team level. This is enacted through the interpreting and integrating processes (Crossan *et al.,* 1999). Rogers (1976) postulates a two-step flow process wherein the absorption of external knowledge through boundary spanners depends on cognitive abilities, while influencing skills determine the spread of such knowledge across the organisation. Thus, unlike individual's ability to assimilate, collective assimilation depends on situated cognition, which facilitates shared understanding necessary for the integration of individually acquired and assimilated knowledge (Argote *et al.,* 2000). The process of interpreting entails the creation of shared understanding among individuals within a group, thereby minimizing ambiguities associated with their respective cognitive maps (Crossan *et al.,* 1999). Through the mechanism of social interpretation, knowledge learned by

individuals is expected to be transmitted to the team level (Edmondson, Dillon, and Roloff, 2007).

By synthesizing extant contributions in absorptive capacity (Zahra and George, 2002; Lane *et al.,* 2006; Nemanich *et al.,* 2010; Silva and Davies, 2011), individual creativity (Amabile, 1983), organisational learning (Crossan *et al.,* 1999) and strategic alliance (Lane *et al.,* 2001), the theoretical framework explains the joint team's ability to utilize partner knowledge from the micro-level antecedents of the ability to recognize the value of knowledge and assimilate knowledge, as well as the social context of the team. The underlying hypothesized relationships are discussed in the subsequent Section.

## 3.3 Hypotheses Development

### 3.3.1 Prior Experience

Cohen and Levinthal (1990) identify prior related knowledge and intensity of effort as the main antecedents of absorptive capacity. Analogously, in an attempt to explain consensus assessment of creativity, Amabile (1996) postulates that an individual's ability to recognize and accept an idea or product as creative (valuable) emanates from his/her prior engagement within the domain. "For example, if solutions to business problems are going to be assessed on creativity, it would be inappropriate to ask school-teachers or artists to make those assessments ... The guiding assumption is that, in recognizing creativity in a particular domain, people who actually work in that domain know best" (Amabile, 1996:4).

Relatedly, Cohen and Levinthal (1990) contend that prior relevant knowledge influences the ability to understand and value external knowledge. On this, Lane and Lubatkin posit, "Simply put, a chemistry scholar may not be able to appreciate advances in biotechnology without first having an understanding of basic biological sciences" (1998: 464). In essence, the effect of prior knowledge on firm absorptive

capacity builds on individual memory and learning. Similarly, Amabile (1996) describes domain relevant skills, as the expression of an individual's memory for expert knowledge, technical adeptness, and other specialized skills, as one of the components of creative performance. Earlier empirical work on the effect of memory found that individual ability to store and recall information is influenced by the level of prior knowledge in related areas (Anderson, Farrell, and Sauers, 1984; Barfield, 1986; Wickens, Gordon, and Liu, 1997).

Research on associative networks postulates on knowledge associative structure wherein knowledge exists in a semantic network and each section of the network is made up of associated bits of information (Anderson, 1976; Norman and Rumelhart, 1975 cited in Silva and Davies, 2011). As a result, an individual is able to recognize and internalize external information that is related to those already stored in his/her memory. Wickens, Gordon and Liu (1997) corroborate that access to information stored in memory is influenced by the extent or level of association that can be made. Cohen and Levinthal (1990) emphasize the cumulative impact of learning, whereby an individual's earlier learning influences the ability to learn new things.

Certainly, prior experience has a corresponding effect on the locus and extent of search for external knowledge (Lane *et al.*, 2006). For example scholarship on consumer behaviour (see Alba and Hutchinson; 1987; Rao and Sieben; 1992) attest that an individual's experience accumulates as knowledge in the memory, which in turn affects the ability to recognize related external information. Van Riel and Lievens (2004) found that experienced marketing researchers possess higher capability to interpret and assimilate emerging market trend and incorporate such into the design of new offerings. Considering an individual's ability to use information technology (IT), Seeley and Targett (1999) found that an individual's knowledge in a given task diminishes as he/she engages less in updating his/her knowledge about the task. Regarding individual level absorptive capacity, Silva and Davies (2011) hypothesize that the extent of researchers' exposure to others ideas will have a positive effect on their productivity.

Studies have investigated the effect of individual heterogeneity (in terms of experience and ability) on knowledge acquisition (Deng *et al.*, 2008; Park, 2010). For example, Deng *et al*. (2008) examined the effect of prior experience on the link between individual engineers' engagement in IT related works and innovation. Based on a sample of 208 engineers, they found that prior engagement in task, IT, and problem solving positively affect innovation and productivity. Empirical study on the performance determinant of IJVs in Korea (Park, 2010) confirmed employees' international experience as a predictor of managerial knowledge acquisition.

Premised on the above, it can be argued that prior experience can directly impact memory development and thereby influence the ability to recognize and assimilate new knowledge. As noted by Crossan *et al*. (1999), individuals with expert intuition will be able to recognize learning that is within their existing frame of reference. Through intuition, individuals are able to learn new things or recognize the value of external knowledge by associating it with prior stored patterns/concepts (Sun and Anderson, 2010). Thus, employees from local partners with relevant and varied knowledge will possess expert intuitive ability and are more likely to recognize the value of and internalize the new knowledge brought into the joint project by the foreign partner. Thus the following hypotheses are suggested:

H1a: Prior experience is related to the individual ability to recognize the value of foreign partner knowledge in a joint project team.

H1b: Prior experience is related to the individual ability to assimilate foreign partner knowledge in a joint project team.

### 3.3.2 Need for Cognition

Like Cohen and Levinthal's (1990) notion about the need to complement prior experience with the intensity of effort, Amabile (1996) contends that the possession of domain expertise is a precondition for creativity, but not sufficient to generate creative ideas in the absence of appropriate cognitive processes and intrinsic motivation for the task. "Finally, if he is productively creative, his work style is probably marked by an ability to concentrate effort for long periods of time

(Campbell, 1960; Hogarth, 1980) and an ability to abandon unproductive strategies, temporarily putting aside stubborn problems" (Amabile, 1996:5).

Basically, cognitive relevant processes integrate individual cognitive style and personality traits as measures of thinking ability (Amabile, 1983). Amabile (1996) argues that personality traits constitute some of the variation in individual cognitive disposition, as expressed in terms of "independent will, self-discipline, risk-taking behaviour, tolerance for ambiguity, perseverance in the midst of adversity, and even relative apathy for social approval". Also, personality traits have been empirically demonstrated as determinant of individual disposition like goal orientation (Harris, Mowen, and Brown, 2005).

Cacioppo and Petty (1982) suggest the need for cognition (NFC) in an attempt to unravel how cognitive action emerges from individual traits. NFC is closely related to cognitive style (Claxton and McIntyre, 1994) as an explanation of the effect of an individual's cognitive skills on the process of knowledge acquisition. NFC captures "people's tendency to engage in and enjoy thinking" (Cacioppo and Petty, 1982:130). It predicts the behavioural pattern underlying an individual's action, as he/she engages in a task or social context. An analytic review of related literature shows that individuals with higher need for cognition are more likely to be drawn towards expending effort on knowledge acquisition, reasoning, and problem solving (Cacioppo, Petty, Feinstein, and Jarvis, 1996).

Glaser, Chi, and Farr (1988) argue that individual differences in cognitive ability determine how they recognize and handle information and experience. Theorizing on individual creativity in an organisational setting, Oldham and Cummings (1996) emphasize the role of human agents in generating novel and useful ideas regarding the work process. Indeed, individuals show varying ability in their initiatives to identify, locate and access the knowledge, expertise and experience required for the performance of a given task (Bateman and Crant, 1993). Tullet (1996) confirmed that the effectiveness of managerial antecedents for productivity is dependent on thinking style and ability.

Task performance in knowledge intensive activities like engineering projects requires systematic thinking, which enables individuals to recognize the relevant methods/procedures relevant to solving challenges; and intuitive thinking, which facilitates the integration of diverse sources of knowledge (Deng *et al.,* 2008). The latter encompasses individual reasoning mechanisms, which enables the generation of creative ideas through associative thinking. Reasoning itself is an element of individual creative skills, which can facilitate the capacity for developing systematic and intuitive frames for assessing the value of new knowledge in a given task (Deng *et al.,* 2008).

Empirical enquiries have confirmed the positive relationship between individual differences in cognition and academic performance (Bors, Vigneau and Lalande, 2006; Verplanken, Hazenberg and Palenewen, 1992) as well as information search (Curseu, 2011; Das, Echambadi, McCardle, and Luckett, 2003). The effect of thinking ability on creativity is evident in enabling problem solving skills, and learning capability is facilitated by similar preconditions and developmental processes such as problem solving (Cohen and Levinthal, 1990). However, learning capability is relevant to the acquisition of existing knowledge, while problem solving encapsulates the creation of new knowledge (Cohen and Levinthal, 1990; Nonaka, 1994).

Evidently, individuals possess varying aptitude to reconfigure patterns and modify the mental models for constructing new understanding of the knowledge acquired from external sources (Chen and Edgington, 2005). Accordingly, an individual's need for cognition (i.e., disposition towards thinking) can impact the ability to acquire and assimilate external knowledge. Thus, the following hypotheses are suggested:

H2a: Need for cognition is related to the individual ability to recognize the value of a foreign partner's knowledge in a joint project team.

H2b: Need for cognition is related to the individual ability to assimilate a foreign partner's knowledge in a joint project team.

### 3.3.3 Learning and Performance Approach Goal Orientation

Further to the effect of cognitive disposition on learning capability, scholarship in educational psychology suggests achievement goal motivation as a salient determinant of students' learning disposition (Eison, 1981; Nicholls, 1975; Dweck, 1996). Dweck's (1996) notion regarding achievement goal theory posits that individuals are driven to demonstrate ability for achieving a task based on their motivational disposition. Two major types of motivational disposition are identified as learning and performance approach goal orientation (Dweck, 1996). Learning oriented individuals perceive ability as dynamic, which can be improved on through concerted effort. Thus, the learning context offers opportunity to acquire knowledge (Payne, Youngcourt, and Beaubien, 2007) that is beyond just meeting basic performance requirements (Dweck, 2002). While learning oriented individuals are motivated by the mastery of skills embedded in the learning context, performance oriented individuals are ego-driven and concerned with demonstrating their competency (Nicholls, 1975; Kankanhalli *et al.*, 2012; Rogers and Spitzmueller, 2009).

Amabile (1983) suggests intrinsic task motivation as facilitating an individual's willingness and extent of effort towards carrying out tasks related to the generation of new ideas. Taggar (2002) indicates that intrinsically motivated individuals are persistent, even in the face of challenging and difficult task. Major *et al*. (2006) found proactive personality to be more significant in predicting individual's motivation to learn, as compared to the basic Big Five personality factors (findings consistent with Hough and Schneider's, 1996). Psychologists have widely acknowledged extraversion, emotional stability, agreeableness, conscientiousness and openness to experience as the five main factors underlying personality attributes (Digman, 1990; Barrick and Mount, 1991). Furthermore, proactive individuals are task motivated and perceive learning context as an opportunity to acquire new knowledge (Payne *et al.,* 2007) as well as enhance ability beyond just meeting basic performance requirements (Dweck, 2002). Broadly speaking, individual commitment towards generating new ideas is parallel to

motivation to learn, which invariably is the orientation towards learning (Kankanhalli *et al.*, 2012; Silva and Davies, 2011).

Learning goal orientation is the strong tendency towards improving one's competence by developing new skills and taking up challenging tasks (Bell and Kozlowski, 2002; Nonaka, 1994). According to Shuell (1992) the role of individuals in learning within a context can vary between passive and active engagement. Active learners perceive learning as their responsibility and are willing to commit everything necessary in order to improve their knowledge base (Shuell, 1992). By taking learning as a personal responsibility, an individual inclination is towards acquiring new knowledge underlying the development of competence (Hansen, 1999). In the course of engagement within a project context, proactive minded individuals are well disposed and attentive to others' experience, as well as understanding and interpretation of given concepts (Ayas, 1998; Hansen, 1999). They are willing to contribute an appreciable amount of resources in terms of time and effort, so as to keep abreast of development, track changing market demands and technological opportunities, and connect with external networks (Howell and Shea, 2001; Laursen and Salter, 2006).

Therefore, through active engagement in locating knowledge from across the learning context, an individual is more likely to uncover new things. Brett and VandeWalle (1999) found individuals' learning goal orientation to be positively related to openness towards experiencing new things. Individual's learning goal orientation impact on self-efficacy, which in turn affects the willingness to put in extra effort (Ames and Archer, 1988). According to Jerusalem and Schwarzer (1992) self-efficacy is an optimistic self-belief, which enables one to perform difficult tasks or cope with adversity. Empirical research on absorptive capacity within the R&D domain (Howell and Shea, 2001) confirmed that individual effort in the search process positively influences the identification of valuable external knowledge. Yeh (2008) investigation of engineers within middle management, confirmed that self-initiated learning is an antecedent of a manager's performance.

Based on high learning goal orientation, an individual can be resolute in the midst of a challenging task by committing every resource and being ready to try complex learning and knowledge processing mechanisms. Gray and Meister (2004) attest that such individuals have a tendency put in the necessary effort in order to achieve the task goals. Other empirical work found individuals' disposition towards learning as a predictor of individuals' learning effectiveness (Kankanhalli *et al.*, 2012; Gray and Meister, 2004; Laursen and Salter, 2006; Yeh, 2008). In essence, the orientation of local individual members of the joint team towards learning is likely to influence their ability to recognize the value of a foreign partner's knowledge and also assimilate such knowledge.

On the contrary, performance-oriented individuals are mainly driven by the need to prove their ability in a given task. These individuals perceive ability is fixed and the main precondition for engaging in a task is the opportunity to demonstrate competence, and therefore avoid the task when lack of competence can be noticed (Dweck, 1996; Elliot and Harackiewicz, 1996). VandeWalle et al. (2001) assert that they are driven to ensure positive assessment of existing ability, rather than developing competency for a task. The motivation is external to the task, i.e., conditioned on proving performance, therefore perception of achievement comes from gaining favourable assessment of ability, rather than building new competence for the task. According to Ames and Archer (1988) their dispositions towards a task follow the maladaptive patterns of behaviour - perception of inadequacy result in the avoidance of challenging and complex tasks when there is high possibility of failure (Dweck, 1991; Ziegler, Schober, and Dresel, 2005). They are primarily driven by the opportunity to prove competency, and consider the need for more effort as an indication of low ability. Thus, rather than commit effort towards gaining in-depth task knowledge, their disposition would be toward demonstrating existing ability on a given task.

Generally, studies on classroom achievement, have found performance approach goal orientation to be associated with negative affective, cognitive, and behavioral patterns (Button, Mathieu, & Zajac, 1996; VandeWalle, Cron, & Slocum,

2001). However, it has also been found to have positive impact on effort (Sujan, Weitz, & Kumar, 1994; Lopez, 1999), achievement (Elliot, 1999; Harackiewicz, Barron & Elliot, 1998), and task value (Church, Elliot & Gable, 2001; Bong, 2001). These contrasting findings could be associated with differences in study contexts, and the conceptualization of PO as either a one or two dimensional construct. An empirical study concluded that findings on the effects of psychological constructs on a student sample should not necessarily be generalized to employed adults (Ward, 1993). Midgley, Kaplan & Middleton (2001) questioned the need for such demarcation, arguing that both are associated with maladaptive outcomes. On the contrary, Harackiewicz and colleagues (2002) cited some inconsistency in Midgley and colleagues conceptualization, thereby justifying the adaptive outcome, when the performance approach dimension is investigated. Accordingly, they reiterated the need for clear distinction between both in order to build logical, scientific, theoretical, and empirically validated studies.

Given the context of the present study, i.e., project teams, individuals would not be able to avoid assigned tasks even when they lack the competencies, thus only the effect of performance approach goal orientation on individuals' ACAP is hypothesized. With respect to engagement in an engineering project, individuals with a high score in performance approach goal orientation might be motivated to demonstrate their competencies, but reluctant to commit effort towards a time consuming task. Thus, access to new knowledge could be perceived as opportunity to demonstrate competencies over others. Dweck (1986) contends that learning oriented individuals might exhibit performance disposition in order to prove smartness when engaged in a competitive environment. Indeed, an engineering project is complex, knowledge intensive and requires high level of task interdependence, thus the individual member's confidence in his/her ability could motivate him/her to learn new things in order to be seen by others as being smart.

The ability to recognize the value of new knowledge encompasses the identification of the most valuable knowledge to target for assimilation (Nemanich et al., 2010). Thus, approach-oriented individuals are likely to demonstrate greater

ability to recognize the value of new knowledge. These individuals are motivated to demonstrate their abilities, when others perceive them to be competent (Brett and VandeWalle, 1999). Therefore, in an attempt to demonstrate the relatedness between their existing abilities and the knowledge embedded in the projects, approach individuals could uncover related knowledge. According to Button et al. (1996), they are driven by task involving meeting performance standards, schedules and deadlines wherein outcomes relative to others can be assessed. Such individuals are ego-centric and can be motivated to show the fit between their abilities and task engagement, thereby creating awareness on related task embedded knowledge. These individuals are driven to demonstrate ability by trying to look more competent than others (Brett and VandeWalle, 1999).

Contrarily, the ability to assimilate knowledge requires potential for in-depth understanding (Nemanich et al., 2010), which might require commitment. Thus, rather than to commit effort towards gaining in-depth task knowledge, approach-oriented individuals' disposition would tend towards demonstrating the similarity between extant ability and given tasks. VandeWalle *et al.* (2001) posit that these individuals perceive ability as fixed and are driven to ensure positive assessment of existing ability rather than developing competency for a task. The motivation is external to the task, i.e., conditioned on proving performance, therefore, perception of achievement comes from gaining favourable assessment on ability rather than building new competence for the task. Therefore, their perceptions of lack of competencies in a given task could constrain the commitment of effort necessary to gain mastery of the task. Based on the above, the following hypotheses are suggested:

H3a: Learning goal orientation is positively related to the individual ability to recognize the value of foreign partner knowledge in a joint project team.

H3b: Learning goal orientation is positively related to the individual ability to assimilate a foreign partner's knowledge in a joint project team.

H4a: Performance approach goal orientation is positively related to the individual ability to recognize the value of a foreign partner's knowledge for a joint project team.

H4b: Performance approach goal orientation is negatively related to the individual ability to assimilate a foreign partner's knowledge in a joint project team.

By extending the conceptual affinity and theoretical notion of creative capacity with respect to ACAP, prior experience, need for cognition, learning and performance approach goal orientations are proposed as micro-level predictors of individual dimension of absorptive capacity (i.e., ability to recognize and assimilate new knowledge). The next sub-Section examines the implications of the social context in terms of partner support and trust in partner on multidimensional ACAP.

### 3.3.4 Social Context: Partner Support and Trust in Partner

Learning from a joint team projects relies on local team members gaining access to the partner's knowledge through the working relationship. Therefore, the extent of the collaboration is an important determinant of the outcome (Inkpen and Tsang, 2008). Given the tacit nature of the underlying knowledge, the foreign team members need to be actively engaged in order for the local employees to be able to gain exposure to their knowledge base thereby facilitating the team's ability to adapt knowledge. Thus, the need for firm level mechanisms in the allocation of tasks, responsibilities, authority and decisions in a strategic alliance is inevitable (Child, 1984). At the formal level, both formalization and centralization mechanisms have proven relevant as the platform through which knowledge can be organised and processed (Lane and Lubatkin, 1998). A recent case study (Inkpen, 2008) on knowledge transfer from Toyota to GM, through the NUMMI IJV, confirmed that a firm can capitalize on a well-structured organizational process for the transfer of socially embedded knowledge between organizational boundaries.

The strength of social ties between partners can be quantified in terms of the support and effort the foreign partners commit into the joint project (Kale, Singh and Perlmutter, 2000; Uzzi and Lancaster, 2003). Through socialization, they provide adequate support to their local partners, thereby enabling effective management of the joint project as well as enhance the capability of the latter to understand the

knowledge embedded in their practice (Kale et al., 2000; Dyer and Nobeoka, 2000). Dhanaraj, Lyles, Steensma, and Tihanyi (2004) assert that as interactions deepen between partners the collaboration becomes seamless. Therefore, through active engagement in the project the expatriates from the foreign partner could support the local employees to acquire related understanding on their practices and tools, which in turn enable the collective application of the knowledge.

Also, Inkpen's (2008) case study on the alliance between GM and Toyota demonstrated the significance of support provided by the teaching partner on the learner's ability to appreciate the value of the new knowledge, as well as the realization of its benefit. According to Inkpen (2008) the disconnection of NUMMI's initially grafted managers, contributed to GM's earlier inability to appreciate the value of Toyota Production Systems (TPS). Rather than facilitating the appreciation of TPS and emergence of shared understanding around it, these managers were so detached that they had limited impact on members' mental model and logic. Therefore, through active engagement and concerted effort of the project team, the grafted foreign team members could facilitate local members' abilities for recognizing the value of their embedded knowledge, as well as collective capabilities for realizing its benefit.

Unlike IJVs in developed economies, those in developing economies lack the capability to leverage the learning opportunities offered by the alliance (Hitt *et al.*, 2000), most especially when collaborating on knowledge intensive project like engineering, which involve highly embedded and tacit knowledge. Thus the need to adapt and disseminate acquired knowledge internally is imperative for value creation (Cohen and Levinthal, 1990; Lane et al., 2001). Considering the diversity among the collaborating partners, the acquisition and direct utilization of knowledge is only feasible in the presence of relevant support mechanisms (Park, 2010; Lane et al., 2001; Hitt *et al.*, 2000). IJVs scholars (Lane *et al.*, 2001; Lyles and Salk, 1996) have demonstrated the provision of training and technological assistance by foreign partners as the support mechanisms relevant in fostering close interaction within joint

ventures, thereby facilitating the transfer of foreign partner knowledge to local partners (Dhanaraj *et al.*, 2004).

Basically, the application of acquired knowledge depends on the creation of the system to ensure its institutionalization. The newly acquired knowledge is easily institutionalized when the transferor becomes actively engaged in supporting the acquirer to adapt it within the specific context (Steensma and Lyles, 2000). Kasuga (2003) asserts the positive effect of foreign partner support on extent of the knowledge acquired by the local partner. Through their support, the foreign partners can enhance the ACAP of the local partners for the acquisition of knowledge (Lyles and Salk, 1996; Park, 2010).

Thus, the following hypotheses are put forward to examine the effect of individual's perception on foreign partner support on the ability to recognize the value of knowledge as well as the on the team's ability to utilize knowledge.

H5a: Individual perception of foreign partner support is positively related to individual ability to recognize the value of foreign knowledge in a joint project team.

H5b: Individual perception of foreign partner support is positively related to team ability to utilize foreign knowledge in a joint project team.

According to Uzzi (1997:43) trust is the "belief that an exchange partner would not act in self-interest at another's expense". Although, the terms of collaboration, as well as partners' expectations and responsibilities could be defined in the contractual agreement for the joint project, several unexpected situations might emerge. Such occurrence could be mitigated through trust, wherein partners demonstrate mutual commitment towards solving the underlying problem (Uzzi, 1997). Rather than being constrained by the agreement, trust bridges the gaps between partners and enables knowledge acquisition through the creation of shared understanding and reduction of the associated cost (Dyer and Nobeoka, 2000). Based on trust, partners could restrain from capitalizing on others deficiencies (Steensma and Lyles, 2000). Lane *et al*. (2001) described trust as the mechanism for social

control as well as minimizing the associated risk, with resultant positive effect on partner's acquisition of knowledge from others.

Certainly, the significance of trust cannot be overemphasized, most especially in joint projects involving partners from different cultural backgrounds. As earlier noted, partners' perceptions of the learning outcomes are asymmetric, asides the barriers of cultural differences, diversity, and proximity gaps. Although studies have considered several barriers to knowledge acquisition, adequate consideration should also be placed on the role of trust in facilitating collaboration. For inter-firm collaboration in R&D, Husted and Michailova (2009) argue that the socialization tactics governing the work process can condition individuals' engagement in the knowledge process. Individuals engaged in a collaborative knowledge intensive project like engineering are confronted with dual allegiance to their parent firm and collaboration team (Husted and Michailova, 2009). Thus, individuals' engagement in the knowledge process could be constrained by the social mechanisms through which their decisions and behaviours in the joint projects are enacted.

Dyer and Nobeoka (2000) acknowledge the role of trust in facilitating shared understanding between foreign and local partners. At the inception of collaboration, the involved parties are likely to be apprehensive, faced with uncertainty and inability to gauge the partner's intentions, thereby preventing the realization of learning opportunities. However, as interaction deepens with time, partners get to know more about the others and shift towards relationship building. According to Inkpen (2008) the GM managers were able to develop awareness of the value of and realized the benefit of the alliance knowledge, after ascertaining the commitment of their NUMMI alliance partner, Toyota. Another noticeable change was the creation of common understanding among the members on the collective integration and application of embedded knowledge. Accordingly, the learning disposition and corresponding capabilities for Toyota's knowledge diffused to the entire team, thereby TPS became part of other members shared experience.

As revealed from the NUMMI case study, the level of trust that is reposed in the partner could impact both the individual's ability to understand the value of partner's knowledge, as well as the collective ability to apply it. Tsai and Ghoshal (1998) had earlier realized the importance of social ties among organisation members in facilitating 'strategic linking capability' to support the transfer of knowledge. The ensuing linkage can be attributed to the network effect, which is created within a social context when individuals attain that level of trust which motivates them to interact, engage and share experience or meaning with others (Pastor, Meindl, and Mayo, 2002). In essence, trust is an essential ingredient for consensus building through which individuals converge in their understanding of a given concept based on the mental model shared with others.

Based on the above, a relationship is hypothesized between local individuals' perceptions of trust in the foreign team members and their abilities to recognize the value of the latter's knowledge. Also, another hypothesis is put forward regarding such perceptions and the team's shared cognition, which is the ability for collective understanding of foreign partners' knowledge.

H6a: Individual perception of trust in a foreign partner is positively related to individual ability to recognize the value of foreign partner knowledge in a joint project team.

H6b: Individual perception of trust in a foreign partner is positively related to the shared cognition in a joint project team.

### 3.3.5 Multidimensional ACAP

Cohen and Levinthal's (1990) original construct of absorptive capacity associated individuals with the role of absorbing knowledge from external sources. On this they argued that a "firm's absorptive capacity depends on the individuals who stand at the interface of either the firm and the external environment or at the interface between subunits within the firm" (1990: 132). From the perspective of information processing theory, every team member does not necessarily need to possess high competence in recognizing and assimilating external knowledge (Cohen

and Levinthal, 1990). Rather, a few individuals, called gatekeepers, stay at the interface between internal processes and the external knowledge sources'.

According to Todorova and Durisin (2007), the ability to recognize the value of external knowledge is the precursor for the extent to which an individual will develop the pertinent cognitive map for assimilation (Huber, 1991). With the aid of such a map, an individual is more likely to incline his/her knowledge search effort to the areas that are most valuable to the project (Tripsas and Gavetti, 2000) thereby making assimilation easier. An individual who is competent in evaluating the value of new knowledge is expected to have substantial ability for assimilating such knowledge in that his/her attention will be directed towards assimilating the specific valuable knowledge (Lettl *et al.*, 2008). Recent empirical investigation on US-based research teams, found that members ability to evaluate external knowledge is a predictor of the ability to assimilate the knowledge (Nemanich *et al.*, 2010). Thus, it is hypothesized that;

H7: Individual ability to recognize the value of foreign partner knowledge is positively related to individual ability to assimilate the knowledge in a joint project team.

Consistent with Cohen and Levinthal (1990), Crossan *et al.* (1999) considered an organisation beyond the simple sum of individual members. It encompasses institutionalized non-human elements (i.e., processes, routines, rules, structure, etc.). By integrating both, Sun and Anderson (2010) developed a model, which relates specific learning capability to each dimension of absorptive capacity, while the socio-psychological processes of learning exert influence through firm level mechanisms. Thus, pertinent to the dynamic mode of learning is the need to account for individuals' roles within the context (Volberda *et al.*, 2010). To this end, Kozlowski and Klein (2000) postulate organisational learning as a multilevel phenomenon wherein the higher level outcome in terms of firm performance/innovation is emergent on the lower level antecedents, which are expressed as cognition, behaviour and affect or other related individual level characteristics.

On the demarcation between potential and realized absorptive capacity, Zahra and George (2002) argue that an organisation will only be able to exploit the knowledge that has been absorbed. The extent of the knowledge absorbed can be expressed in terms of valuable knowledge, which an individual has already acquired and assimilated.

Consequently, a multilevel relationship is suggested to link the ability to assimilate knowledge to the capability to utilize knowledge thereby involving the complex transition from individually assimilated knowledge to collectively utilized knowledge. From Crossan *et al*. (1999), individuals with significant knowledge assimilation capability have higher intuitive skills and are more likely to engage in collective interpretation processes. Also, group learning scholars (Laughlin, 1978; McGrath and Kravitz, 1982) suggest that the aggregation of individually embedded knowledge is a necessary precondition for team effectiveness in a knowledge intensive work domain, especially when creativity and problem solving skills are required. Lane *et al*. (2006) assert that the degree of knowledge assimilated by individuals is likely to impact team outcomes in knowledge utilization.

This study aligns with Lane and colleague's (2001) proposition on the positive effect of the extent of knowledge assimilated on the capability to utilize knowledge in enhancing IJV's performance. Accordingly, the team offers the platform for facilitating the identification, retrieval and exploitation of individually-embedded knowledge. Thus a positive relationship is predicted between an individual's ability to assimilate knowledge and the capability to collectively utilize the knowledge at the joint team level. Individuals' knowledge assimilation capability is a dynamic process which influences team knowledge utilization capability (Nemanich *et al.*, 2010). Therefore, it is hypothesized that:

H8: Individual ability to assimilate foreign partner knowledge is positively related to team's ability to utilize the knowledge in a joint project team.

Although boundary spanning individuals involved in joint projects possess the ability to recognize the value of a partner's knowledge and assimilate it, a high level of complexity is involved in the course of sharing this knowledge with other individuals (Cohen and Levinthal, 1990; Allen, 1977). Rogers (1976) contends that absorption of external knowledge through boundary spanners depends on their cognitive abilities, while their influencing skills determine the spread of such knowledge across the organisational. To buttress the need for shared understanding among partnering firms, Lane and Lubatkin (1998) suggest relative absorptive capacity as the extent to which partnering firms are similar in terms of knowledge base, dominant logic, and organisational structure.

Furthermore, shared cognition is a reflection of collective assimilation, whereby individually assimilated knowledge becomes integrated to generate shared understanding (Nemanich *et al.,* 2010). Like shared cognition, the ability to apply knowledge is also team level capability, which is the extent to which the team can utilize the absorbed knowledge in enhancing collective performance. Nemanich *et al.* (2010) investigated the moderating effect of team structure on the link from team members' assimilation ability to the team's capability to apply knowledge. The cross-sectional survey of 100 R&D project teams revealed that the ability to evaluate external knowledge has a positive impact on the ability to assimilate the knowledge. Both individual and collective assimilation capabilities were found to have a significant positive effect on the team's ability to apply the knowledge. Findings also supported the moderating effect of team structure on the hypothesized relationship.

With respect to situated context, Walsh and Ungson (1991) expatiated on the need for shared understanding, which is facilitated by the creation of common language and continuous social engagement. Through such engagement, the extent of knowledge exchange is broadened, which incentivises the enactment of knowledge sharing processes (Yli-renko, Autio, and Sapienza, 2001). Extent of similarity in individuals' representation and interpretation of knowledge as well as systems for constructing meaning are the main determinants of effective learning interaction within a group (Nahapiet and Ghoshal, 1998). More importantly, knowledge

intensive projects like engineering are executed through task interdependence, and are differentiated by complexity, clarity, and specificity; thereby dependent on the extent of individuals' input in terms of interpretation, judgment and creativity (Deng *et al.*, 2008).

According to Klimoski and Mohammed (1994) shared mental models impact the collective cognition as well as behavioural action underlying the utilization of external knowledge. Theorists in sense-making (Weick, 1995; Senge, 2006) have advanced that individual action within a group is conditioned on others actions. According to Hollingshead (2001) a team-level cognitive system pulls together individuals' cognitive abilities to enhance collective task performance. Collective capability is critical to the application of individually assimilated knowledge, whereby the project is executed as individuals' knowledge is interpreted and integrated in reaching a consensus decision and solving relevant problems at the team level (Knight *et al.*, 1999).

Based on the above, the following hypotheses are suggested:

H9: Individual ability to assimilate foreign partner knowledge is positively related to the shared cognition in a joint project team.

H10: Shared cognition mediates the relationship between individual ability to assimilate foreign partner knowledge and team's ability to utilize the knowledge in a joint project team.

H11: Shared cognition is positively related to a team's ability to utilize foreign partner knowledge in a joint project team.

### 3.4 Conceptual Model and Hypotheses

Further to the earlier exposition on the hypothesized relationships among the variables in chapter two, this section presents the conceptual model, as in Figure 3.2. The variables can be categorized into three main types; independents (i.e. micro-level antecedents and social context), dependents (i.e. multidimensional absorptive

capacity construct), and a mediator (i.e. shared cognition) is proposed as one of the dimensions of the ACAP construct.

The novelty of this model anchors in the conceptualization of the micro-level antecedents for the previously validated multidimensional ACAP construct (Nemanich *et al.*, 2010), and postulation of the effect of the social context of the project team, based on strategic alliance literature. Furthermore, for each hypothesis, the corresponding research question is identified, as detailed in Table 3.1 (see pg. 72). The conceptual model, with the relevant hypotheses is depicted in the Figure 3.2 (see pg. 71).

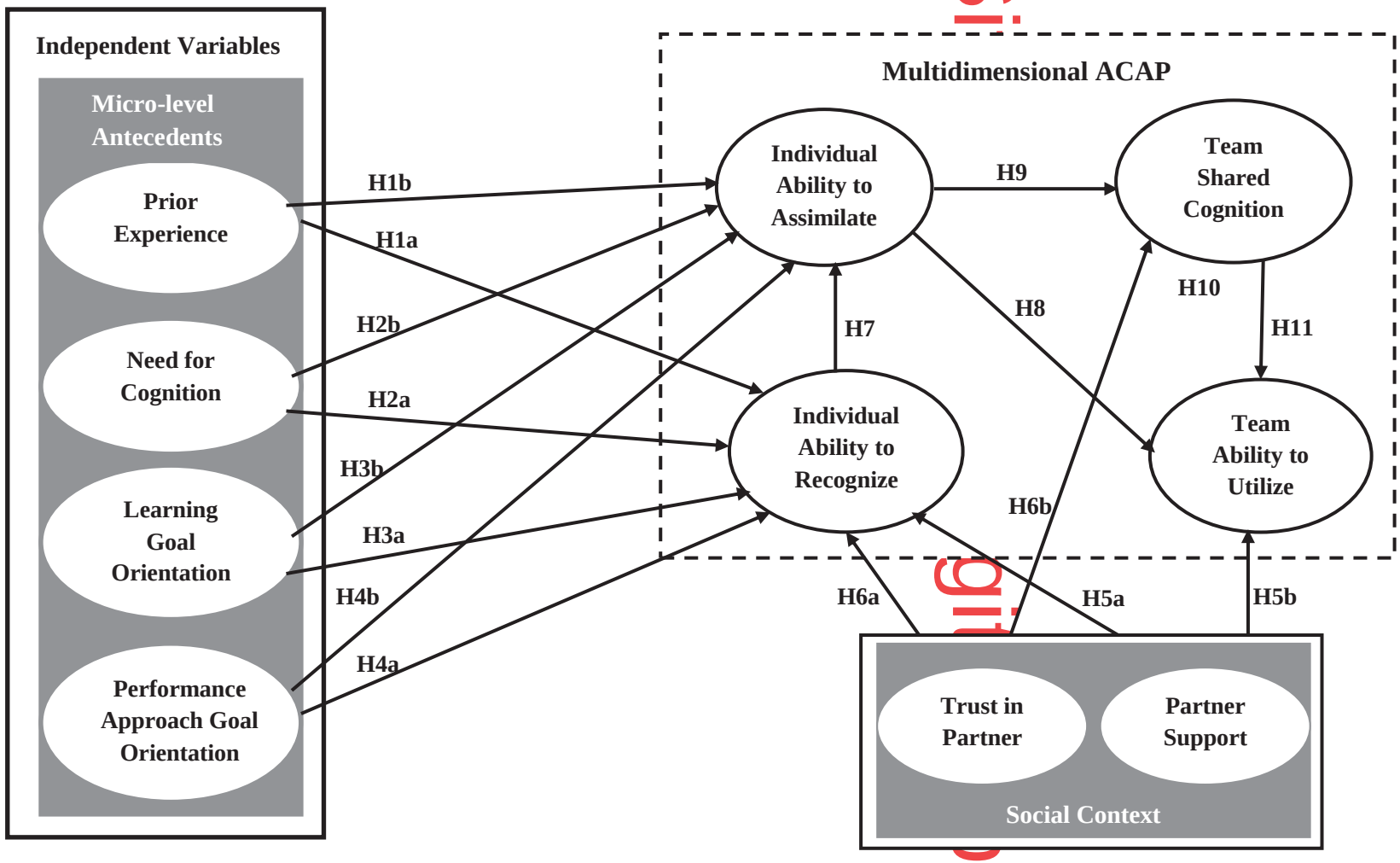


**Figure 3.2:** Research Conceptual Model

**Table 3.1:** Research Questions and Associated Hypotheses

| Research Questions | Hypotheses |
|---|---|
| Q1.<br>To what extent do micro-level antecedents influence the ability to (i) recognize the value of a partner's embedded knowledge and (ii) assimilate it? | H1a: Prior experience in related knowledge is positively associated with the individual ability to recognize the value of foreign partner knowledge in joint project team.<br>H1b: Prior experience in related knowledge is positively associated with the individual ability to assimilate foreign partner knowledge in joint project team.<br>H2a: Need for cognition is positively associated with the individual ability to recognize the value of foreign partner's knowledge in joint project team.<br>H2b: Need for cognition is positively associated with the individual ability to assimilate foreign partner's knowledge in joint project team.<br>H3a: Learning goal orientation is positively associated with the individual ability to recognize the value of foreign partner knowledge in joint project team.<br>H3b: Learning goal orientation is positively associated with the individual ability to assimilate foreign partner's knowledge in joint project team.<br>H4a: Performance approach goal orientation is positively associated with the individual ability to recognize the value of foreign partner's knowledge joint project team.<br>H4b: Performance approach goal orientation is negatively associated with the individual ability to assimilate foreign partner's knowledge in joint project team. |
| Q2.<br>Of what significance is the social context on the multidimensional construct of ACAP? | H5a: Individual perception of the foreign partner support in joint project team is positively associated with individual ability to recognize the value of foreign knowledge.<br>H5b: Individual perception of the foreign partner support in joint project team is positively associated with team ability to utilize the foreign knowledge.<br>H6a: Individual perception of trust in foreign partner is positively associated with individual ability to recognize the value of foreign knowledge in joint project team.<br>H6b: Individual perception of trust in foreign partner is positively associated with shared cognition in joint project team. |

**Table 3.1:** Research Questions and Associated Hypotheses (…Continued)

| Research Questions | Hypotheses |
|---|---|
| Q3.<br>What is the significance of individual ability to recognize the value of partner knowledge on the ability to assimilate it? | H7: Individual ability to recognize the value of foreign partner knowledge is positively associated with individual ability to assimilate the knowledge in the joint project team. |
| Q4.<br>What is the significance of individual ability to assimilate knowledge on joint team ability to utilize it? | H8: Individual ability to assimilate foreign partner knowledge is positively associated with the team ability to utilize the knowledge in the joint project team. |
| Q5.<br>Does shared cognition within the joint team mediate the effect of individual ability to assimilate knowledge on joint team ability to utilize knowledge? | H9: Individual ability to assimilate foreign partner knowledge is positively associated with shared cognition in joint project team.<br>H10: Shared cognition mediates the effect of individual ability to assimilate foreign partner knowledge on team ability to utilize the knowledge in joint project team.<br>H11: Shared cognition is positively associated with the team ability to utilize foreign partner knowledge in the joint project team. |

## 3.5 Research Design

Research can be classified according to its philosophical paradigm, which informs the assumptions about the world and nature of knowledge (Collis and Hussey, 2003). A research paradigm can be described as consisting of three elements – "a belief about the nature of knowledge, a methodology and criteria for validity" (Mac Naughton, Rolfe and Siraj-Blatchford, 2001:32). More specifically, Creswell (2009) suggests three preconditions for designing a research study: (i) the researcher's knowledge claims (i.e., theoretical perspective); (ii) strategies of inquiry, which inform the procedures; and (iii) data collection and analysis methods. This

section examines the relevance of each of these preconditions in the design of empirical research.

Apparently, social scientists' have preference for the quantitative paradigm, which is strongly associated with hard science, as evident in the usage of statistical procedures and theoretical frameworks in studying social facts. The main assumption of this approach emanates from the objectivity of social observation, wherein the observer is considered as separate from the entity that is subjected to observation (Johnson and Onwuegbuzie, 2004). Thus, by adopting an objective perspective about the nature of knowledge, the quantitative paradigm offers rigorous procedure for examining causes and outcomes, with scientifically substantiated facts (Creswell, 2009; Zikmund, Babin, Carr and Griffin, 2010).

The quantitative paradigm adopts a reductionistic approach, wherein an idea is reduced to a small, specific set of testable ideas, like variables in hypotheses and research questions (Creswell, 2009). Basically, it involves testing hypothesized relationships in order to explain the nature of a phenomenon, or differences among clusters, or interaction between two or more attributes of a phenomenon (Sekaran and Bougie, 2010).

In the last five decades, surveys have emerged as a scientific and accurate method for quantitative studies (Zikmund *et al.*, 2010). The present study considers several researchers' positions on the relevance of a survey to the investigating context. Bailey (1978) attests to the advantage of survey research in minimizing an interviewer's biasness by ensuring data anonymity. Furthermore, it facilitates the generalization of findings by supporting the collection of data from diverse groups of respondents across a sample population (Lai, 1999 in Lee, 2010), while the statistical power can be leveraged to establish generalized and replicable results (Teo, Wei and Benbasat, 2003). Sureshchandar *et al.* (2001) acknowledge its suitability as a powerful tool, when assessing individuals' perceptions and experiences about a given subject. Lastly, it can enable researchers to conduct direct and methodical measurement, as well as simultaneous assessment of variables (Amy, 2002; Lee,

2010). Therefore a survey was used as the main data collection instrument for investigating the antecedents of ACAP.

Another important issue in research design is the specification of the unit of analysis, which is the level of investigation (Zikmund, 1997). The main unit of analysis for this study was the individual members of joint engineering teams from the local partner. Based on the retrospective account of their participation in joint engineering projects, individuals' perceptions on the micro-antecedents of ACAP and contextual effects were obtained through their responses to closed-ended questions. Although some scholars have challenged findings from self-reported surveys, they are widely accepted in organisational behaviour studies, most especially to investigate employees' attitudes and behaviours (Podsakoff and Organ, 1986; Howard, 1994). Following Podsakoff and Organ (1986), Table 3.2, highlights the desirability of a self-report survey in the present study context.

Besides the demographic questions, the survey instrument consists of a total of 60 measurement items, covering ten variables of three constructs (i.e., micro-antecedents, ACAP and contextual effects). Each variable was measured with multi item scales, which are adapted or adopted from extant literature, as detailed in the preceding section on construct operationalization. All items were assessed using Likert Five-point interval scales, which correspond to the level of agreement or disagreement to each given question on a scale of 1 to 5 (i.e., 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, and 5 = strongly agree).

**Table 3.2:** Desirability of a Self-Report Survey (Podsakoff and Organ, 1986)

| |
|---|
| (1) Gathering demographic or otherwise factual data (e.g., respondent's age or years of tenure), that are, in principle, verifiable from other sources;<br>(2) Evaluating the effectiveness of experimental manipulations;<br>(3) Obtaining personality data such as locus of control, trait anxiety and [need for cognition, learning goal orientation];<br>(4) Collecting descriptions of a respondent's past or characteristics behaviour [exposure to related knowledge], and/or…or how they would behave under certain hypothetical conditions.<br>(5) Scaling the psychological states of respondents (e.g. ability, motivation); and<br>(6) Seeking respondent's perceptions of external environmental variable [e.g. trust for partner, partner support] |

This study employed the cross-sectional approach in the administration of the survey. Cross-sectional study design involves the collection of data at a single point in time (Sekaran and Bougie, 2010; Zikmund *et al.,* 2010). Furthermore, this design is more appropriate for testing hypotheses, which is the focus of the current study. Even though, the investigative phenomenon could be considered as evolutionary in nature - ACAP is cumulative and path dependent - due to difficulties associated with eliciting long term participation from the sampled population as well as financial and time constraints, the longitudinal approach was not feasible. According to Bailey (1978) a cross sectional design enables the comparison of data from a large sample size, without the interference of time differentials, as is synonymous with longitudinal study. Other researchers (i.e., Kankanhalli *et al.,* 2012; Nemanich *et al.,* 2010; Deng *et al.,* 2008; Zhao and Anand, 2009) have considered similar logic, by employing cross-sectional designs, when investigating ACAP from the organisational learning perspective.

The survey instrument was administered on-site. Although an expensive method when compared to snail mailing and online survey, wherein no extra cost is incurred for the physical distribution of the questionnaires. However, considering the nature of the phenomenon being investigated and the context of study, the on-site strategy is more desirable. Specifically, this method is more appropriate given that

the investigative phenomenon is context specific. For example, some employees of the local partner firms might not have been directly engaged in joint projects with foreign partner, thus the researcher needed to be on-site in order to make necessary clarifications on the appropriate respondents. Moreover, due to cultural factors there is a general apathy towards dealing with unidentified or non-visible persons. Thus following prior studies in Nigeria (Ijose, 2010; Oyejide and Adewuyi, 2011) the onsite approach was employed in the administration of the questionnaires. Detailed discussion on the sampling techniques and questionnaire administration is presented in Sections 3.4.4 and 3.4.5.

### 3.5.1 Development of Survey Instrument

Of significance to instrument development is the need to ensure validity, which involves achieving the best fit between the construct and the measuring model. According to Kankanhalli *et al.* (2012) dependability of the research methodology to capture the exact construct is a function of the measurement model. Fundamentally, the measurement model consists of two elements; (i) operationalization and (ii) scale measurement (Hair, Bush and Ortinau, 2003). The former involves the detailed description of the construct to be made measured, with the specification of the dimension, where necessary (Sekaran, 2003). While the latter examines how the items used in measuring the variables are quantified. For instance, the variables underlying the present study cannot be directly observed or measured, thus, the use of indirect measurement scales is necessary.

Validity in behavioural research is mainly challenged by common method variance (CMV), which accounts for error in the measured constructs and relationships, among the constructs (Podsakoff *et al.,* 2003). According to Jarvis *et al.* (2003) bias in the structural model is caused by the misrepresentation of the measurement model. Thus, in an attempt to adhere to the pre-conditions for the validity of the measurement construct, this study considered pertinent scholarly suggestions (Podsakoff *et al.,* 2003; Jarvis *et al.,* 2003; MacCallum, Browne, Sugawara *et al.,* 1996). Specifically, in developing the survey instrument, this study

incorporated Podsakoff *et al.'s* (2003) suggestions on appropriate procedural and statistical techniques for controlling common method variance, as explained in Section 3.6 on factor analysis.

Also, the survey instrument included a few reverse-worded or reverse-scored items (Schriesheim, Eisenbach and Hill, 1991; Lindell and Whitney, 2001). Schriesheim *et al.* (1991) reveal that this could contribute in controlling for subject agreement response propensities in a self-report survey, while Lindell and Whitney (2001) underscore its impact in reducing response bias. For instance, the adopted measuring scale of need for cognition incorporates reverse-worded items in order to control for respondents' bias. In tandem with Lindell and Whitney (2001) suggestion, the questionnaire was developed to consist of 60 items, thereby achieving a relatively short length, in order to reduce non-responses due to respondents' boredom and fatigue. On the average it took a respondent about 15 minutes to complete the questionnaire.

All the variables were measured as multi-items, using a five-point Likert-type scale. The five-point scale was employed as the optimal number of response categories in order to eliminate the error in scores associated with self-reports survey. Originally, Likert (1932) expected that respondents would be able to align their exact responses on every item to a five-point scale (in Remmers and Ewart, 1941). Elmore and Beggs (1975) empirically confirmed that wider scales of seven (7) or even nine (9) points have no significant impact on the reliability of the ratings. Also, similar findings have been reported by other scholars (Jenkins and Taber, 1977; Lissitz and Green, 1975; Remmers and Ewart, 1941). Nonetheless, Dawes (2008) supported the slight possibility of enhancing reliability when a ten-point scale is substituted by five/seven-point version.

Following analytical review of literature over a period of eight decades, Cox (1980) found odd numbered scales as preferable to even numbered ones, when a respondent needs to express his/her neutrality (i.e. neither agree nor disagree, or even no idea) on a given question. Also Cox (1980) suggests the five-point scale as

suitable for measuring subject-centred scales. This study employed the subject-centred scales, with multiple items measuring each of the variables, while respondents indicated the extent of their perception along the scale for a given item.

As demonstrated by Szulanski (1996), when there are limited empirical enquiries to guide the development of measurement items, researchers can leverage comprehensive review of literature across diverse fields. Therefore, in addition to ACAP and organisational learning, this study draws on literatures from creativity, entrepreneurship, educational psychology, consumer research, and strategic alliances, in order to define and operationalize the constructs. In adherence to the preconditions for content validity, the final items were selected based on the outcome of pre-screening and pilot testing, assessing the suitability in the present study context. Furthermore, explicit accounts on the operationalization of these constructs are henceforth presented.

### 3.5.1a Operationalization of Micro-level Antecedents

Prior experience is defined as the distinctive knowledge possessed by an individual about a subject matter, which enables him or her to identify learning opportunities (Venkataraman, 1997; Shane, 2000). From Cohen and Levinthal (1990), prior knowledge implies the quantity of the accumulated knowledge and the extent of relatedness with new knowledge. Scholarly work in consumer behaviour (Alba and Hutchinson, 1987; Rao and Sieben, 1992) measure individual's prior knowledge as the extent of exact information that has been accumulated in the memory and self-perceptions about the acquired knowledge. Similarly, studies on the effect of prior knowledge on learning outcomes (Griffith, Sawyer, and Neale, 2003; Shapiro, 2004; Ertl, Kopp and Mandl, 2004; Wohlin, 2004) have measured prior knowledge from the individual's assessment of his/her awareness on specific domain. Furthermore, prior knowledge has been operationalized in terms of work experience (Cooper *et al.*, 1994), education (Gimeno *et al.*, 1997), experiential and vicarious learning (Huber, 1991). Based on the above, five items were adapted to measure the construct of individual prior experience, as presented in the Table 3.3.

**Table 3.3:** Operationalization of Prior Experience

| Prior Experience | Sources |
|---|---|
| Prior to my engagement in the joint project team I had:<br>1. The required general knowledge.<br>2. Acquired substantial theoretical knowledge.<br>3. Attended foreign training in related area.<br>4. Substantial working experience in related area.<br>5. Acquired some level of expertise in related area. | Cohen and Levinthal (1990); Cooper *et al.* (1994); Gimeno *et al.*, 1997 |

Learning goal orientation captures the disposition of an individual towards committing the necessary effort for the mastery of a given task. According to VandeWalle (1997) performance approach goal orientation could be subdivided into approach and avoid dimensions, however the present study only examined the former. The performance approach goal orientation measures individual motivation towards a task based on the opportunity to demonstrate competency. This study adopts the validated items for measuring both (VandeWalle, 1997; Brett and VandeWalle, 1999; Kankanhalli *et al.*, 2012; Hirst, *et al.*, 2009), as stated in Table 3.4 and Table 3.5, respectively.

**Table 3.4:** Operationalization of Learning Goal Orientation

| Learning goal orientation (VandeWalle, 1997) |
|---|
| To what extent do the following describe your disposition towards task;<br>6. I am willing to pursue challenging task that I can learn new things from.<br>7. I often look for opportunities to develop new skills and knowledge.<br>8. I prefer taking up challenging and difficult tasks at work where I can learn new skills.<br>9. I am willing to put in extra efforts where necessary, for me to develop new skills and enhance my knowledge.<br>10. I prefer to work in situations that require a high level of ability and talent |

**Table 3.5:** Operationalization of Performance Approach Goal Orientation

| **Performance approach goal orientation (VandeWalle, 1997)** |
| --- |
| To what extent do the following describe your disposition towards task:<br>11. I'm concerned with showing that I can perform better than my co-workers.<br>12. I try to figure out what it takes to prove my ability to others at work.<br>13. I enjoy it when others at work are aware of how well I am doing.<br>14. I prefer to work on projects where I can prove my ability to others. |

The last micro-antecedent of ACAP in this study is the need for cognition, which mainly originated from Cacioppo and Petty (1982). Originally, Cacioppo and Petty (1982) developed 34-items, which were later compressed to 18-items (Cacioppo, Petty, and Kao, 1984), with higher inter-item correlations but the same reliability values. Further studies have examined the possibility of fewer items, for instance Wolfe and Grosch (1990) tested 15 items, Manfredo and Bright (1991) validated a 9-item version for mail survey, and 6 items were confirmed by Verplanken *et al.* (1992). Wu and colleagues (2011) selected and validated three (3) items, which are of relevance in the work domain from the 18 items construct. Nevertheless, the 18-item scale has gained wide acceptability and validation in numerous studies. For instance Cacioppo *et al.* (1984) presented a coefficient alpha of 0.90, while Sanders, Gass, Wiserman and Bruschke (1992) and Culhane, Morera and Hosch (2004) reported 0.88 and 0.86, respectively. These findings imply a high internal consistency for the measure. In an attempt to demonstrate the impact of need for cognition on the acquisition of complex skill, Day *et al.* (2007) adapted the 18-item measurement scale. Equally, Curseu (2011) assessed the need for cognition using the same scale in order to investigate the effect it has on students' active information search. Accordingly, this study also adopted the 18-item measurement scale on the need for cognition (see Table 3.6).

**Table 3.6:** Operationalization of Need for Cognition

| **Need for Cognition (Cacioppo, Petty, and Kao, 1984)** |
|---|
| To what extent do each of the following item describe you;<br>15. I would prefer complex to simple problem.<br>16. I like to have the responsibility of handling a situation that requires a lot of thinking.<br>17. Thinking is not my idea of fun.*<br>18. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.*<br>19. I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something.*<br>20. I find satisfaction in deliberating hard and for long hours.<br>21. I like tasks that require little thought once I've learned them.*<br>22. I really enjoy a task that involves coming up with new solutions to problems.<br>23. It's enough for me that something gets the job done; I don't care how or why it works.*<br>24. I only think as hard as I have to.*<br>25. I prefer to think about small, daily projects to long-term ones.*<br>26. The idea of relying on thought to make my way to the top appeals to me.<br>27. Learning new ways to think doesn't excite me very much.*<br>28. I prefer my life to be filled with puzzles that I must solve.<br>29. The notion of thinking abstractly is appealing to me.<br>30. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.<br>31. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.*<br>32. I usually end up deliberating about issues even when they do not affect me personally. |

*Reverse scoring is used on this item.

### 3.5.1b Operationalization of Social Context of Joint Project Team

Scholars (Lyles and Salk, 1996; Lane *et al.*, 2001; Park, 2010) have empirically validated the effect of partners' trust and support on the outcome for IJVs. Lyles and Salk (1996) operationalized it in terms of the extent of support provided by the foreign partner in the course of executing joint activity. Lane *et al.* (2001) modelled the effect of trust and foreign partner's management support on the extent to which the assimilated knowledge can be applied in enhancing the IJV

performance. To demonstrate the micro-foundational origin of such support, Minbaeva *et al.* (2003) operationalized it in terms of the extent to which foreign expatriates participate in the joint activity. Consequently, this study will measure foreign partner's support as a four-item measure (see Table 3.7) considering the extent of collective and individual support associated with the foreign partner in the joint engineering design project.

**Table 3.7:** Operationalization of Partner Support

| Partner Support | Sources |
|---|---|
| With respect to the execution of joint engineering project:<br>33. The foreign partner provided adequate technical support.<br>34. The foreign partner provided adequate training support.<br>35. Foreign partner employees actively participated.<br>36. Foreign partner employees were accessible and helpful. | Lyles and Salk (1996); Lane *et al.* (2001) |

Equally, the role of trust, as a social construct has been extensively investigated in empirical studies on the outcome of inter-organisational relationships (Zaheer, McEvily and Perrone, 1998; Lofstrom, 2000; Adobor, 2005; Madhok, 2006). Cummings and Bromiley (1996) developed the organisational trust inventory (OTI) to measure individual/collective perceptions of trust on another person or group. They suggested a 62-item measure, to capture the three dimensions of trust (i.e., reliability, predictability and fairness). Subsequent attempts have adapted Cummings and Bromiley's (1996) scales to suggest and empirically validate fewer numbers of items. For instance, Lofstrom (2000) operationalized it as 5-item scale (Cronbach's $\alpha = 0.90$), while Adobor (2005) validated a 12 items scale. Given the reported high value for the Cronbach alpha, the Lofstrom 5-item scale was adpted in the current study in order to attain a relatively shorter length for the questionnaire.

**Table 3.8:** Operationalization of Trust in partner

| Trust in Partner (Lofstrom, 2000) |
|---|
| With respect to the execution of engineering project, employees from the foreign partners:<br>37. Met their obligations to you.<br>38. Dealt fairly with you<br>39. Did not mislead you<br>40. Withheld relevant information<br>41. Kept their word |

### 3.5.1c Operationalization of Multidimensional Absorptive Capacity

Definitions of terms relevant to this research were provided in see Section 1.10, and each dimension of the ACAP was operationalized as a separate construct of individual's ability to (i) recognize the value of; and (ii) assimilate foreign partner's knowledge; and team's (iii) shared cognition; and (iv) ability to utilize foreign partner's knowledge. Consistent with extant operationalization of the multi-dimensions of ACAP (Nemanich *et al.* 2010; Pedrosa and Jasmand, 2011) this study considered the multidimensional construct as a conceptual description of the four identified dimensions. In essence, the multidimensional ACAP is not considered as a separate entity from the underlying four dimensions (i.e., second order or aggregate construct), therefore no specific measures are directly assigned to it. As noted by Williams, Vandenberg and Edwards (2009), this approach has been found to be empirically superior to modelling the multidimensional construct as second order or aggregate.

The ability to recognize the value of foreign partner knowledge is examined from the knowledge sharing perspective and operationalized as the capability of the individual members involved in the joint engineering project to accurately assess the most valuable partner knowledge to target for assimilation (Szulanski, 1996; Zahra and George, 2002; Jansen *et al.,* 2005; Lane *et al.*, 2006; Todorova and Durisin, 2007; Nemanich *et al.,* 2010). And the ability to assimilate knowledge is envisioned as encompassing the acquisition, assimilation and transformation of foreign partner's

knowledge (Todorova and Durusin, 2007). Basically, assimilation ability is operationalized to capture the capability to learn, interpret and develop a deep understanding of valuable partner's knowledge (Lane and Lubatkin, 1998; Nemanich *et al.*, 2010). Tables 3.9 and 3.10 present lists of survey items for each dimension.

**Table 3.9:** Operationalization of Ability to Recognize the Value of Knowledge

| Ability to recognize the value of partner's knowledge | Sources |
|---|---|
| To what extent do you demonstrate each of the following, during your participation in joint engineering project:<br>42. I was able to develop awareness on foreign partner tools, practice, and knowledge.<br>43. I was able to keep track of foreign partner tools, practice, or knowledge, by consulting other sources of information.<br>44. I was capable at accurately evaluating the worth of foreign partner tools, practice, or knowledge in the project.<br>45. I was able to identify foreign partner tools, practice, or knowledge with the most significant value to the project performance.<br>46. I was good at ascertaining whether foreign partner tools, practice, or knowledge could add value to the project. | Nemanich *et al.*, 2010; Pedrosa and Jasmand, 2011 |

**Table 3.10:** Operationalization of Ability to Assimilate Knowledge

| Ability to Assimilate Partner's Knowledge | Sources |
|---|---|
| To what extent do you demonstrate each of the following, during your participation in joint engineering project:<br>47. I was able to learn the tools, practice or knowledge associated with foreign partner.<br>48. I was capable at understanding the tools, practice or knowledge associated with foreign partner.<br>49. I was adept at interpreting the use of tools, practice or knowledge associated with foreign partner.<br>50. I was adept at experimenting with the tools, practice or knowledge associated with foreign partner.<br>51. I was able to discover other use of tools, practice or knowledge associated with foreign partner. | Nemanich *et al.*, 2010; Pedrosa and Jasmand, 2011 |

This study defines shared cognition capability as the joint project team collective assimilation, which is the mechanism through which the team reaches a common understanding on the individually acquired and embedded knowledge

(Nemanich *et al.*, 2010). The need for clarification on the significance of shared cognition in the enactment of individually embedded knowledge at the group level, has dominated scholarly discourse in organisational learning (Senge, 2006; Knight *et al.*, 1999; Weick, 1995). Theorists (Cannon-Bowers *et al.*, 1993; Larson and Christensen, 1993) on team level cognition have recognized knowledge commonality as the main facilitator of task performance within a situated context, like a team (Hollingshead, 2001). Team shared cognition was measured based on an empirically validated scale, which evaluate joint team ability to share partner knowledge, reach consensus on it and communicate it across the team members (Nemanich *et al.*, 2010) (see Table 3.11).

**Table 3.11:** Operationalization of Shared Cognition

| **Shared Cognition (Nemanich *et al.*, 2010)** |
|---|
| With respect to deliberating on project, our joint engineering project team:<br>52. Was very competent in integrating different views.<br>53. Had mechanism to support collective assessment.<br>54. Was able to achieve amicable resolution of conflict and disagreement.<br>55. Was able to communicate collective view across members.<br>56. Was able to take appropriate action based on collective view. |

Following Nemanich *et al.* (2010) the ability to utilize knowledge at the team level will be measured with a four-item scale (see Table 3.12). These items are the indicators of the complete definition of the construct, namely the ability to exploit knowledge and the ability to utilize knowledge for commercial gains. Contrary to empirical research in team learning and innovation, foreign partner knowledge will be considered as external to the local partner, but embedded in the foreign partner's employees, tasks and tool, and brought into the joint team structure in executing the engineering project. In essence, this knowledge is a source of diverse capability, which has been internalized by the foreign partner, but external to both the local partner's individual members and joint project team. Thus, the spread of such knowledge across the joint team, from the foreign to local partners, is a measure for the effectiveness of team performance (Cohen and Levinthal, 1990; Lane *et al.*, 2001).

**Table 3.12:** Operationalization of Ability to Utilize Partner Knowledge

| **Ability to utilize knowledge (Nemanich *et al.*, 2010)** |
|---|
| With respect to utilizing knowledge in project execution, the joint team:<br>57. Was very competent at exploiting the resource in specific activity.<br>58. Had the ability to effectively apply the resource in specific activity.<br>59. Was able to enhance project delivery by applying the resource.<br>60. Had the capability to maximally exploit the resource in specific activity. |

### 3.5.2 Survey Instrument Pretesting and Pilot Study

The survey instrument was developed from the operationalized constructs, based on extant literature, as detailed above. Furthermore, the instrument was subjected to expert screening in order to identify and resolve likely issues, which could affect responses to the questions. According to Zikmund *et al.* (2010), instrument pre-test can incorporate expert opinion from both practitioners and researchers on issues like wording of the questions and suitability of scale. Thus, the initial questionnaire was presented to and discussed with three project managers with substantial experience in managing activities in joint engineering projects in Nigeria's upstream oil industry, and three academics with research expertise in inter-organisational learning in knowledge intensive firms. The outcome of deliberations with the experts is summarised in Table 3.13, showing the suggestions and the relevant actions that were taken in addressing them.

Further refinement of the survey instrument was done based on the outcome of the pilot study. This involved the distribution of the preliminary questionnaires to 35 respondents, who were selected from the study population but excluded from the main survey. Zikmund (1997) suggests a pilot study as an essential activity towards the refinement and restructuring of a survey instrument. Each of the administered questionnaires was enclosed with a covering letter stating the objectives and implications of the study. Also, the commitment to keep responses anonymous was stated, and assistance was solicited in indicating the total time taken to complete the

survey, identifying ambiguous questions, and suggesting how to improve the general design of the questionnaire.

**Table 3.13:** Expert Suggestions and Corresponding Actions

| Expert Suggestions | Corresponding Actions |
|---|---|
| Demographic profiles should include information on individual's role in project team. | Question (QA9) was introduced, i.e., Your position in the joint venture project team. |
| Reduce the length and minimize the use of technical jargon in the covering letter. | Reviewed and rephrased the covering letter, as in Appendix A. |
| Rephrase questions on foreign partner. | The use of foreign partner was replaced with joint venture partner. |

The pilot survey questionnaire was divided into five sections. Section A included demographic profile questions, micro-level antecedents constituted section B, the multidimensional construct of absorptive capacity was provided in section C, while the joint team context was examined in section D. Finally, section E requested relevant comments or suggestions on how to improve the questionnaire design. On average, the respondents reported that they were satisfied with the questionnaire; a few provided comments were incorporated to improve the face validity and make necessary clarifications on ambiguous questions (Straub *et al.*, 2004). The original items and corresponding refined items are summarized in Table 3.14.

In addition, each of the studied constructs was subjected to statistical analysis aimed at ascertaining the reliability of the measurement scale. According to Dunn *et al.* (1994) scale refinement is essential in order to ascertain that the items are conceptually associated with the intended construct. This is a major prerequisite to factor analysis, so as to eliminate unwanted items, which could distort the construct dimension(s). At this stage, two criteria were considered in the refinement of the measurement scale. First was the elimination of items, with total item correlation lesser than 0.30 - this indicates that such item does not correlate very well with the overall scale and could be considered as not belonging to the measurement scale

(Flynn et al., 1997; Nunnally and Bernstein, 1994). Second, the elimination of items with negative inter-item correlation values (Pett *et al.*, 2003).

**Table 3.14:** Refinement of Survey Instrument

| Code | Original Items | Refined Items |
|---|---|---|
| E1 | I have acquired related general knowledge | I had the required general knowledge on the project |
| E2 | I have acquired related theoretical knowledge. | I had acquired substantial theoretical knowledge. |
| E3 | I have attended some training in related domain | I had attended foreign training in related area. |
| E4 | I have acquired some industrial experience in related domain | I had substantial working experience in related area. |
| E5 | I have acquired some expertise in related domain | I had acquired some level of expertise in related area. |
| O1 | I'm concerned with showing that I can perform better than my co-workers. | I like to demonstrate that I can perform better than my co-workers. |
| O2 | I try to figure out what it takes to prove my ability to others at work. | I try to figure out what it takes to prove my competency to others at work. |
| O4 | I prefer to work on projects where I can prove my ability to others. | I prefer to work on projects where I can prove my competency to others. |
| O8 | I prefer to avoid situations at work where I might perform poorly. | I prefer to avoid job tasks when I might perform poorly. |
| R3 | I was capable at accurately evaluating the worth of foreign partner tools, practice, or knowledge in the project. | I was able to identify partner's tools or practice with the most significant value to project performance. |
| R4 | I was able to identify foreign partner tools, practice, or knowledge with the most significant value to the project performance. | I was capable at accurately evaluating the worth of partner's knowledge in the project. |
| A1 | I was able to learn the tools, practice or knowledge associated with foreign partner. | I was able to learn joint venture partner's tools or practice. |
| S2 | Had mechanism to support collective assessment. | Had structure to support collective assessment of views. |

Given the above criteria, some items were eliminated from need for cognition, ability to recognize knowledge and trust in partner. Accordingly, nine items from need for cognition and one from ability to recognize, with total item correlation lesser than 0.30, and having substantial improvement in Cronbach Alpha were eliminated. Also, one item from the trust in partner with negative total item correlation was eliminated.

### 3.5.3 Questionnaire Design

The main instrument used for collecting data from engineers and other technical personnel involved in joint engineering project teams in the upstream oil industry, was the questionnaire. The initial questionnaire was based on extant literature, with the scales been adopted or adapted from validated sources (see Sections 3.4.1a to 3.4.1c). Furthermore, the initial instrument was pretested through a pilot study, from which the final questionnaire was generated (see Appendices A and B).

Several strategies were considered in a bid to encourage participation in the survey. For instance, the covering letter was enclosed to give a brief introduction of the purpose and procedures of the study, guarantee respondents anonymity, offer the option to decline to participate, and the average duration for completing the questionnaire. Also each section is separated by including appropriate headings, and instructions on how to complete the associated questions. Overall, a total of 48 statements, excluding the demographic profile, were used in order to measure the ten variables being investigated. A sample of the final questionnaire is enclosed as Appendix B.

### 3.5.4 Population of Study and Sampling

This study employed the individual members of joint project teams from the local partner as the unit of analysis. The significance of the individual level in the

present context is underscored by the measure of work done in engineering projects, which is generally assessed as man-hours performed. A single upstream engineering project could take two years, with a minimum of 1.5 million man-hours (NCDMB, 2012). According to Deng *et al.* (2008) an engineering project is mainly organised into tasks, which differ in complexity, clarity, and specificity, thus the extent of individual input can be assessed in terms of interpretation, judgment and creativity. Indeed, project execution will require a series of deliberations, iterative activities, exchange of ideas, analytical problem solving and reflection on what has been learned so as to apply the new knowledge on the job. Consequently, the main focus of empirical investigation in this study was the explication of the impact of individual differences and social context on team ability to utilize knowledge within the project context.

According to Teddlie and Yu (2007), researchers should select the sampling procedure(s) that are most suitable to answering the research questions. The investigative phenomenon in the present study requires purposeful selection of respondents. ACAP at the individual level is theoretically associated with boundary spanning behaviour, which is evident in a few individuals (Cohen and Levinthal, 1990; Zahra and George, 2002). As explicated in the latter part of this section, the purposive sampling technique was adapted in the order to ensure the selection of respondents who played such a role. Generally, the data obtained from non-probability sampling like purposive is considered non-generalizable; however, Teddlie and Yu (2007) critically questioned the underlying assumption. Basically, the former ensures the generalization to the population, while the latter facilitates generalization to the external context. Thus, the former offers wider information from a larger number of representatives of the population, while the latter offers in-depth insight from the specifically selected smaller sample (Patton, 2000). Another differentiating notion is the relevance of the sampling frame. For the former, the sampling frame is expected to be explicitly pre-specified as a representation of the overall population, while for the latter it could be assessed on expert judgement or other relevant resources (Mason, 2002).

In defining the population frame, this study followed prior empirical studies on the Nigerian oil industry (Heum, 2003; Oyejide & Adewuyi, 2011; Ijose, 2010). Thus, the information obtained on joint projects in the industry, from the Department of Petroleum Resources (DPR) and the Nigerian oil and gas industry content joint qualification system (NOGIC JQS) was supplemented with internet search. The DPR is a Federal Government agency charged with the regulation, monitoring and supervision of all activities in the Nigeria oil industry. The NOGIC JQS is a unit of the Nigerian content development monitoring board (NCDMB), which serves as the industry databank on available capabilities and Nigerian content registration as well as evaluation. Although, registration of local companies with NOGIC JQS is voluntary, it is a major prerequisite for the award of projects in the industry. As a result, a majority of the leading and active engineering firms are registered on the database.

Based on the above, a list of 52 local engineering companies with reported joint venture arrangements with foreign partners in the upstream oil industry was drawn. More than 80% of these companies have their headquarters in Lagos, with operational activities clustered around the two oil cities of Port Harcourt and Warri in the Niger-Delta region. The Niger-Delta is the heartbeat of upstream activities in the oil industry, with 90% of the service providers in the oil sector located in both cities (Oyejide and Adewuyi, 2011). The population of the study consists of local technical employees in the 52 engineering companies, with reported joint projects handling experience with foreign partners. Specifically, a total of 1460 local technical personnel were identified as the population, as drawn from the DPR database on the 52 companies.

In order to achieve the main objective of study, as well as minimize sampling error, the purposive sampling technique was adapted in the selection of local firms, from where the sampled respondents were randomly selected. Although purposive sampling is synonymous with qualitative studies, however it can also be adapted in quantitative design (Maxwell, 1997; Teddlie and Yu, 22007; Cooper and Schondler, 2008). Maxwell (1997) asserts the suitability of purposive sampling in selecting

respondents that conform to specified criteria as well as in accessing a difficult to reach sample. Since both of these are evident in the present study context, purposive sampling was used. The four criteria considered in the selection of the firms were:

1. Completion of two or more engineering design projects with foreign partners in order to ensure that the employees have participated in joint projects.
2. Firm size range of medium or large, as assessed by the numbers of technical personnel and man-hours performed. For the former the threshold number is 20, while the latter is 40,000 (NCDMB, 2012).
3. Third party acknowledgement (i.e., newspaper, industry or business reports) of the company's success in handling engineering project.
4. Getting management's consent for employees' participation in order to increase the response rate.

Given the first three criteria, 43 engineering companies were identified. But on the consideration of the fourth criterion, the technical personnel from 35 companies were selected for the final study. The most challenging and expensive task was getting management consent for employees participation. These 35 companies are thosewhere the management consented to the participation of their employees. Targeted respondents are technical personnel and their job tasks are mostly in offshore locations, therefore the possibility of accessing them without management's support or contact person is narrow. Therefore, the following initiatives were taken in order to obtain management consent from the 35 companies.

The first step was to initiate contacts with the management of the 52 identified companies. To this end, letters of introduction were emailed to the addresses obtained from the companies' websites. The letters were addressed to the corporate affairs or human resource departments. These letters stated the research objectives and significances to practice, as well as solicited for managements' consents on the participations of employees, with promise to email the executive summary of the findings. The use of a pre-notification message has been found to impact response rates in survey research (Yammarino, Skinner & Childers, 1991; Fox, Crask & Kim, 1988). After a week, only two firms responded positively to the

email, thus the non-responding firms were contacted by telephone. In addition, the researcher leveraged referral networks and followed up with onsite visits to the firms. Prior empirical studies of the Nigerian oil industry corroborate that respondents' participation can be facilitated through an insider contact person (Ijose, 2010; Oyejide & Adewuyi, 2011). Accordingly, management consent was obtained in another 33 firms. The final survey was administered between November 2012 and February, 2013.

Based on the discussion with the human resources departments across the sampled firms, the lead local team members were identified as respondents. The lead members were also asked to randomly select 2 to 3 other members of their teams. For teams, where the lead local team members had left the companies or were inaccessible (i.e. 40 teams) the survey was administered to the immediate subordinates, who were also requested to nominate other members of teams as respondents.

Consequently, 400 questionnaires were administered to the local members of 150 teams across the sampled firms, with each team constituted by at least five personnel from both the local and foreign partners. For the administration and collation of the survey, the researcher relied on the contact person in each of the firms who followed up with the respondents in order to ensure a higher response rate. In some of the sampled firms (i.e. 32%), respondents volunteered as the contact person, while in the others, the human resources personnel assisted in distributing and collating the questionnaires.

### 3.5.5 Sampling Techniques

This study adopted some techniques to increase the response rate. The length of the questionnaire was kept relatively short. Specifically, the questionnaire consisted of four sections, with a total of 48-item, excluding the section on demographic profiles. On the average it took a respondent less than 15 minutes to completely answer the questions. Studies (e.g., Roth and BeVier, 1998; Yammarino,

Skinner, and Childers, 1991) confirmed that the length of questionnaire has a negative effect on response rate. Also, questions on the demographic profile were featured in the first section of the questionnaire (Drummond, Sharp, Carsin, Keller and Comber, 2008).

As noted in the earlier section, the survey was administered onsite having sought management consent for the participation of employees. According to Trochim and Donnelly (2008) onsite survey administration combines the advantages of the group administered questionnaire and mail survey, in order to increase the percentage of willing respondents. Furthermore, the researcher relied on the contact person in each firm to liaise with other respondents, and collate the completed questionnaires. To complement this approach, each questionnaire was enclosed with a cover letter written on Multimedia University letter head so as to underscore the academic objective of the study. Academic-oriented research has better response rates as compared with private or other research institutions (Roth and BeVier, 1998; Bruvold, Corner and Rospert, 1990). Written statements assuring respondents' anonymity can positively influence respondents' participation in survey (Tyagi, 1989; Yammarino *et al.* 1991). Thus, this letter expressed the researcher's commitment towards keeping respondent anonymity, and solicited for voluntary participation.

Consequent on the above, this study was able to attain a response rate of 68%, despite the high mobility of the respondents (see Section 4.2).

### 3.6 Statistical Analysis

This study employed both descriptive and inferential statistics to analyse the data collected from the survey. Besides the descriptive statistics on the demographic profiles, the other analyses are considered in terms of - (i) initial assessment of data to satisfy necessary conditions for SEM and (ii) assessment of measurement and structural models. The former involved the use of the Statistical Package for the

Social Sciences (SPSS) 19 to screen the data and conduct univariate analyses. In the course of data screening, the presence of outliers was identified through visual inspection and the examination of the graphical output, i.e., the residuals scatterplots. The descriptive statistical analyses for all the measurement items were also considered to ensure that the data conformed to the requirements for normality and linearity. Other statistical analyses were conducted to assess the reliability and validity - namely, factor analysis and correlation of the measurement scales (see Sections 4.3 and 4.4).

The choice of SPSS was informed by its rich graphical interface and functionalities. Specifically, Karp (1995) defines the three main features of SPSS as - (i) interface which enables the user to enter and import data, and also view in the rows and columns; (ii) an output window to display the generated statistical results, with support for the editing of the results; and (iii) a customisable chart window for displaying various chart and graphs.

Given that the research model has multiple relationships, the structural equation modelling (SEM) technique was selected in order to enable the performance of simultaneous multiple regression analyses, with the incorporation of the measurement error in the estimation process (Frazier *et al.*, 2004). Most importantly, SEM produces path estimates on the series of multiple regression analyses. Such estimates are pertinent to meeting this study's objective in testing the mediating effect of the shared cognition on the link from an individual's ability to assimilate and collective ability to utilize knowledge.

The SEM was conducted with the aid of the Analysis of Moment Structures (AMOS) software. SEM is basically a combination of factor analysis and path estimates. It has the capability to incorporate the confirmatory factor analysis (CFA) on the measurement model with the structural model, which examines the relationships among latent variables (Tabachnick and Fidell, 2012). CFA is a theory-driven procedure for validating a measurement model by generating the shared variance of measured variables likely associated with the latent construct (Hair *et al.*,

2010). Further to this, the hypothesized relationships were tested based on the assessment of the structural models, i.e., path estimates among the latent variables.

The choice of AMOS in the present context is guided by both methodological and theoretical considerations. AMOS supports data from the SPSS platform, and incorporates coding with a syntax free user-friendly interface for statistical analysis (Hair *et al.*, 2010; Babin *et al.*, 2008; Hopwood, 2007). From the theoretical perspective, AMOS had been employed in prior studies (Nemanich *et al.*, 2010) which demonstrated its suitability on the multidimensional construct of ACAP. Consequently, this study conducted SEM with the aid of AMOS software, and the results of the analyses are reported in Chapter 4.

### 3.6.1 Data Screening

Common to quantitative research design is the problem of missing data. The approach for dealing with missing data is informed by the extent of missing data, kind of missing data (i.e. single items, whole questionnaire, etc.) and the reasons for missing data (Peng *et al.* 2008; Graham, 2012). For instance, by drawn a sample from the total population, the excluded cases can be considered as missing, however this is typically ignored, since the former is representative of latter and the focus is to generalize the outcome to the entire population. Accordingly, the occurrence of missing data is usually anticipated in quantitative research design, but this does not impair the capability of the multivariate techniques to generalize findings to the entire population (Hair *et al.*, 2010).

However, missing data generated as a result of a respondent's omission or unwillingness to answer questions needs further investigation. The default option in SPSS is the Listwise method, which involves the deletion of cases with missing values. This method can result in a reduction in the sample size and also generate substantial standard errors. Consequent on these, the statistical power can be reduced, thereby increasing the probability of type II error (i.e., failing to reject the null hypothesis, when the null hypothesis is false). Also, deletion of missing data without

prior investigation could also introduce bias in effect estimates for regression coefficient.

Thus, in order to minimize the occurrence and eliminate the adverse effect of missing data, this study introduced several mechanisms at different stages. As noted previously, the development of the survey instrument followed through rigorous refinement processes of pre-screening and pilot testing so as to eliminate ambiguous questions, which are likely to be left uncompleted (see Section 3.4.2). Furthermore the onsite administration of the questionnaires facilitated higher response rates – clarifying respondents' queries on perceived ambiguous questions.

Despite the above initiatives, some data were discovered to be missing. Accordingly, during the data screening stage statistical analysis was conducted to investigate the pattern of missing data. The result revealed that only 4.98% of cases had missing values. Hair *et al.* (2010) and Babbie (2010) recommend outright deletion of cases with missing values when the extent of missing data is not high enough to affect the sample size. Given the low number of cases of missing data, i.e., less than 5%, the cases with missing values were excluded from further analysis (Savalei and Bentler, 2009).

Subsequent statistical procedures focused on testing the basic assumptions for SEM. Residual scatterplots were generated in order to identify and eliminate when necessary. Based on the graphical data output, cases with standardized residuals outside the range of +/-3 were considered as outliers. One of the most important assumptions for multivariate analysis is normality. The extent of deviation from normality is dependent on the shape of distribution and sample size (Hair *et al.* 2010). To assess the former, this study conducted statistical procedures to generate the skewness and kurtosis values for all the variables. The reported values for both were within the acceptable values of -2.0 and +3.5 (Lei and Lomax, 2005), as presented in Section 4.3.

Violation of the normality assumption could adversely affect goodness-of-fit indices and standard errors, thus results of the model estimation and testing could be biased. Nonetheless, some SEM estimation methods have capabilities for handling mild to slightly moderate violation of normality (Fan and Wang, 1998). For instance the effect of non-normality is insignificant on parameter estimates based on the maximum likelihood estimation (MLE) method (Lei and Lomax, 2005). Furthermore, SEM has demonstrated capability for handling non-normally distributed data, with large sample size. Hair *et al.* (2010) corroborate that the effect of non-normality becomes negligible with sample sizes of 200 or more.

In addition to the examination of skewness and kurtosis values, this study considered the graphical output of the normal probability plot. According to Hair *et al.* (2010) this plot displays the comparison of the values of the cumulative distribution of the actual data with that of a normal distribution. Basically, the normal distribution is represented by a straight diagonal line between the axes, while the actual residuals are plotted accordingly on the axes. For a normally distributed data set, the actual residuals are plotted along the diagonal line (see Section 4.3).

### 3.6.2 Refinement and Validation of Instrument

In addition to the rigorous processes underlying the development of the finalised questionnaire, the collected data was subjected to further refinement in order to validate the measurement scales.

#### 3.6.2a Reliability

Reliability is defined as the "consistence of measurement, the extent to which similar results are obtained through different forms of the same instruments or occasions of data collection" (McMillian and Schumacher, 1993: 227). Basically, it is the extent to which a measurement scale generates identical results when subjected to repeated assessment. As done in this study, some level of reliability is ascertained

in survey design through the use of standardized and replicated questionnaires (Babbie, 2010).

A salient issue pertinent to ensuring scale reliability is unidimensionality. This affirms that a set of measuring items are associated with a single construct (Sureshchandar *et al.*, 2001). Anderson and Gerbing (1982) premised misspecification of a measurement model on lack of unidimensionality. SEM reports the comparative fit index (CFI), as an indicator for unidimensionality, with an acceptable value of 0.90 or above (Sureshchandar *et al.*, 2001). Thus the CFI fit indices for the constructs are presented in Chapter 4 (see Section 4.6).

Assessment of reliability can be performed through the test-retest or internal consistency methods (Hair *et al.*, 2010). The former examines the degree of consistency for individual responses collected at two different points in time; thus it is more applicable in longitudinal studies. The latter gives "estimates of reliability based on the average correlation among items within a test" (Nunnally and Bernstein, 1994: 251). Following Saraph *et al.* (1989) the internal consistency method is considered to be more suitable for assessing reliability in cross sectional surveys. Thus, the analyses progressed to assessing the initial condition for internal consistency. This involved the examination of the item inter-correlation matrix, with items showing low correlation (i.e., $r < 0.30$) due for elimination (Nunnally and Bernstein, 1994). In addition, the Cronbach's alpha coefficients were examined. The acceptable lower limit for Cronbach's alpha coefficients is 0.7, while 0.6 is good enough for an exploratory study (Robinson, Shaver, & Wrightsman, 1991).

In order to satisfy statistical requirements for measurement reliability in SEM, the present study further computed the composite reliability for each of the measurement scales. Composite reliability can be interpreted in terms of Cronbach's alpha. However unlike the latter, which assumes equal weight for every item, composite reliability is computed from the actual factor loadings (Chau and Hu, 2001). Thus, it has been acknowledged to be of more significance, when assessing internal consistency in SEM (Chau and Hu, 2001; Hill *et al.*, 2009). As presented in

the next chapter, this study reported composite reliability values, which are greater than Bagozzi and Yi's (1988) recommended threshold of 0.60. Moreover, the comprehensive results of reliability analyses for all the measurement scales are presented in Chapter 4 (see Section 4.3).

### 3.6.2b Validity

Validity is applicable in assessing the accuracy of the measurement scale. Hair *et al.* (2006:3) define it as the "extent to which a set of measures correctly represents the concept of study." Two main types of validity are expected to be satisfied in quantitative research – content and construct (Hair *et al.*, 2010). The former is a subjective assessment of the extent of similarity between individual items and the concept being measured. It involves getting expert opinion and comments on the suitability of items underlying the measuring concept (Hair *et al.* 2010). As discussed in the earlier section on instrument pretesting, this study met the necessary conditions for ascertaining content validity (see Section 3.4.2).

The other measure of validity, i.e. construct is the "extent to which a set of measured items actually reflects the theoretical latent construct those items were designed to measure" (Hair *et al.* 2010). In order to satisfy this requirement both convergent and discriminant validity were assessed.

According to Hair *et al.* (2010) convergent validity is the extent to which multiple items of a construct are correlated. The insignificance of method variance can be ascertained, when this requirement is satisfied (Mitchell, 1985). This study adopted Anderson and Gerbing's (1988) procedure in assessing the convergent validity of the measurement model. Accordingly, in satisfying the requirement, the estimated coefficient for each of the loaded items on the associated construct should be of a value greater than twice its standard error (see Table 4.36). Also, following the suggestion of Sureshchandar *et al.* (2001), the value of the Bentler-Bonett coefficient was examined for each construct. Also the average variance extracted

(AVE) for each of the constructs was examined (see Table 4.37) to further demonstrate the satisfaction of convergent validity (see Section 4.7.2b).

Contrary to convergent, discriminant validity is an assessment of the degree to which two conceptually similar concepts are different (Hair *et al.* 2010). Central to discriminant validity is the uniqueness of each construct, which is evident in the low correlation between valid measures of two different constructs (Bagozzi, Yi, and Phillips, 1991). To assess discriminant validity, this research employed Bagozzi and Warshaw's (1990) guideline - which stipulates that the value of each pair of correlations should be less than 1.0, by an amount greater than twice the respective standard error. This approach has also been employed in recent studies (Walczuch, Lemmink, and Streukens, 2007; Lei, Ruyter and Wetzels, 2008). Detailed results of the assessment on constructs validity are reported in Sections 4.7.2b and 4.7.2c.

## 3.7 Exploratory Factor Analysis (EFA)

Following Hair *et al.* (2010) this study examined the interrelationships among the latent variables, with a view to validate their associated underlying factors. To this end, both the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are relevant to this study. EFA is a data interdependence technique which is traditionally used to explore data in order to delineate the variables according to their underlying dimensions (Hair *et al.*, 2010). The main purpose of this technique is to summarize interdependent variables according to their underlying dimensions (i.e., factors). Further to the theoretical premise and rigorous processes involved in the development of the measurement instrument, the EFA was only employed to assess the likelihood of common method variance (CMV) and unidimensionality of constucts. Also, Gerbing and Anderson (1988) recommend EFA as a prerequisite to conducting confirmatory factor analysis (CFA).

With the aid of SPSS 19, the Harman's single-factor test was conducted in order to ascertain the insignificance of CMV. This involves running all the variables

through EFA statistical procedures with the examination of the un-rotated factor solution (Podsakoff *et al.* 2003). The significance of CMV is confirmed if either of the following is evident: (i) a single factor is underlying all the variables or (ii) a general factor accounts for most of the covariance among variables. As shown in the reported results in Section 4.5 (see Table 4.21), none of the above was evident; therefore the presence of CMV is insignificant in the present study.

Other examined outputs from the EFA were Bartlett's test of sphericity and the measure of sampling adequacy (MSA). Together they inform the appropriateness of the inter-correlation among variables in generating the delineated factors. Specifically, the former evaluates the overall significance of the correlations among all the variables (i.e., significance value < 0.05). MSA evaluates the extent of inter-correlations among variables and the suitability of factor analysis (Hair *et al.* 2010). The appropriateness of factor analysis is justified in the present study, having reported significant values for Bartlett's test, and MSA values greater than 0.50 (Hair *et al.* 2010), as shown in Table 4.21.

In addition to the EFA, the CFA was conducted using SEM. Basically CFA provides a confirmatory test for the theoretically based measurement model (Hair *et al.*, 2010). It is suitable in explaining mediation in causal models through the estimation of indirect effects and causal parameters (James and Brett. 1984). According to Terblanche and Boshoff (2008) CFA offers a wide range of fit indices when assessing the fit of data set to the theoretical model. A more detailed explanation on the relevance of CFA in the present study is presented in Section 3.7.1.

## 3.8 Structural Equation Modelling (SEM)

As previously noted, the choice of SEM was premised on the unique advantage it offers in testing complex hypothesized relationships among the variables. According to Hair *et al.* (2010) SEM encompasses the capabilities of

multiple regression analysis, factor analysis and path analysis in a single model. As a result, it supports the simultaneous analyses of series of equations in complex causal relationships through the estimation of the interaction effects among independent variables or on dependent variables as well as indirect effects (Hoyle and Smith, 1994). Also, it allows the explanation of the indicator variables in terms of the underlying latent variables, thereby incorporating measurement error into the estimation process (Hair *et al.,* 2010). Contrary to regression, SEM incorporates more flexible assumptions which for instance, support estimation of parameters in the presence of multicollinearity (Byrne, 2010). Lastly, SEM offers a substantial number of fit indices, which aid in achieving a better assessed model (Peyrot, 1996).

The latent variable model adopted in this study, is an integration of two SEM models; measured variable path analysis and confirmatory factor analysis (Mueller and Hancock, 2008). Basically, the relationship between the indicator and latent variables constitutes the measurement model. This is then assessed through the CFA to find the fit of the hypothesized model with the collected data. According to Byrne (2001) SEM offers a statistical technique based on confirmatory data analysis of a structural model.

### 3.8.1 SEM Procedures

In line with the above, the present study followed the two-step SEM modelling technique, as suggested by Anderson and Gerbing (1988). The first step of any SEM analysis is development of the measurement model. As noted by Muller and Hancock (2008) this should evolve from aprior theoretical specification. Furthermore, the measurement scale for each of the constructs should be assessed using the EFA technique. This was done in adherence to Gerbing and Anderson's (1988) recommendation of EFA, as prerequisite to CFA, in order to establish the non-significance of CMV, unidimensionality and factorability of constructs. Thereafter the CFA procedure was conducted, so as to validate the fit of the measurement items with the associated latent variables (see Section 4.6).

Aside from the measurement model for each construct, the measurement model could also be extended to represent the non-structural relations among the latent variables (Muller and Hancock, 2008; Schreiber, Stage, King, Nora, and Barlow, 2006). Through this model the researcher can easily identify and fix mis-specification errors, which are likely to affect the fit of the structural model (Schreiber *et al.* 2006). Thus the outcome of analysis for the overall measurement model is presented in Section 4.6 (see Figure 4.22).

The second step is structural modelling, which involves the assessment of hypothesized effects among the latent variables as well as causal effects and degree of variance. Basically, the path diagrams were examined in assessing causal relationships among the exogenous and endogenous latent variables. In analogy to the regression model, SEM is made up of exogenous and endogenous variables. Using regression terminology, exogenous can be considered as the independent variable, which exerts some influence on the other variable, i.e. endogenous. Thus, the latter is like the dependent variable, which is regressed on the former. However, given SEM capability for handling complex models, an integrated structural path could be developed, wherein a specific latent variable is concurrently expressed as dependent and independent (Hair *et al.*, 2010; Byrne, 2010). An example is the path modelling technique for mediation used in this study, which involved the estimation of both the direct and indirect *paths* among latent variables.

### 3.8.2 Parameter Estimates in SEM

Model assessment in SEM is simply an attempt to establish the specified theoretical plausible model as the most appropriate of other possible models that can be generated from the data. Hence, model specification in both CFA and structural modelling ensues through the estimation of distinct parameters from the data points (Byrne, 2001). Parameters could be the values of regression coefficients between exogenous and endogenous variables or the factor loadings of the indicators on the latent variable. With respect to estimation, two different types of parameters are possible. Fixed parameters have values set at zero and as such are not to be estimated

from the data, while the values for free parameters are unknown and need to be estimated from the data points. The main condition for model estimation is the degree to which the free parameters can be estimated through the manipulation of data (i.e., degrees of freedom). Based on the degrees of freedom, model identification can be categorized into three types under-identified, just-identified, and over-identified. A model is under-identified, when the data points are fewer than the number of estimated parameters. In line with the requirement for identification, the present study consists of just-identified (i.e., zero degrees of freedom) and over-identified (i.e., positive degrees of freedom) models. The depicted latent variables in Figures 3.3 and 3.4 are just-identified models, with zero degrees of freedom (see pg. 114 - 115).

In SEM, the choice of parameter estimation method depends on the objective of the analysis (Hair, Ringle, and Sarstedt, 2011). The covariance method is suited for theory testing and development. For example, maximum likelihood (ML) uses the covariance technique, which involves the estimation of model parameters to minimize the discrepancy between the theoretical covariance matrix and the estimated covariance matrix (Fornell and Bookstein, 1982; Gefen *et al.* 2000). It can be performed with the aid of software packages like AMOS, LISREL, and EQS. The partial least square (PLS) approach is a variance based estimation technique for assessing the significance of relationships among latent variables (Haenlein and Kaplan, 2004). The primary objective of the PLS is to support exploratory or predictive analysis.

The present study employed the covariance method, using ML in the assessment of SEM models. ML is the default in most SEM software packages, and has capability for iterative estimation (Hoyle, 1995). ML is scale independent, allowing parameter estimation to be conducted with a combination of transformed and untransformed scales, without differences in generated results (Schumacker and Lomax, 2010). More importantly, ML's robustness in handling slight to moderate deviation from normality (Joreskog and Sorbom, 1986) was helpful in the present study considering that the collected data are from a self-reporting instrument.

According to Bagozzi and Yi (2012) self-reported data are more likely to deviate slightly from normality, as noticed in this study.

From the methodological perspective, extensive review of SEM literature over a period of 15 years found that most of the studies using Likert scales were conducted with the ML method (Breckler, 1990). Furthermore, influential scholars (e.g. Hair *et al.,* 2010; Savelei, 2008; Kline, 2005) on multivariate analysis acknowledge the wide acceptability of the ML estimation technique. Finally, in contrast with other related techniques like generalized least squares (GLS), the fit indices generated from the ML estimation technique have been found to be more sensitive to model misspecification (Fan, Thompson, and Wang, 1999).

As previously noted, model assessment with ML involves finding the best fit between the observed covariance matrices and the estimated covariance matrices. The primary objective of fitting is to obtain a model that is sensibly consistent with the observed data without need for re-specification (Bagozzi and Yi, 2012). Therefore, reliable estimation of the structural paths is dependent on the fit of the measurement model. Nevertheless a good fitting model does not always imply a valid model. Non-valid but good fitting models could be derived when all the parameters of a model are zero - this could be an indication of poor discriminant validity or presence of Heywood cases. The presence of Heywood case is ascertained when there is a negative estimate for the variance or the correlation estimate is greater than one in absolute value, i.e., the error variance is negative or the standardized loading is greater than 1 (Kolenikov and Bollen, 2012). Thus, further to a good fitting model, the parameter estimates should be carefully considered to ensure the practicality of the model.

### 3.8.3 Goodness-of-fit Indices for SEM

Another significant issue in model assessment is the choice of fit indices. Several fit indices have been developed to support the assessment of fit between the observed data and hypothesized model, thereby guiding the researcher in the course

of model re-specification. A model could be accepted and retained, when the values of the selected indices reached the criterion cut-off point, otherwise the modification indices (MI) as well as standardized residuals could be considered in order to identify areas of mis-specification. In accordance with best practices (Bagozzi and Yi, 2012), this study only incorporated suggestions on mis-specifications in the modifications of the model based on theoretical justification. Due to the limitations of individual fit measures, scholars (Hair *et al.* 2010; Kline, 2005; Byrne, 2010) have suggested the use of multiple fit indices. Table 3.15 shows the fit indices employed in the present study along with the desirable criteria for each.

Absolute fit indices are the foundations for all other measures. These indices are generated as output of the comparison between the observed covariance matrices and the estimated covariance matrices. The measures offer the basic assessment on the extent to which a model fits the empirically observed data (Hair *et al.* 2010). Thus, measures of fit are expressed in terms of the extent of disparity between the model and the perfect fit (Hu and Bentler, 1992). As shown in Table 3.15, this study considered five different measures of absolute fit indices. The selected measures for this study are briefly described in the following section.

**Table 3.15:** Sampled Goodness-of-Fit Indices

| Fit Indices | Desirable Criteria |
|---|---|
| **Absolute fit indices** | |
| Chi-square statistic ($\chi^2$) | The obtained $\chi^2$ value should be close to zero, and interpreted based on the degrees of freedom. |
| Normed Chi-square (NC) | Assume reasonable fit for value less than or equal to 5 (Mak and Sockel, 2001) |
| Goodness-of-fit index (GFI) | Assume good fit for value greater than or equal to 0.8 (Forza and Filipini, 1998; Greenspoon and Saklofske, 1998) |
| Adjusted goodness of fit index (AGFI) | Assume good fit, for value equal to or greater than 0.80 (Forza and Filippini, 1998) |

**Table 3.15:** Sampled Goodness-of-Fit Indices (…Continued)

| Fit Indices | Desirable Criteria |
|---|---|
| **Absolute fit indices** | |
| Root mean square error of approximation (RMSEA) | Assume mediocre fit, for value between 0.80 and 0.10 (MacCallum *et al.*, 1996)<br>Assume close approximate fit, for value equal to or less than 0.05 (Browne and Cudek, 1993) |
| **Incremental fit indices** | |
| Normed fit index (NFI) | Assume good fit, for value greater than 0.90 (Forza and Filippini, 1998) |
| Comparative fit index (CFI) | Assume acceptable fit to data, for value greater than 0.90 (Hair *et al.*, 2010; Schhaufeli et al., 2009). |
| Tucker Lewis index (TLI) | Assume well-fitted model, for value greater than 0.90 (Vandenberg and Scarpello, 1994) |

The Chi-square statistic ($\chi^2$) is the traditional measure of "badness of fit" and the desirable criterion is to obtain a small value relative to the degrees of freedom (Kline, 2005). The main assumption underlying this measure is that there is a zero fit for the best fitting model. According to Kline (2005) these measures correspond to the "badness of fit" in that the larger the values relative to degrees of freedom, the further the model differs from the perfect fit. However, due to several limitations, its usage as the only measure of fit is unacceptable. Joreskog and Sorbom (1986) assert to $\chi^2$'s sensitivity to data with non-normal distribution; Hair *et al.* (2010) acknowledge the strong influence of sample size; and finally it has proven unreliable when handling complex model (Kline, 2005). Following most SEM based analysis, this study also considered the values of Normed Chi-square (NC). A model's NC is the ratio of $\chi^2$ to the degrees of freedom (Mak and Sockel, 2001). As reported in Chapter 4, the values of NC for all the assessed models are lesser than the highest acceptable value of 5 for reasonable fit (Mak and Sockel, 2001).

Joreskog and Sorbom (1986) developed GFI as an alternative to the Chi-square test in order to estimate the proportion of variance that can be explained from the estimated covariance matrix (Tabachnick and Fidell, 2012). According to Diamantopoulos and Siguaw (2000) the proportion of variance or covariance explained by the model is an indication of the extent to which the model can reproduce the observed covariance matrix. Nevertheless, its sensitivity to degrees of freedom, sample size and the number of parameters has restricted its usage as a sole measure of fit (Kline, 2005). The AGFI was developed in order to adjust GFI based on the degrees of freedom; however Tabachnick and Fidell (2012) argue that the fit could be compromised in a saturated model. Despite the limitations and recommendations against their usage (Sharma *et al.* 2005), both have continued to feature in reported analyses to support the assessment of model fit (Hooper, Couglan, and Mullen, 2008). Both GFI and AGFI can take any value between 0 and 1, with value closer to 1 indicating a good fit (Hair *et al.* 2010). As presented in Section 4.6, the reported values in this study are higher than the cut-off point of 0.80 (Forza and Filippini, 1998; Shimizutani, *et al.* 2008).

The last measure of absolute fit examined in this study was the RMSEA. This can be described as the least problematic of all the absolute fit measures (Hooper *et al.* 2008). According to Byrne (2001), RMSEA is a measure of the extent to which a model having unknown but optimally selected parameter estimates would fit the estimated covariance matrix. Its ability to handle non-normally distributed data as well as small sample size has been widely acknowledged (Hu and Bentler, 1998). Expectedly, Diamantopoulos and Siguaw (2000) describe it as an informative fit index because of the parsimonious estimation it offers through the selection of the model with fewer parameters. Like the $\chi^2$ measure, RMSEA follows the "badness of fit" criterion, with a value closer to zero as desirable in order to establish good fit. This study considered a value of 0.05 or less as the indicator of close approximate fit, and values between 0.06 and 0.08 as indicators of a reasonable error of approximation (Browne and Cudeck, 1993), while values ranging from 0.08 to 0.10 are indicator of mediocre fit, and values higher than 0.10 indicate poor fit (MacCallum *et al.* 1996).

The incremental fit indices are measures derived from the comparison of the Chi-square value to a baseline model (Hooper *et al.* 2008). These measures have also been referred to as comparative (Miles and Shevlin, 2007) or relative fit indices (McDonald and Ho, 2002). As shown in Table 3.15, the first measure of incremental fit examined in this study was the NFI. This is the output generated from the comparison between the model's $\chi^2$ and that of the independence model. The independence model represents the worst case scenario, wherein all the measured variables are uncorrelated. The major limitation of the NFI is sensitivity to sample size (Bentler, 1990), and the TLI measure has been developed to correct this in simpler models (Hooper *et al.* 2008). Moreover, this issue is of negligible effect in the present study since the sample size was in excess 200 (Mulaik *et al.* 1989). Both NFI and TLI can be any value from 0 to 1. Following Hu and Bentler (1992), this study employed a cut-off point of 0.80, with all the reported values exceeding this point (see Section 4.6).

The third incremental measure examined in this study was the CFI, which is an improvement on the NFI's limitation in handling small sample size (Byrne, 2001; Tabachnick and Fidell, 2012). Similar to NFI, assessment involves making comparison between the independence model and the sample model, with the generation of an output value between 0.0 and 1.0. A value closer to 1.0 is an indication of good fit, and the lowest cut-off point has been set at 0.90 (Hu and Bentler, 1992). The ability of CFI to handle small sample size has contributed to its acceptability as one of the most important measure of fit indices in SEM (Fan *et al.* 1999).

The last set of measures examined in this study was the parsimony fit indices. In an attempt to adjust for the loss of degrees of freedom, Mulaik *et al.* (1989) developed the PGFI and PNFI, based on GFI and NFI respectively. The primary objective of these measures is to penalize the less parsimonious model, by prioritizing the simpler theoretical model ahead of the complex ones. Thus, a lower value is expected as the model become more complex. Mulaik *et al.* (1989) suggest

that a value within the region of 0.50 is appropriate for the parsimonious measures, provided other measures of fit are well above their cut-off point. The results of assessment for the goodness-of-fit indices for all the research constructs are presented in Chapter 4 (see Section 4.6).

### 3.8.4 Assessments of Models

Further to the above exposition on SEM, the subsequent sub-sections examine the models underlying the conduct of SEM in this study. Basically, the conducted statistical analyses are categorized into three models - measurement, structural, and mediating. A brief description of each of the models is presented as follows.

#### 3.8.4a Measurement Model (CFA)

The basic statistical assumptions relevant to the measurement model have been discussed in the earlier section on instrument refinement and validation, as well as EFA (see Sections 3.4.2 and 3.6). Having met the necessary conditions for reliability and validity (see Sections 4.3 to 4.5), the focus was shifted to factor analysis (see Section 4.6). Factor analysis is the statistical method used in the assessment of interrelationships among large number of variables, and also in the clarification of the factor underlying these variables (Hair *et al.* 2010). This study conducted both the exploratory and confirmatory factor analysis; the latter has been examined in the Section 3.6. In fact measurement model consists of both the EFA and CFA, and the latter has been acknowledged as a precondition for the achievement of good fit for the CFA (Anderson and Gerbing, 1988).

CFA is a theory-driven technique for testing the relationships between indicator variables and latent variables, i.e., factors (Brown, 2006). A generic CFA on the latent variable measurement model is depicted in Figure 3.3. The indicator variables are expressed in terms of items or questions in the questionnaire. Based on pertinent theory or other evidence, a relationship is hypothesized between a set of

indicators and the latent variable, and the CFA is performed in order to test the appropriateness of such.

Thus, contrary to EFA, which depends on the data, CFA examines the degree to which the hypothesized pattern of factor loadings matches the actual data (Hair *et al.* 2010). Brown (2006) highlights it superior analytical capabilities, which include the use of data in validating an a priori measurement scale, evaluation of method effects, and the assessment of model stability (Brown, 2006). CFA is best performed on well-developed models with validated factors (Byrne, 2010) and it offers a wide range of fit indices to assess the extent of fit between data and theoretical model. Accordingly, this study performed the CFA in order to test the fit of the hypothesized model with collected data (see Section 4.6).

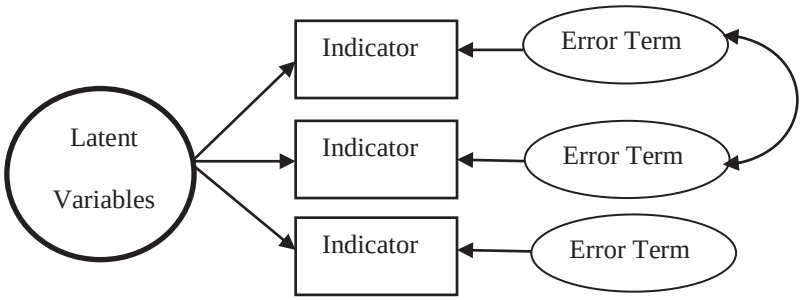


**Figure 3.3:** Schema for a First Order Latent Variable Measurement

### 3.8.4b Structural Model

This model estimates the hypothesized causal path among the exogenous and endogenous latent variables. The structural model results from the SEM procedure underlying the testing of hypothesized relationships. With the aid of the AMOS 18 software package, hypothesized relationships were diagrammed to show the causal paths among the variables. The structural model was assessed following the outlined procedures for structural equation modelling above. Based on the measure-of-fit indices, and examination of parameter estimates and modification indices, the model was re-specified when necessary in accordance with theoretical and empirical

justification. A generic representation of a structural model, consisting of two exogenous variables and an endogenous variable is depicted in Figure 3.4. A more comprehensive review on the structural model is presented in Chapter 4 (see Section 4.8.1).

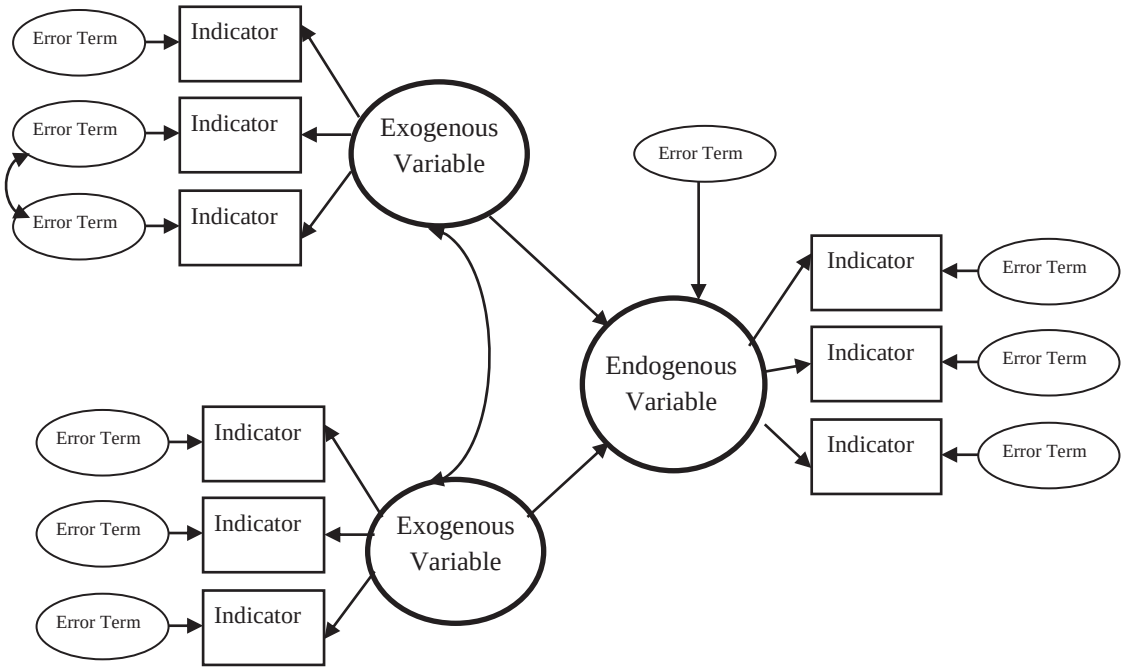


**Figure 3.4:** A Generic Direct Structural Model with Latent Variables

### 3.8.4c Mediating Model

This model involves interrelationships among three latent variables – independent, dependent and mediator (Baron and Kenny, 1986). In the present context, this model was employed in testing the hypothesized mediation effect of shared cognition on the influence of individual ability to assimilate knowledge on team ability to utilize knowledge. The mediating or indirect model explains the effect of an intervening variable on the relationship between the independent and dependent variables (Pituch and Stapleton, 2008). The conventional approach for testing mediation in regression models emerged following contributions from Kenny and colleagues (e.g. Kenny *et al.* 1998; Baron and Kenny, 1986; Judd and Kenny, 1981).

This approach relies on Sobel's test, which is the statistical procedure used to evaluate the significance of the mediation effect. Although, recent studies on SEM have adopted this approach in testing for mediation (Sarkis *et al.* 2010; Delerue and Lejeune, 2010; Curran *et al.* 2009), however, the inability of this approach to generate the confidence interval statistics and sensitivity to non-normality are major limitations (Preacher and Hayes, 2004).

The above limitations are adequately addressed by the bootstrapping approach, which offers a non-parametric resampling procedure for the observed data, in order to generate empirical sampling distribution for the indirect path (Preacher and Hayes, 2004). Therefore, this study considered both techniques in order to validate the mediating model (see Section 4.8.2).

## 3.9 Summary of the Chapter

This chapter examines the underlying philosophy for this study to justify the appropriateness of the positivism paradigm for the thesis. Accordingly, the procedure for the data collection starting with the development and pretesting of survey instruments to the administration and collation of data are explicitly considered. The statistical procedures for the analyses of the data are discussed, with emphasis on the two main software packages of SPSS and AMOS. The application of the former in the performance of preliminary assessment of data, descriptive analysis, and exploratory factor analysis are discussed. The suitability of the latter in the conduct of structural equation modelling (SEM) is described. Further expositions are provided on the conduct of SEM include the selection of maximum likelihood parameter estimation method, goodness-of-fit indices and assessment of the measurement and structural models.

# CHAPTER 4

## DATA ANALYSIS AND RESULTS

### 4.1 Introduction

This chapter reports the results of the statistical analyses, which include the demographic profiles of the respondents, descriptive analysis, EFA, CFA, and SEM. The demographic profiles are summarized in Section 4.2. The exploratory data analysis, which consists of sub-Sections on descriptive, reliability, and normality analysis are included in Section 4.3. In Section 4.4, the results of scale development and validation are presented, with sub-Sections on data screening, missing data and outliers. Section 4.5 reports the results of EFA for all the latent variables along with the assessment of the common method variance (CMV). The outcomes of the CFA on each of the latent variables are presented in Section 4.6, while the overall measurement models are reported in Section 4.7. In Section 4.8, the results of assessment of construct reliability and validity are presented. Section 4.9 covers the assessment of the structural models; main and mediating. Finally, the results of hypotheses testing are summarized in Section 4.10.

### 4.2 Respondents' Demographic Profiles

A total of 400 questionnaires were administered to members of 150 teams, across the sampled 35 engineering firms engaged in joint projects, between November, 2012 and February, 2013. Based on the preliminary data screening, 6.98% of the returned questionnaires were discovered to have missing values. These were excluded from further analysis, thereby reducing the returned and valid questionnaires from 272 to 253. The outcome of investigation on the presence of extreme data points revealed another 5 as outliers. Having deleted the outliers, the total numbers of questionnaires was 248, and these were used in the course of

conducting further analysis. As highlighted in Section 3.4, the technique employed in survey administration contributed in a high overall response rate of 68%.

As shown in Table 4.1, the first demographic characteristic considered in this study was the gender, with 87.9% (i.e., 218 respondents) male and 12.1% (i.e., 30 respondents) female. The engineering field is a male-dominated profession in Nigeria (Akingbade, 2010; Chovwen, 2007) as a result the substantial difference in gender is expected. The respondents within the age group of 26 – 35 years made up 55.6% of the sample, followed by those within 36 – 45 years, corresponding to 35.5%. Moreover, the other two age categories of 25 years and below, and 46 years and above, made up 3.6% and 5.2% of the total respondents respectively. Given that the majority of the respondents (i.e., 91.1%) are within the 26 – 45years age bracket, it can be deduced that the study considered employees within the mid-career level. Regarding educational attainment, 96.8% of the respondents have at least a bachelor or equivalent degree, with 23% of these having a graduate degree.

Consistent with the age demography, a majority of the respondents (i.e., 79.4%) have cumulated working experience of at least 4years in the oil industry. The length of working experience is the total tenure of the respondents in the oil industry, which encompasses the time spent on joint projects, in local firms, and other firms within the oil industry. Thus, when juxtaposed with the total length of time engaged in joint projects, the sampled respondents were found to have acquired experience in other areas beyond their engagement in the joint project teams. Specifically, only 59.3% of the respondents have a minimum of 4 years working experience in a joint projects team. A more diverse distribution was obtained on the respondents' total length of time in the joint projects. With 10.5% having less than a year, 30.2% are within 1-3years, 35.1% are within 4-6 years, those between 7-9 years constituted 12.9%, and 11.3% with 10 or more years. Finally, with respect to job positions, a majority of the respondents (i.e. 75.8%) were engineers, followed by supervisors who constituted 9.3%. The technicians and managers made up 4.0% and 5.2% of the total respondents, respectively. And the remaining 5.6% occupied other positions like designers, testers, analysts, etc.

Given the descriptive statistics of the demographic profiles, the appropriateness of the sampled respondents for the investigated phenomenon can be ascertained. As discussed above, the majority are within the midlevel career given the distributions on age, educational attainment, working experience, total length of time engaged in joint projects, as well as job positions (see Table 4.1).

**Table 4.1:** Respondents' Demographic Profiles

| Profile | Frequency (N=248) | Percentage (100%) |
|---|---|---|
| **Gender** | | |
| Male | 218 | 87.9 |
| Female | 30 | 12.1 |
| **Age** | | |
| 25-Years and below | 9 | 3.6 |
| 26 – 35 Years | 138 | 55.6 |
| 36 – 45 Years | 88 | 35.5 |
| 46-Years and above | 13 | 5.2 |
| **Highest level of Education** | | |
| Diploma / less | 8 | 3.2 |
| Bachelor / Equivalent | 183 | 73.8 |
| Graduate Degree | 57 | 23.0 |
| **Total Length of Working Experience** | | |
| 3 Years and below | 51 | 20.6 |
| 4 – 8 Years | 111 | 44.8 |
| 9 – 13 Years | 62 | 25.0 |
| 14 Years and above | 24 | 9.7 |
| **Total Length of Time Engaged in JVs** | | |
| Less than a year | 26 | 10.5 |
| 1 – 3 Years | 75 | 30.2 |
| 4 – 6 Years | 87 | 35.1 |
| 7 – 9 Years | 32 | 12.9 |
| 10 Years and above | 28 | 11.3 |
| **Position in JVs** | | |
| Technician | 10 | 4.0 |
| Engineer | 188 | 75.8 |
| Supervisor | 23 | 9.3 |
| Manager | 13 | 5.2 |
| Other | 14 | 5.6 |

## 4.3 Exploratory Data Analysis

This Section includes the results of descriptive analyses, test of normality and scale reliability for the micro-antecedents (i.e., prior experience, need for cognition, learning and performance goal orientation); multidimensional ACAP (i.e., individual ability to recognize and assimilate knowledge, shared cognition and team ability to utilize knowledge); and social contexts (i.e., individual perceptions of partner's support and trust in partner). The detailed descriptions of the statistical analyses for each of the variables are presented next.

### 4.3.1 Prior Experience

The descriptive statistics for the prior experience measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.2. With the exception of item E3, which has a kurtosis value of -1.109, the skewness and kurtosis values for all the other items are less than ±1.0. Nevertheless, the skewness and kurtosis values for all the items are less than the cut-off criterion (see Section 3.5.1) thus the distribution for each of the items does not violate the normality assumption. One of the negative implications of the lack of normality is inflation of the chi-square value. According to West, Finch and Curran (1995) the chi-square goodness-of-fit statistic is considered reliable provided the skewness and kurtosis values for the each indicators are lower than 2.00 and 7.00, respectively.

Furthermore, the normality plot for the 5-item scale shows that each of the observed values is closely located with its expected value, thereby creating a more or less straight line (see Figure 4.1). Accordingly, the normality for the overall measurement scale for prior experience is assumed. The prior experience scale computed from the 5 items has a mean score of 3.45, which implies that the local employees engaged in the joint projects possess well above average prior related experience on the projects. This scale has a Cronbach's alpha value of 0.764, which is greater than the lowest cut off point of 0.7 (Hair *et al.*, 2010). Thus, these items are

considered to have high internal consistency. A summary of the descriptive statistics for the prior experience scale is presented in Table 4.3.

**Table 4.2:** Descriptive Statistics of Items for Prior Experience

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| E1 | I had the required general knowledge on the project. | 3.76 | 0.914 | -0.863 | 0.652 | 0.520 |
| E2 | I had acquired substantial theoretical knowledge. | 3.96 | 0.741 | -0.661 | 0.654 | 0.445 |
| E3 | I had attended foreign training in related area. | 2.51 | 1.346 | 0.433 | -1.109 | 0.431 |
| E4 | I had substantial working experience in related area. | 3.48 | 1.134 | -0.595 | -0.486 | 0.731 |
| E5 | I had acquired some level of expertise in related area. | 3.53 | 1.094 | -0.627 | -0.330 | 0.615 |

[a] Standard Deviation

**Table 4.3:** Descriptive Statistics for Prior Experience Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 1 | 5 | 3.45 | 0.764 | -0.382 | -0.056 | 0.764 |

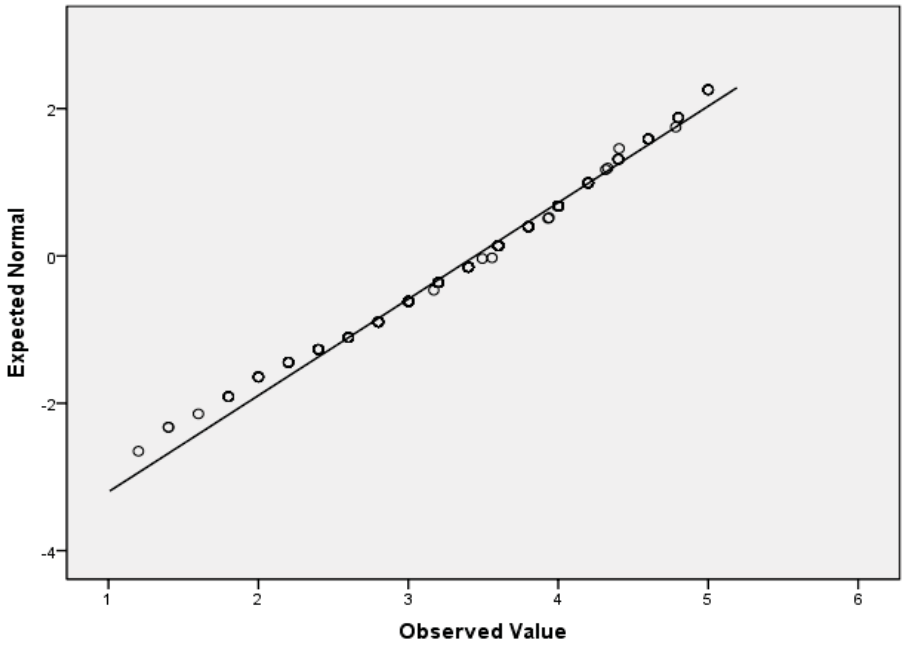


**Figure 4.1:** Normality Probability Plot for Prior Experience Scale

### 4.3.2 Learning Goal Orientation

The descriptive statistics for the learning goal orientation measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.4. As shown in this table, the item-total correlation for all the items exceed the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). Although, the skewness values for the items are greater than 1, these values are within the expected range of -2.0 and +3.5 (Lei and Lomax, 2005). Likewise, the kurtosis values are within the acceptable range, thereby satisfying the normality assumption. The mean score for the overall scale is 4.65, which is a confirmation of the high learning goal orientation of the employees. This scale can be considered to be reliable, given that the value of Cronbach's alpha (i.e., 0.821) is above the acceptable value of 0.700 (Hair *et al.*, 2010). The descriptive statistics and the normality plot for the overall scale are summarized in Table 4.5 and Figure 4.2.

**Table 4.4:** Descriptive Statistics of Items for Learning Goal Orientation

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| L1 | I am willing to pursue challenging task that I can learn new things from. | 4.74 | 0.457 | -1.367 | 0.536 | 0.603 |
| L2 | I often look for opportunities to develop new skills and knowledge. | 4.71 | 0.491 | -1.316 | 0.630 | 0.588 |
| L3 | I prefer taking up challenging and difficult tasks at work where I can learn new skills. | 4.53 | 0.623 | -1.172 | 1.261 | 0.563 |
| L4 | I am willing to put in extra efforts where necessary, for me to develop new skills and enhance my knowledge. | 4.69 | 0.496 | -1.241 | 0.409 | 0.728 |
| L5 | I prefer to work in environments that require high level of ability and talent. | 4.58 | 0.577 | -1.037 | 0.088 | 0.564 |

[a] Standard Deviation

**Table 4.5:** Descriptive Statistics for Learning Goal Orientation Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 3 | 5 | 4.65 | 0.402 | -1.319 | 2.136 | 0.812 |

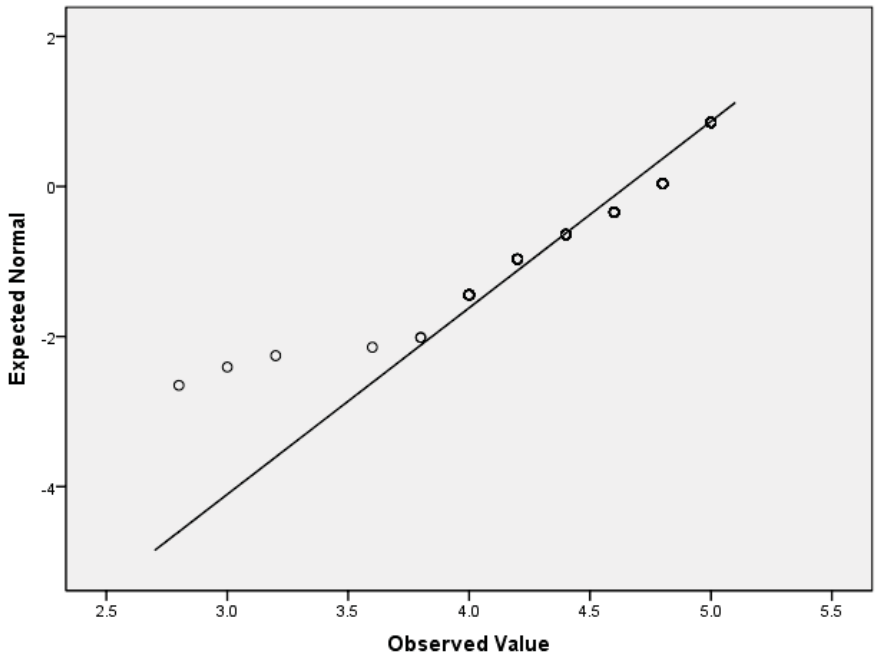


**Figure 4.2:** Normality Probability Plot for Learning Goal Orientation Scale

### 4.3.3 Performance Approach Goal Orientation

The descriptive statistics for the performance approach goal orientation measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.6. The item-total correlation for each of the item exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). The skewness and kurtosis values are less than +/-1, thus all are within the acceptable range to satisfy the normality assumption (see Section 3.5.1). For the overall scale, the mean score of 3.54 reveals that the employees' orientation toward performance is well above average. However, in comparison to the mean score for learning goal orientation (4.65), the sampled respondents can be described as more learning focused than performance driven. The overall scale for performance approach goal orientation has a Cronbach's alpha value of 0.814, thus this scale is accepted as reliable, with high internal consistency. The descriptive statistics and the normality plot for the overall scale are summarized in Table 4.7 and Figure 4.3.

**Table 4.6:** Descriptive Statistics of Items for Performance Approach Goal Orientation

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| O1 | I like to demonstrate that I can perform better than my co-workers. | 3.22 | 1.048 | -0.186 | -0.242 | 0.603 |
| O2 | I try to figure out what it takes to prove my competency to others at work. | 3.65 | 0.978 | -0.562 | -0.066 | 0.666 |
| O3 | I enjoy it when others at work are aware of how well I am doing. | 3.62 | 0.959 | -0.329 | -0.359 | 0.654 |
| O4 | I prefer to work on projects where I can prove my competency to others. | 3.66 | 1.034 | -0.510 | -0.305 | 0.614 |

[a] Standard Deviation

**Table 4.7:** Descriptive Statistics for Performance Approach Goal Orientation Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 1 | 5 | 3.54 | 0.806 | -0.358 | -0.095 | 0.814 |

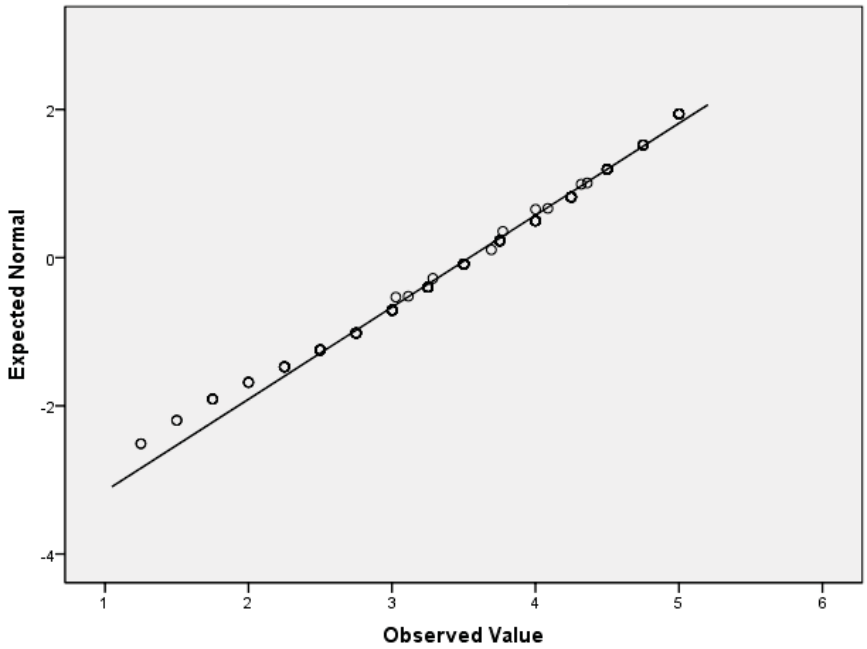


**Figure 4.3:** Normality Probability Plot for Performance Approach Goal Orientation Scale

### 4.3.4 Need for Cognition

As previously noted, the original 18-item scale for need for cognition was reduced to 9-item upon the preliminary analysis of the pilot study (see Section 3.4.2). Table 4.8 summarizes the means, standard deviations, item-total correlations, skewness and kurtosis values for the 9 measurement items. As shown in this table, with the exception of items N3 and N8, the item-total correlation for the other items exceed the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). Thus, the two items were deleted. The Cronbach's alpha for the revised scale of 7-item was 0.779.

**Table 4.8:** Descriptive Statistics of Items for Need for Cognition

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| N1 | I like to have the responsibility of handling a situation that requires a lot of thinking. | 4.03 | 0.752 | -0.580 | 0.268 | 0.457 |
| N2* | I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. | 4.00 | 0.858 | -0.774 | 0.187 | 0.516 |
| N3** | I find satisfaction in deliberating hard and for long hours. | 3.11 | 1.031 | -0.059 | -0.560 | 0.195 |
| N4* | I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something. | 3.75 | 1.008 | -0.907 | 0.472 | 0.423 |
| N5 | I really enjoy a task that involves coming up with new solutions to problems. | 4.33 | 0.707 | -1.048 | 1.450 | 0.476 |
| N6* | It's enough for me that something gets the job done; I don't care how or why it works. | 3.82 | 1.104 | -0.764 | -0.233 | 0.466 |
| N7* | I prefer to think about small, daily projects to long-term ones. | 3.61 | 0.967 | -0.594 | 0.189 | 0.479 |
| N8** | The idea of relying on thought to make my way to the top appeals to me. | 3.41 | 1.046 | -0.537 | -0.061 | 0.159 |
| N9* | Learning new ways to think doesn't excite me very much. | 3.93 | 0.937 | -0.987 | 0.895 | 0.553 |

* Reversed coded item

**Dropped item

[a] Standard Deviation

Moreover, the skewness and kurtosis values for the items are less than the cut-off criterion value, and the normality plot for the overall scale revealed an almost straight line. Thus, this scale has not violated the assumption of normality. The

overall scale has a mean score of 3.92, which implies that the local employees involved in the joint projects are well disposed to engaging in and enjoying thinking. The descriptive statistic and the normality plot for the overall need for cognition scale are summarized in Table 4.9 and Figure 4.4.

**Table 4.9:** Descriptive Statistics for Need for Cognition Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 2 | 5 | 3.92 | 0.600 | -0.415 | 0.111 | 0.779 |

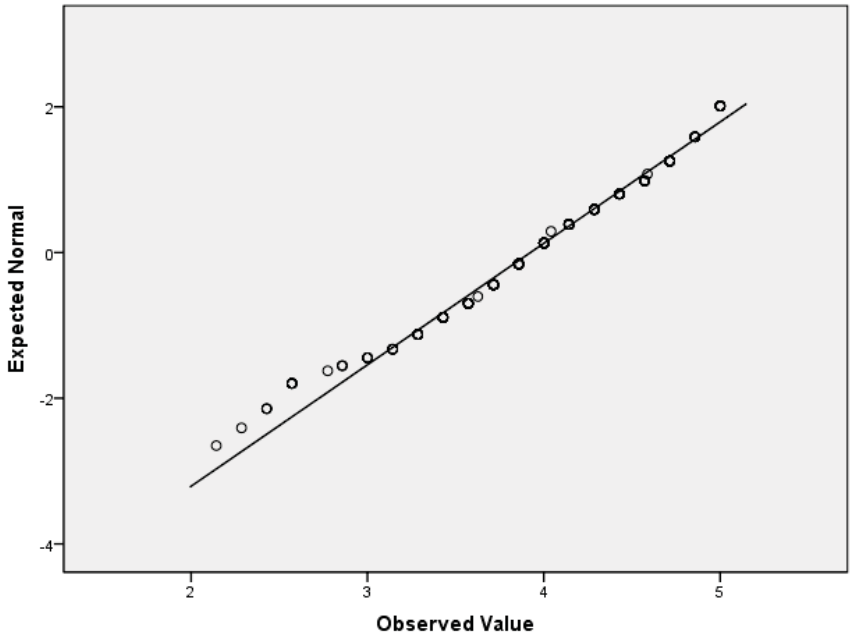


**Figure 4.4:** Normality Probability Plot for Need for Cognition Scale

### 4.3.5 Partner Support

A summary of the means, standard deviations, item-total correlations, kurtosis and skewness values of the measurement items for respondents' perception of the level of partner's support is presented in Table 4.10. As shown in this table, the item-total correlation for each of the item exceeds the lowest cut-off point of 0.3

(Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). The skewness and kurtosis values for all the items are within the acceptable range to satisfy the normality assumption (see Section 3.5.1).

**Table 4.10:** Descriptive Statistics of Items for Partner Support

| Item Code | Item | Mean | Std Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| P1 | Our partner provided us adequate technical support. | 3.89 | 0.765 | -0.521 | 0.219 | 0.599 |
| P2 | Our partner provided us relevant training. | 3.47 | 0.937 | -0.510 | -0.026 | 0.537 |
| P3 | Our partner's employees were accessible and helpful. | 3.79 | 0.742 | -0.778 | 1.386 | 0.686 |
| P4 | Our partner's employees actively participated. | 3.92 | 0.666 | -0.575 | 0.972 | 0.640 |

[a] Standard Deviation

For the overall scale, the mean score of 3.77 indicates that the employees' perceived the level of partners' support is quite high. This scale is assumed to be reliable with a Cronbach alpha value of 0.794, which is greater than the lowest cut-off point of 0.700. Thus, all the items are retained at this stage. The descriptive statistics and normality plot for the overall scale are summarized in Table 4.11 and Figure 4.5.

**Table 4.11:** Descriptive Statistics for Partner's Support Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 2 | 5 | 3.77 | 0.616 | -0.355 | 0.327 | 0.794 |

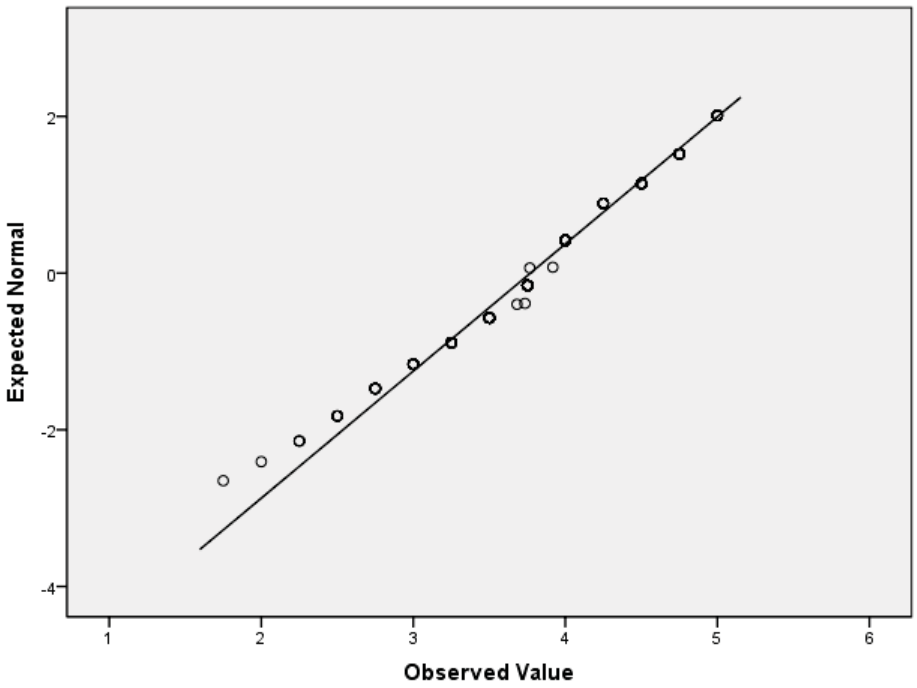


**Figure 4.5:** Normality Probability Plot for Partner's Support Scale

### 4.3.6 Trust in Partner

The descriptive statistics for the trust in partner measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.12. The item-total correlation for each of the item exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). Further, the skewness and kurtosis values are less than the cut-off criterion (see Section 3.5.1), thus the distribution for each of the items does not violate the normality assumption.

**Table 4.12:** Descriptive Statistics of Items for Trust in Partner

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| T1 | Our partner met their obligations to us. | 3.82 | 0.726 | -0.534 | 0.428 | 0.589 |
| T2 | Our partner dealt fairly with us. | 3.67 | 0.732 | -0.385 | 0.001 | 0.559 |
| T3 | Our partner did not mislead us. | 3.93 | 0.637 | -0.410 | 0.761 | 0.504 |
| T4 | Our partner kept their word. | 3.77 | 0.721 | -0.265 | -0.023 | 0.607 |

[a] Standard Deviation

As shown in Figure 4.6, the normality plot for the 4-item scale is such that each of the observed values is closely located with the expected values, thereby creating a more or less straight line. Accordingly, the normality for the overall scale for trust in partner is assumed. Furthermore, the overall scale for trust in partner has a mean score of 3.80. This indicates that the sampled employees have a relatively high level of trust perception in the partners. The overall scale is considered to be reliable, given that the value of the Cronbach's alpha (i.e., 0.764) is above the acceptable value of 0.700 (Hair *et al.*, 2010). Thus, all the items are retained at this stage. The descriptive statistics and normality plot for the overall scale are summarized in Table 4.13 and Figure 4.6.

**Table 4.13:** Descriptive Statistics for Trust in Partner Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 2 | 5 | 3.80 | 0.540 | -0.199 | 0.039 | 0.764 |

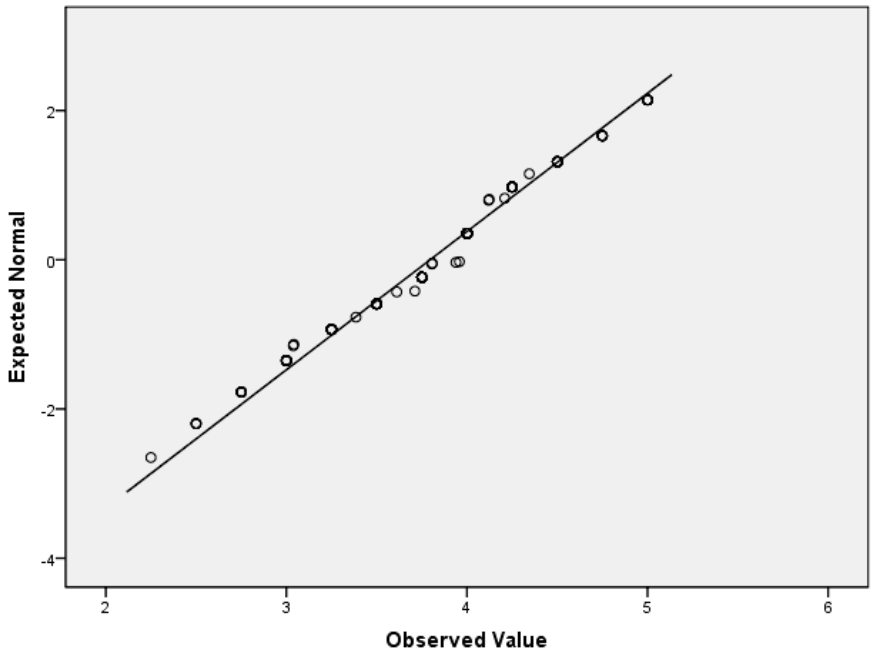


**Figure 4.6:** Normality Probability Plot for Trust in Partner Scale

### 4.3.7 Ability to Recognize the Value of Knowledge

The descriptive statistics for the ability to recognize the value of knowledge measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.14. The item-total correlation for each of the item exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). Also, the skewness and kurtosis values for all the items are less than +/-1, which is within the acceptable range to satisfy the normality assumption (see Section 3.5.1).

**Table 4.14:** Descriptive Statistics of Items for Ability to Recognize the Value of Knowledge

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| R1 | I was able to develop awareness on joint venture partner tools, practice, and knowledge. | 3.92 | 0.735 | -0.304 | -0.130 | 0.544 |
| R2 | I was able to keep track of JV partner tools, practice, or knowledge, by consulting other sources of information. | 3.94 | 0.656 | -0.536 | 0.985 | 0.564 |
| R3 | I was able to identify partner's tools or practice with the most significant value to the project performance. | 3.94 | 0.677 | -0.473 | 0.661 | 0.628 |
| R4 | I was capable at accurately evaluating the worth of partner's knowledge in the project. | 3.79 | 0.693 | -0.125 | -0.151 | 0.630 |

[a] Standard Deviation

For the overall scale, the mean score of 3.90 indicates that the local employees' perceived themselves as having quite high ability to recognize the value of knowledge associated with the foreign partners. This scale can be considered to be reliable given that the obtained value of the Cronbach's alpha (i.e., 0.777) is above the acceptable value of 0.700 (Hair *et al.*, 2010). Thus, all the items are retained at this stage. The descriptive statistics and normality plot for the overall scale are summarized in Table 4.15 and Figure 4.7.

**Table 4.15:** Descriptive Statistics for Ability to Recognize Value of Knowledge Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 3 | 5 | 3.90 | 0.534 | 0.013 | 0.114 | 0.777 |

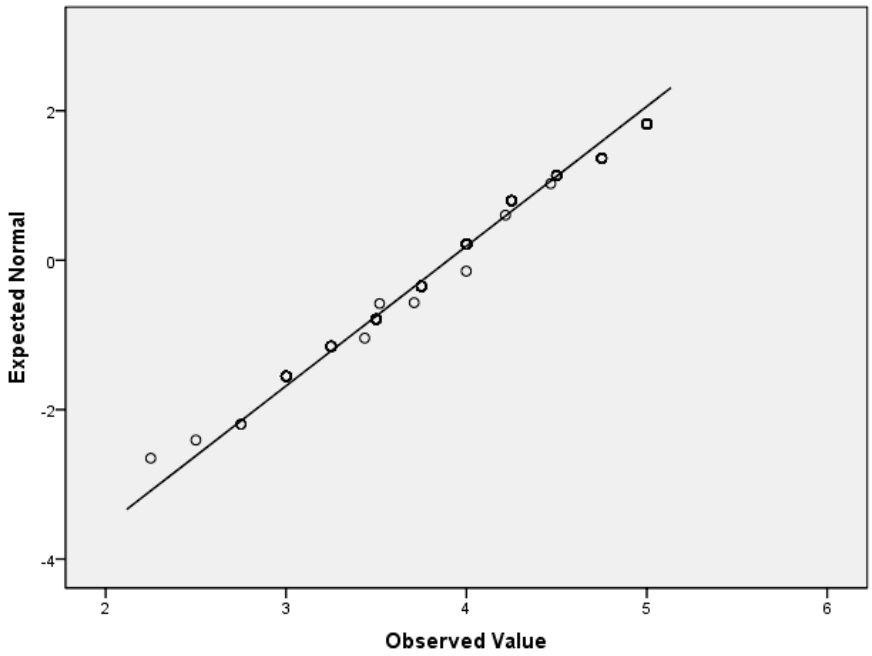


**Figure 4.7:** Normality Probability Plot for Ability to Recognize Value of Knowledge Scale

### 4.3.8 Ability to Assimilate Knowledge

The descriptive statistics for the ability to assimilate knowledge measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.16. The item-total correlation for each of the items exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). With the exception of items A1 and A2, which have kurtosis values greater than 1, the skewness and kurtosis values for the other items are less than ±1.0. Nevertheless, the skewness and kurtosis values for all the items are less than the cut-off criterion, thus the distribution for each of the items does not violate the normality assumption (see Section 3.5.1).

**Table 4.16:** Descriptive Statistics of Items for Ability to Assimilate Knowledge

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| A1 | I was able to learn partner's tools or practice. | 4.07 | 0.654 | -0.586 | 1.204 | 0.720 |
| A2 | I was capable at understanding the tools, practice or knowledge associated with JV partner. | 4.08 | 0.628 | -0.540 | 1.378 | 0.718 |
| A3 | I was adept at interpreting the use of tools, practice or knowledge associated with JV partner. | 3.95 | 0.664 | -0.502 | 0.867 | 0.677 |
| A4 | I tried to experiment with the tools, practice or knowledge associated with partner. | 3.89 | 0.700 | -0.478 | 0.508 | 0.482 |

[a] Standard Deviation

As shown in Figure 4.8, the normality plot for the 4-item scale is such that each of the observed values is closely located with its expected value, thereby creating a more or less straight line. Accordingly, the normality of the overall scale for ability to assimilate knowledge is assumed. Furthermore, the overall scale for ability to assimilate knowledge has a mean score of 4.04, which implies that the local employees engaged in the joint projects have quite high perception of their abilities to assimilate knowledge. This scale has a Cronbach alpha's value of 0.821, which is greater than the lowest cut off point of 0.7 (Hair *et al.*, 2010), but this value is expected to increase to 0.851 with the deletion of A4. Also, the inter-item correlation value of A4 was the lowest; therefore this item was deleted in order to further improve Cronbach's alpha. The descriptive statistics for the ensuing 3-item scale for ability to assimilate knowledge are presented in Table 4.17.

**Table 4.17:** Descriptive Statistics for Ability to Assimilate Knowledge Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 2 | 5 | 4.04 | 0.569 | -0.545 | 1.806 | 0.851 |

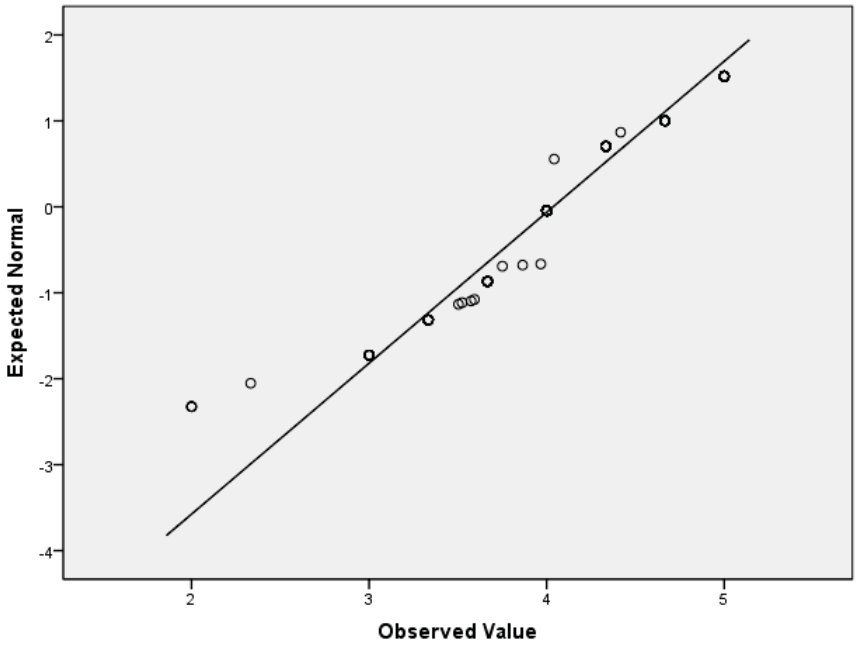


**Figure 4.8:** Normality Probability Plot for Ability to Assimilate Knowledge Scale

### 4.3.9 Shared Cognition

A summary of the means, standard deviations, item-total correlations, kurtosis and skewness values of the measurement items for shared cognition is presented in Table 4.18. As shown in this table, the item-total correlation for each of the items exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). The skewness and kurtosis values for all the items are within the acceptable range to satisfy the normality assumption (see Section 3.5.1). For the overall scale, the mean score of 3.96 indicates that the local employees' perceived the team as having quite high shared cognition. This implies that the joint teams possessed well above average collective understanding and assimilation capability in the course of engagement in the project. This scale can be considered to be reliable given that the obtained value of Cronbach's alpha (i.e., 0.794) is above the acceptable value of 0.700 (Hair *et al.*, 2010). Thus, all the items are retained at this stage. The descriptive statistics and normality plot for the overall scale are summarized in Table 4.19 and Figure 4.9.

**Table 4.18:** Descriptive Statistics of Items for Shared Cognition

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| S1 | Our team was very competent in integrating different views. | 4.00 | 0.602 | -0.441 | 1.271 | 0.542 |
| S2 | Our team had structure to support collective assessment of views. | 3.80 | 0.709 | -0.496 | 0.446 | 0.531 |
| S3 | Our team was able to achieve amicable resolution of conflict and disagreement. | 3.89 | 0.670 | -0.750 | 1.324 | 0.601 |
| S4 | Our team was able to communicate collective view across members. | 4.01 | 0.598 | -0.457 | 1.394 | 0.615 |
| S5 | Our team was able to take appropriate action based on collective view. | 4.08 | 0.582 | -0.013 | -0.105 | 0.595 |

[a] Standard Deviation

**Table 4.19:** Descriptive Statistics for Shared Cognition Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 2 | 5 | 3.96 | 0.469 | -0.282 | 1.294 | 0.794 |

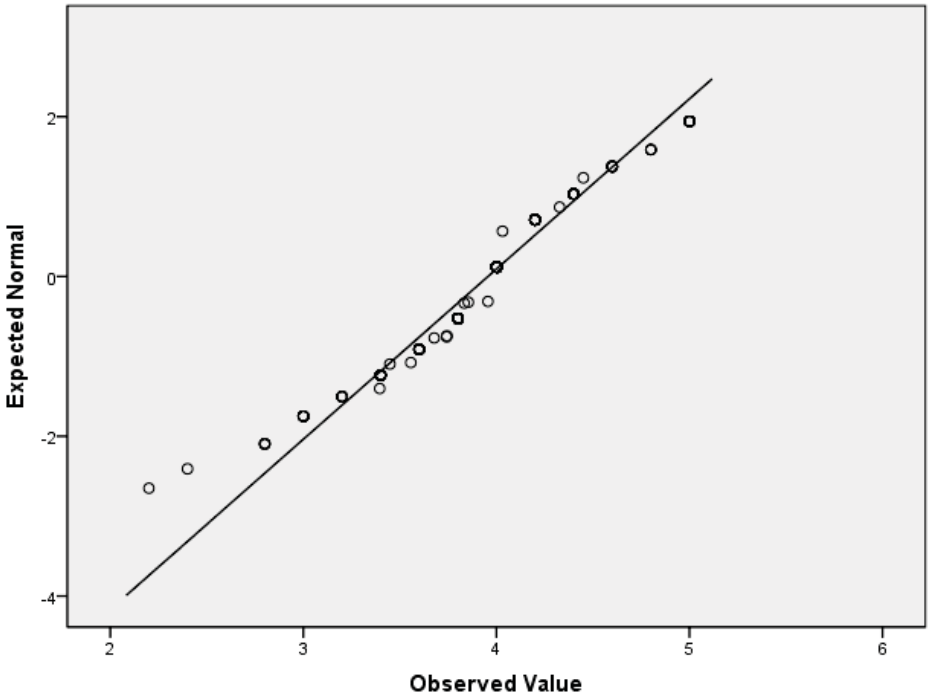


**Figure 4.9:** Normality Probability Plot for Shared Cognition Scale

### 4.3.10 Ability to Utilize Knowledge

The descriptive statistics for the ability to utilize knowledge measurement items are summarized into means, standard deviations, item-total correlations, kurtosis and skewness values, as shown in Table 4.20. The item-total correlation for each of the items exceeds the lowest cut-off point of 0.3 (Flynn *et al.*, 1997; Nunnally and Bernstein, 1994). With the exception of item U2, which has a kurtosis value of 1.210, the skewness and kurtosis values for all the other items are with the range of ±1. Nevertheless, the skewness and kurtosis values for all the items are less than the cut-off criterion (see Section 3.5.1), thus the distribution for each of the items does not violate the normality assumption.

**Table 4.20:** Descriptive Statistics for Items for Ability to Utilize Knowledge

| Item Code | Item | Mean | Std. Dev.[a] | Skew-ness | Kurt-osis | Item-total Correlation |
|---|---|---|---|---|---|---|
| U1 | Our team was very competent at exploiting related knowledge in specific activity. | 4.02 | 0.569 | 0.019 | 0.111 | 0.622 |
| U2 | Our team had the ability to effectively apply related knowledge in specific activity. | 4.14 | 0.597 | -0.401 | 1.210 | 0.619 |
| U3 | Our team was able to enhance project delivery by applying related knowledge. | 4.15 | 0.531 | 0.123 | 0.235 | 0.658 |
| U4 | Our team had the capability to maximally exploit the related knowledge in specific activity. | 4.09 | 0.652 | -0.366 | 0.335 | 0.628 |

[a] Standard Deviation

As shown in Figure 4.8, the normality plot for the 4-item scale is such that each of the observed values is closely located with its expected value, thereby creating a more or less straight line. Accordingly, the normality for the overall scale for ability to utilize knowledge is assumed. Furthermore, the overall scale for ability to assimilate knowledge has a mean score of 4.21. This indicates that the joint teams possessed high abilities to collectively utilize knowledge in the course of project execution. This scale can be considered to be reliable given that the obtained value of the Cronbach's alpha (i.e., 0.811) is above the acceptable value of 0.700 (Hair *et al.*, 2010). Thus, all the items are retained at this stage. The descriptive statistics and normality plot for the overall scale are summarized in Table 4.21 and Figure 4.10.

**Table 4.21:** Descriptive Statistics for Ability to Utilize Knowledge Scale

| Minimum | Maximum | Mean | Standard Deviation | Skewness | Kurtosis | Cronbach Alpha |
|---|---|---|---|---|---|---|
| 3 | 5 | 4.10 | 0.470 | 0.009 | 0.180 | 0.811 |

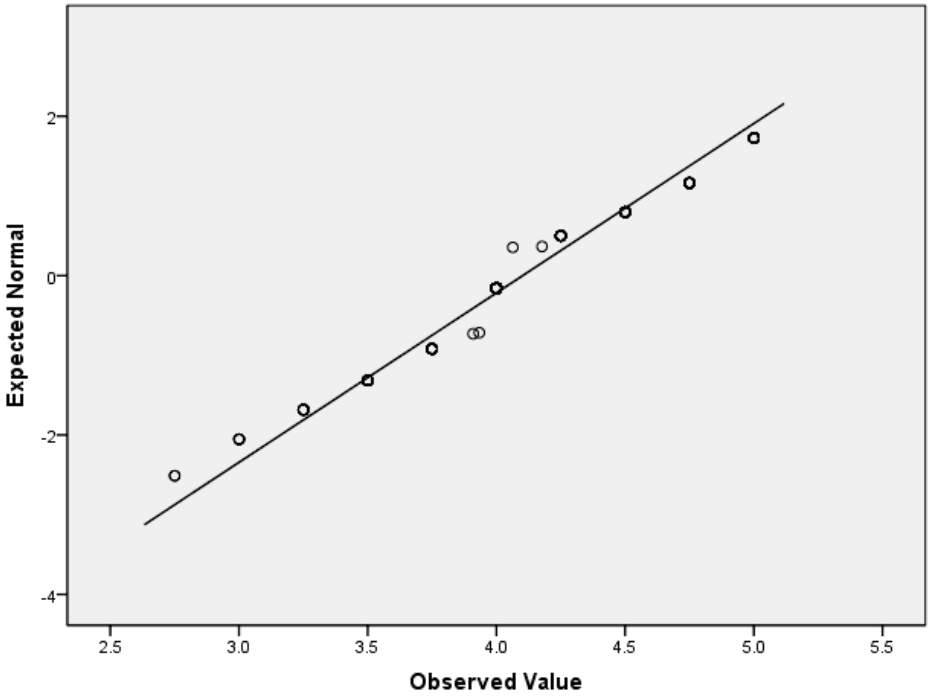


**Figure 4.10:** Normality Probability Plot for Ability to Utilize Knowledge Scale

## 4.4 Scale Development and Validation

### 4.4.1 Data Screening

#### 4.4.1a Missing Data Analysis

Following Hair *et al.* (2006), this study excluded cases with missing values since these were a low percentage of the total (i.e., 4.98%). Having done this, the sample size was reduced to 253, which is suitable enough for the intended SEM analysis. Hair and his colleagues (2010), attest that a minimum sample size of 200 is adequate for the conduct of SEM analysis.

### 4.4.1b Outliers

Further preliminary analysis on the data revealed the values of 5 cases as outliers. These were identified with the aid of graphical output generated from the residuals scatterplot. The standardized residuals for all the 5 cases were outside the range of +/-3, which indicate the presence of outliers. Accordingly, a total of 248 responses were used in the final analysis, with a net response rate of 68%. This sample size is still in excess of the recommended size, as discussed in Section 3.4.5 (i.e., > 200).

## 4.5 Preliminary Assessment for SEM - Exploratory Factor Analysis (EFA)

As discussed in Section 3.6, the EFA is a prerequisite to CFA in order to validate the non-significance of common method variance (CMV) as well as construct unidimensionality. The Harman's single factor procedure was employed in order to test for the presence of CMV (Podsakoff *et al.*, 2003). The EFA was performed with the data collected from the final survey (i.e., 248). This involved entering all the variables into a single EFA procedure based on unrotated factor analysis. The generated output revealed the presence of more than one factor, with the largest factor accounting for 18.83% of the total variance, while the 10 other factors each accounted for less than 10% of the variance. This suggests the absence of a single or general factor; therefore CMV has no significant effect in the present context (see Section 3.6).

Furthermore, all the measurement items corresponding to each construct were factor analysed in order to test for the unidimensionality of the constructs. For the multidimensional construct of absorptive capacity, all the items for the dimensions were analysed together, and the generated results correspond to the hypothesized four factors. As shown in Table 4.22, the values of Bartlett's test of sphericity for each of the analysed factors are large and significant (i.e., from 237.115 to 1613.731). In additions the Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy for each

are greater than the lowest cut-off criterion of 0.50. Consequent on the above, the factorability of the correlation matrix is justified for the present study.

**Table 4.22:** Results of the EFA for all the Constructs

| Construct | Items | Factor Loadings | KMO | Bartlett's Test of Sphericity | Eigen Values | Total Variance |
|---|---|---|---|---|---|---|
| Prior Experience | E1 | 0.713 | 0.749 | 368.005*** | 2.665 | 53.299 |
| | E2 | 0.638 | | | | |
| | E3 | 0.606 | | | | |
| | E4 | 0.868 | | | | |
| | E5 | 0.793 | | | | |
| Learning goal orientation | L1 | 0.771 | 0.796 | 422.230*** | 2.918 | 58.357 |
| | L2 | 0.746 | | | | |
| | L3 | 0.717 | | | | |
| | L4 | 0.854 | | | | |
| | L5 | 0.722 | | | | |
| Performance approach goal orientation | O1 | 0.779 | 0.796 | 321.796*** | 2.576 | 64.394 |
| | O2 | 0.824 | | | | |
| | O3 | 0.816 | | | | |
| | O4 | 0.789 | | | | |
| Need for Cognition | N1 | 0.549 | 0.788 | 425.699*** | 3.039 | 43.413 |
| | N2 | 0.721 | | | | |
| | N4 | 0.632 | | | | |
| | N5 | 0.571 | | | | |
| | N6 | 0.703 | | | | |
| | N7 | 0.697 | | | | |
| | N9 | 0.715 | | | | |
| Partner Support | P1 | 0.777 | 0.732 | 340.424*** | 2.536 | 63.391 |
| | P2 | 0.720 | | | | |
| | P3 | 0.853 | | | | |
| | P4 | 0.827 | | | | |
| Trust in Partner | T1 | 0.785 | 0.764 | 237.115*** | 2.345 | 58.636 |
| | T2 | 0.761 | | | | |
| | T3 | 0.714 | | | | |
| | T4 | 0.800 | | | | |

**Table 4.22:** Results of the EFA for all the constructs (…continued)

| Construct | Items | Factor Loadings | KMO | Bartlett's Test of Sphericity | Eigen Values | Total Variance |
|---|---|---|---|---|---|---|
| Multidimensional Absorptive Capacity (ACAP) | | | 0.842 | 1613.731*** | 14.826 | 63.513 |
| Ability to Recognize | R1 | 0.757 | | | 1.256 | 7.852 |
| | R2 | 0.800 | | | | |
| | R3 | 0.738 | | | | |
| | R4 | - | | | | |
| Ability to Assimilate | A1 | 0.857 | | | 1.905 | 11.908 |
| | A2 | 0.850 | | | | |
| | A3 | 0.792 | | | | |
| Shared Cognition | S1 | 0.733 | | | 1.318 | 8.237 |
| | S2 | - | | | | |
| | S3 | 0.737 | | | | |
| | S4 | 0.747 | | | | |
| | S5 | 0.701 | | | | |
| Ability to Utilize | U1 | 0.723 | | | 5.683 | 35.516 |
| | U2 | 0.743 | | | | |
| | U3 | 0.784 | | | | |
| | U4 | 0.786 | | | | |

**** Significant at p< 0.001*

## 4.6 Confirmatory Factor Analysis (CFA) on Latent Variables

The CFA technique was employed in analysing the measurement and structural models as well as testing for constructs' convergent and discriminant validity. In testing the validity of the models, this study followed the five basic steps for model assessment, which are: (1) model specification (2) model identification (3) estimation of parameters (4) evaluation of goodness-of-fit and (5) model re-specification. As discussed in Section 3.7.4a, the analysed models in this study are either just-identified or over-identified with the usage of the ML estimation technique in the evaluation processes. Furthermore, multiple goodness-of-fit indices were employed in the assessment of the goodness of fit for both the measurement and structural models (see Section 3.7.3). With the aid of these indices, as well as parameter estimates, modification indices, and standardized residual, the

specification errors were detected and appropriate steps were taken. In order to ensure validity and avoid improper solutions, model re-specifications were undertaken based on theoretical and empirical premises (Gerbing and Anderson, 1987). As explained in Section 3.7.2, this study conformed with the best practices in SEM which emphasize the assessment of the measurement model prior to the structural model in order to identify and fix the mis-specification errors (Anderson and Gerbing, 1988). The subsequent sub-sections present findings of the validity of each of the construct measurement models, as well as the overall measurement model, preceding the structural model.

### 4.6.1 Prior Experience

As examined in Section 4.3.1, the measurement model for prior experience consists of 5 items (i.e., E1, E2, E3, E4, and E5). These items constitute the observed variables, and are reflection of the unobserved variable, i.e., prior experience. The initial output from the CFA on this measurement model showed non-reasonable fit (i.e., $\chi^2$/df = 3.564 and RMSEA= 0.102). However, other goodness-of-fit measures like GFI = 0.972, AGFI = 0.915, NFI = 0.952, CFI = 0.965, and TLI = 0.929 have values within the acceptable range. The assessed specified measurement model of prior experience is depicted in Figure 4.11. The indicated values are the standardized estimates.

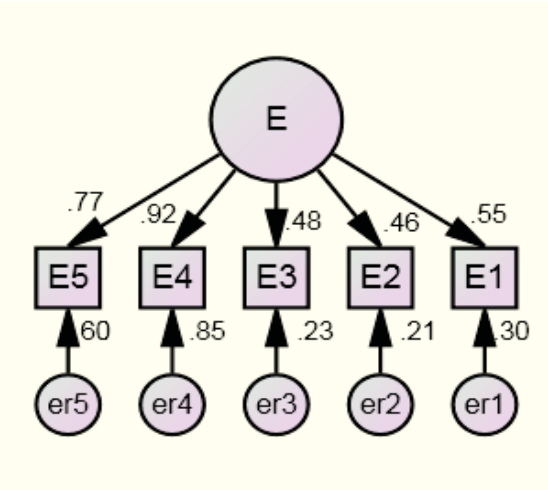


**Figure 4.11:** Specified Prior Experience Measurement Model

In order to improve the goodness-of-fit for this model, the modification indices (MI) values were examined. The MI suggests the need for a link between the covariance error terms er1 and er2 for items E1 and E2, respectively. This path is theoretically justified since both questions focused on the dimensions of knowledge possessed by the respondents. Thus, with the addition of the covariance path between these items, the selected goodness-of-fit indices for the measurement model were greatly improved. However, the standardized estimate for item 2 dropped from 0.458 to 0.431. Following Hair *et al.* (2010) and Byrne (2010) suggestions on the need to eliminate items with low standardized estimates, item 2 was excluded and the ensuing model was reassessed. At this stage the best goodness-of-fit indices for the model were generated as summarized in Table 4.22. The re-specified measurement model for prior experience is shown in Figure 4.12.

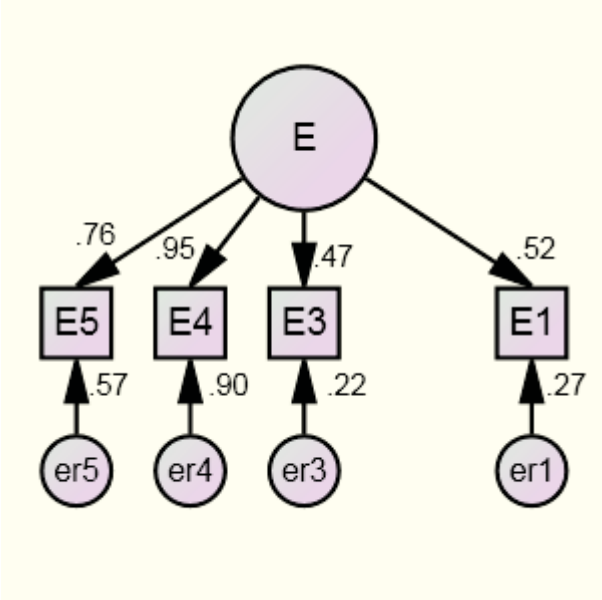


**Figure 4.12:** Re-specified Prior Experience Measurement Model

**Table 4.23:** Goodness-of-Fit Indices for Re-specified Prior Experience Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 1.465 |
| NC | ≤5 | 0.732 |
| GFI | ≥0.80 | 0.997 |
| AGFI | ≥0.80 | 0.985 |
| RMSEA | ≤0.08 | 0.000 |
| NFI | ≥0.80 | 0.995 |
| CFI | ≥0.90 | 1.000 |
| TLI | ≥0.90 | 1.005 ≈ 1.000[a] |

[a] *Index greater than 1, should be approximated to 1 (Kenny, 2014)*

### 4.6.2 Learning Goal Orientation

This model consists of the unobserved variable of learning goal orientation which is operationalized into 5 items, L1, L2, L3, L4, and L5. A preliminary covariance matrix analysis on this model generated a poor fit with the observed data (i.e., $\chi^2$ = 26.231, DF = 5, NC = 5.246, RMSEA = 0.131, GFI = 0.962, AGFI = 0.885, NFI = 0.940, CFI = 0.950, TLI = 0.900). The assessed specified measurement model is shown in Figure 4. 13.

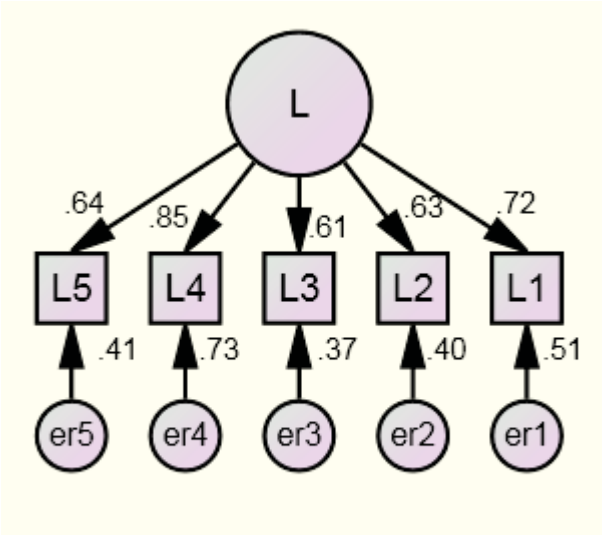


**Figure 4.13:** Specified Learning Goal Orientation Measurement Model

As a result of the poor fit indices, the MI was examined in order to identify mis-specification errors. Several covariance error paths were suggested, however, only two parameters er1 to er3 and er1 to er5, were incorporated into the re-specified model. The former was initially added, but upon assessment, there was an unappreciable improvement in the fit indices, therefore the latter was added. At this stage, the fit indices for the assessed model were greatly improved. Specifically, the RMSEA and NC values dropped from 0.131 to 0.058 and 5.246 to 1.836, respectively. The fit indices for the re-specified model are summarized in Table 4.23, and the standardized revised measurement model is shown in Figure 4.14.

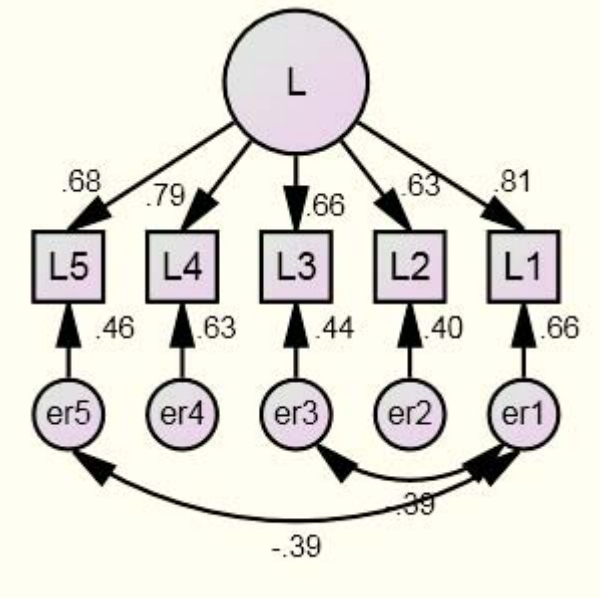


**Figure 4.14:** Re-specified Learning goal orientation Measurement Model

**Table 4.24:** Goodness-of-Fit Indices for Re-specified Learning goal orientation Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 5.508 |
| NC | ≤5 | 1.836 |
| GFI | ≥0.80 | 0.991 |
| AGFI | ≥0.80 | 0.954 |
| RMSEA | ≤0.08 | 0.058 |
| NFI | ≥0.80 | 0.987 |
| CFI | ≥0.90 | 0.994 |
| TLI | ≥0.90 | 0.980 |

### 4.6.3 Need for Cognition

As discussed in Chapter 3 (see Section 3.4.2), the 18-item reduced version of the need for cognition measure was initially considered in this study. However, upon initial assessment of inter-correlation and reliability a 7-item measure was validated (see section 4.3.4). Consequently, the 7-item measurement model was subjected to the covariance matrix analysis as shown in Figure 4.15. The outcome of model assessment at this stage generated goodness-of-fit-indices that indicated a poor fit between the hypothesized model and the observed data (i.e., $\chi^2$ = 77.224, NC = 5.516, RMSEA = 0.135, GFI = 0.922, AGFI = 0.844, NFI = 0.821, CFI = 0.846, TLI = 0.769).

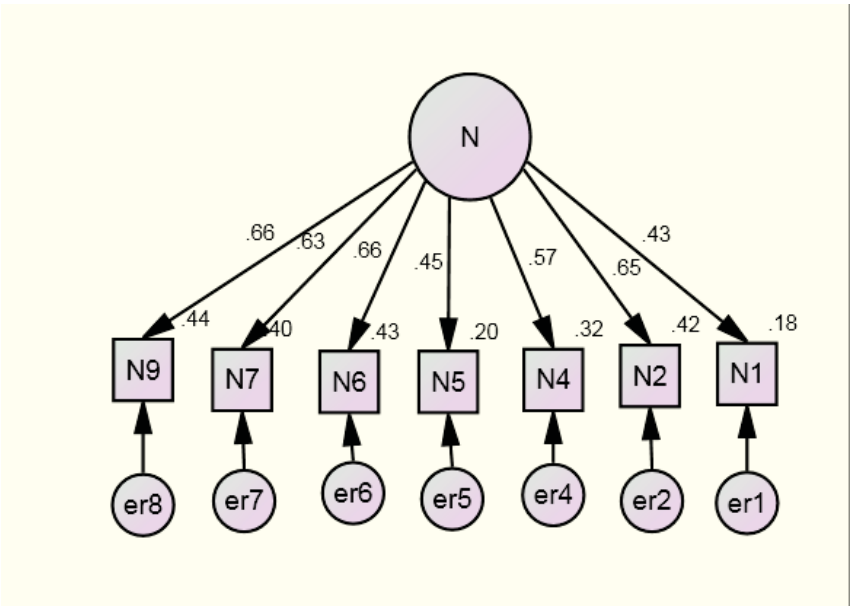


**Figure 4.15:** Specified Need for Cognition Measurement Model

Moreover, examination of the MI values suggested the addition of some error covariance paths between different set of items, with N2 having the highest values. For instance, the MI revealed a drop of 41.642 in the Chi-square value, with the addition of an error covariance path between N1 and N5. Upon the incorporation of this link, the MI for the reassessed model still suggested need for further improvement in fit by correlating the error terms for N1 and N2. Thus this link was added and the model was reassessed. The addition of this link generated acceptable

values for the selected goodness-of-fit indices; specifically the RMSEA dropped from 0.135 to 0.034, while CFI appreciated from 0.846 to 0.992. Both links are considered to be conceptually meaningful given that the corresponding items, N1, N4, and N5 for the correlated error terms are focused on eliciting responses on an individual's attitude toward thinking when faced with challenging tasks. Nevertheless, the assumed problematic nature of N1 was reinforced, upon the examination of the path estimates. As shown in Figure 4.16, it has the lowest standardized factor loading (0.31), and in line with Hair *et al.* (2010) and Byrne's (2010) recommendations on the elimination of non-substantive items, this item was deleted.

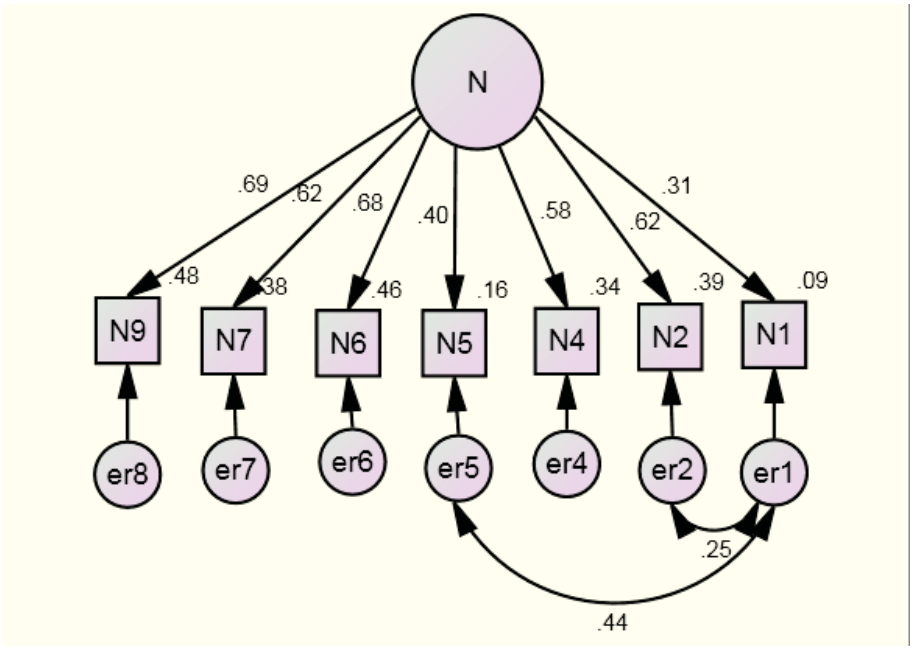


**Figure 4.16:** Initial Re-specified Need for Cognition Measurement Model

Having deleted item N1, the ensuing model was reassessed. The associated goodness-of-fit indices at this stage indicated acceptable fit between the hypothesized model and observed data, but the standardized estimate for item N5 was just 0.399. Therefore, item N5 was also eliminated and the model reassessed. The best fit indices were generated at this stage; for example, the RMSEA value dropped to 0.000 from an earlier value of 0.028 when item N5 was included. The finalized re-specified

model and the goodness-of-fit indices of need for cognition are respectively depicted in Figure 4.17 and Table 4.25.

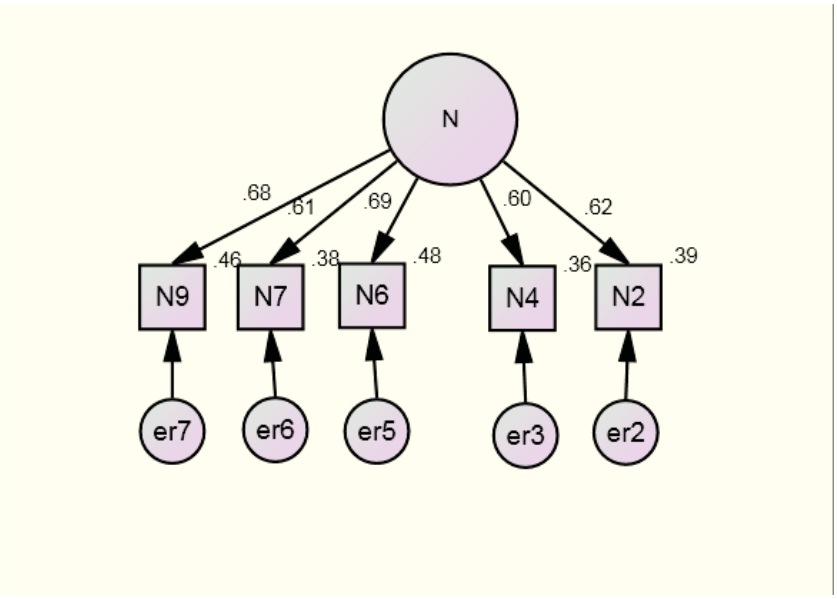


**Figure 4.17:** Finalized Re-specified Need for Cognition Measurement Model

**Table 4.25:** Goodness-of-Fit Indices for Finalized Re-specified Need for Cognition Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 4.929 |
| NC | ≤5 | 0.986 |
| GFI | ≥0.80 | 0.992 |
| AGFI | ≥0.80 | 0.977 |
| RMSEA | ≤0.08 | 0.000 |
| NFI | ≥0.80 | 0.983 |
| CFI | ≥0.90 | 1.000 |
| TLI | ≥0.90 | 1.001 ≈ 1.000[a] |

[a] *Index greater than 1, should be approximated to 1 (Kenny, 2014)*

### 4.6.4 Performance Approach Goal Orientation

This model is constituted of the construct of performance approach goal orientation, which is operationalized into 4 items, O1, O2, O3, and O4. The goodness-of-fit indices generated from the covariance matrix analysis on this model indicated acceptable fit between the hypothesized model and the observed data (see Figure 4.18 and Table 4.26). Further examination of the MI revealed the absence of mis-specification error, thus the measurement model was retained, as shown in Figure 4.18.

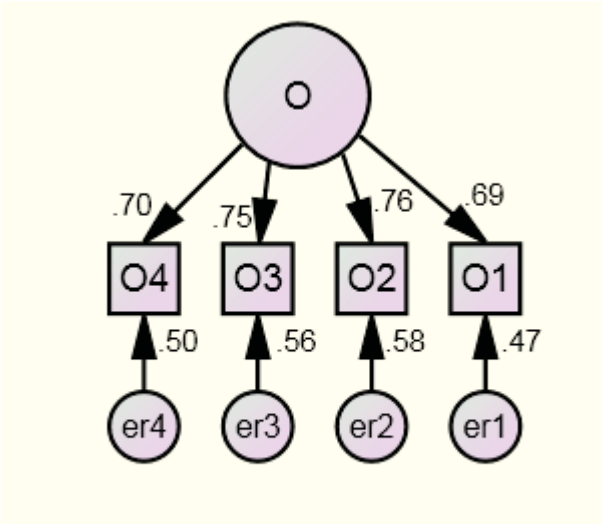


**Figure 4.18:** Specified Performance Approach Goal Orientation Measurement

**Table 4.26:** Goodness-of-Fit Indices for Performance approach goal orientation Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 4.034 |
| NC | ≤5 | 2.017 |
| GFI | ≥0.80 | 0.992 |
| AGFI | ≥0.80 | 0.959 |
| RMSEA | ≤0.08 | 0.064 |
| NFI | ≥0.80 | 0.988 |
| CFI | ≥0.90 | 0.994 |
| TLI | ≥0.90 | 0.981 |

### 4.6.5 Partner Support

The construct partner support was measured with four indicators, i.e. P1, P2, P3 and P4, as shown in Figure 4.19. The generated goodness-of-fit indices from the CFA assessment on this model indicated a poor fit (i.e. $\chi^2$ = 18.433, NC = 9.216, RMSEA = 0.182). However, upon considering the MI, the mis-specification error was identified. In order to address this, the suggested error covariance link between P2 and P4 was incorporated into the model. The outcome of the reassessed model indicated a better fit with observed data, given the acceptable values of the goodness-of-fit indices (see Table 4.27). The re-specified measurement model is depicted in the Figure 4.20.

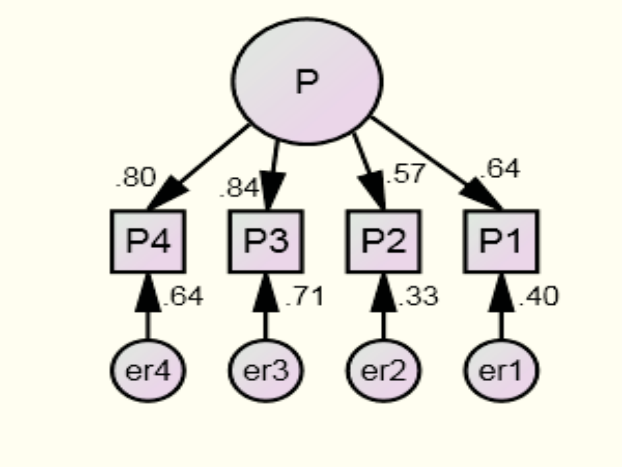


**Figure 4.19:** Specified Partner Support Measurement Model

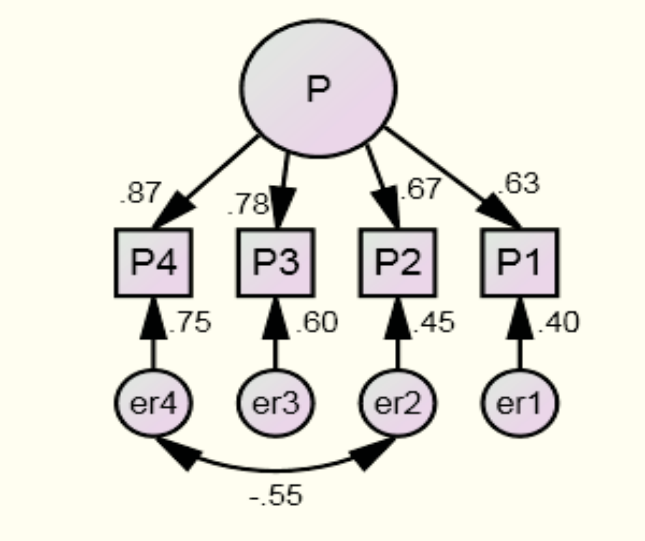


**Figure 4.20:** Re-specified Partner Support Measurement Model

**Table 4.27:** Goodness-of-Fit Indices for Re-specified Partner Support Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 2.639 |
| NC | ≤5 | 2.639 |
| GFI | ≥0.80 | 0.995 |
| AGFI | ≥0.80 | 0.947 |
| RMSEA | ≤0.08 | 0.081 |
| NFI | ≥0.80 | 0.992 |
| CFI | ≥0.90 | 0.995 |
| TLI | ≥0.90 | 0.971 |

### 4.6.6 Trust in Partner

The measurement model for the individual perception of trust in foreign partner is represented with four observed items is reflected by the unobserved construct of trust in partner. The specified CFA model is shown in Figure 4.21. As shown in Table 4.28, the goodness-of-fit indices for this model are within the acceptable ranges, while the standardized parameter estimates in Figure 4.21 are statistically significant. Further examination of the MI revealed no mis-specification error. Thus, this model was retained without any modification.

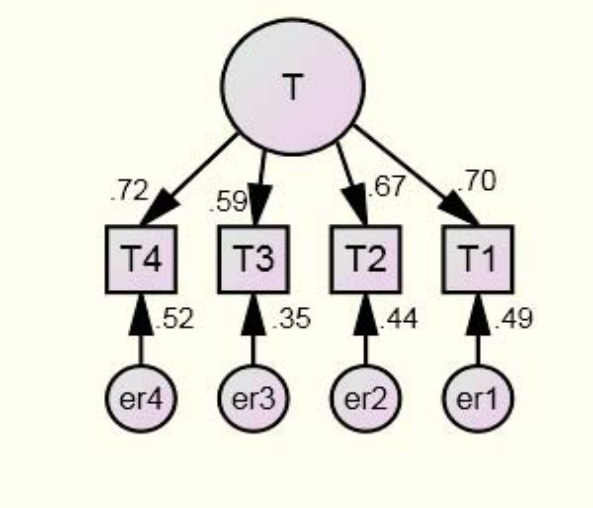


**Figure 4.21:** Specified Trust in Partner Measurement Model

**Table 4.28:** Goodness of Fit Indices for Specified Trust in Partner Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 4.939 |
| NC | ≤5 | 2.469 |
| GFI | ≥0.80 | 0.990 |
| AGFI | ≥0.80 | 0.950 |
| RMSEA | ≤0.08 | 0.077 |
| NFI | ≥0.80 | 0.979 |
| CFI | ≥0.90 | 0.987 |
| TLI | ≥0.90 | 0.962 |

### 4.6.7 Multidimensional ACAP

As previously explained, the multidimensional construct of ACAP consists of four dimensions; individual abilities to (i) recognize the value of and (ii) assimilate foreign partner's knowledge, and team's (iii) shared cognition and (iv) ability to utilize foreign partner's knowledge. Earlier assessment of the internal consistency of each of these dimensions as well as EFA contributed in the elimination of one item each from (i), (ii) and (iii) above. Furthermore, the specified CFA assessed model consisted of the four unobserved variables, with their corresponding observed variable, as depicted in Figure 4.22 (pp. 153).

The generated goodness-of-fit indices from the assessment suggested acceptable fit between the hypothesized model and observed data (i.e., $\chi^2$ = 133.906, NC = 1.886, RMSEA = 0.060, GFI = 0.933, AGFI = 0.901, NFI = 0.906, CFI = 0.940, TLI = 0.953). Further examination of the MI suggested the addition of an error covariance path between different pairs of items, however the corresponding improvement in parameter estimates were low. Therefore the suggested covariance paths were not incorporated into the model at this stage. The goodness-of-fit indices for the specified model are summarized in Table 4.29.

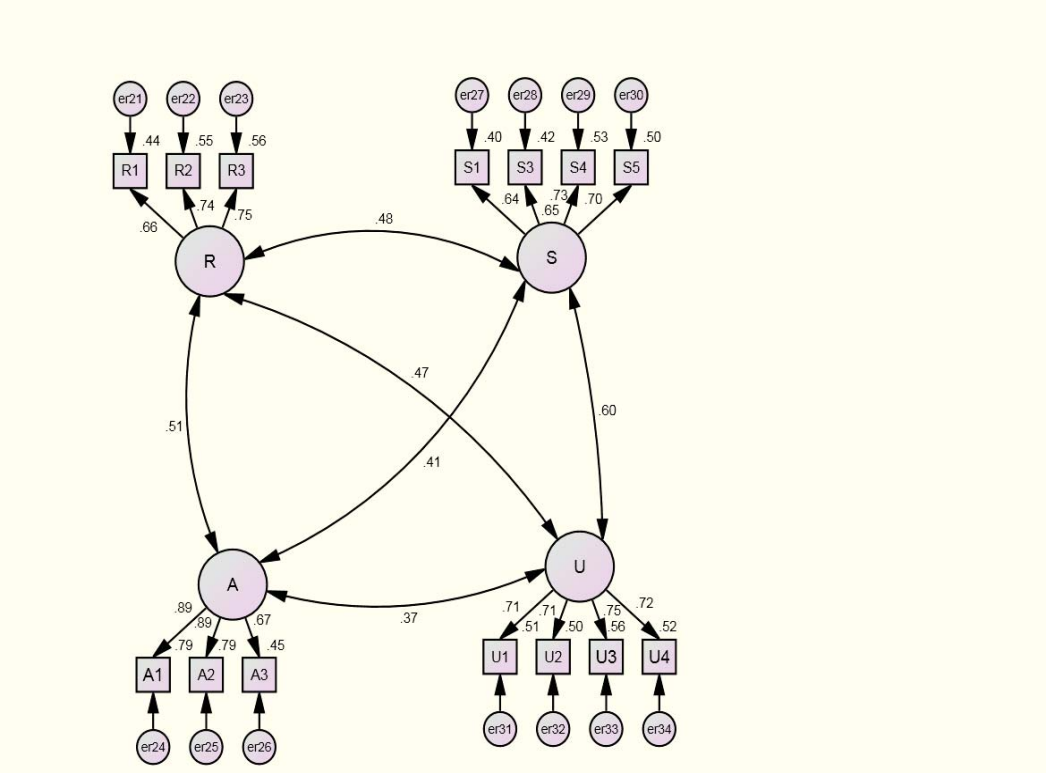


**Figure 4.22:** Specified Multidimensional ACAP measurement model

**Table 4.29:** Goodness-of-Fit Indices for Specified Multidimensional ACAP Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 133.906 |
| NC | ≤5 | 1.886 |
| GFI | ≥0.80 | 0.933 |
| AGFI | ≥0.80 | 0.901 |
| RMSEA | ≤0.08 | 0.064 |
| NFI | ≥0.80 | 0.988 |
| CFI | ≥0.90 | 0.994 |
| TLI | ≥0.90 | 0.981 |

In line with the two-step modelling technique (see Section 3.7), further reassessment of the theoretically and empirically justified mis-specification errors suggested from the MI and standardized residual are considered in Section 4.7 in the course of assessing the overall measurement model, prior to the testing of the structural model.

## 4.7 CFA on Overall Measurement Model

The SEM statistical technique was employed in testing the hypothesized relationships among the micro-antecedents, social context and multidimensional ACAP. In conforming to Anderson and Gerbing's (1988) two-step SEM technique, the interdependence relationships among the latent variables were specified as the overall measurement model, as shown in Figure 4.23 (see page 163). This model was specified from the outcome of CFA on the measurement scale for each of the latent variables (see Figures 4.11 to 4.22). The CFA was performed with the data collected from the final survey (i.e., 248).

As shown in Figure 4.23, the micro-antecedents (i.e., prior experience, learning goal orientation, performance approach goal orientation, and need for cognition), social context (partner support and trust in partner) and multidimensional ACAP (ability to recognize, ability to assimilate, shared cognition ability, and ability to utilize) constructs loaded on the specified *a-prior* model. The non-structural model allows for inter-correlation among all the variables by introducing the covariance path between every pair of variables. The unstandardized estimates for the regression weights, co-variances and variances are shown on the Figure 4.23, while the corresponding goodness-of-fit indices for the model are summarized in Table 4.30 (pp. 156).

The generated values for the goodness of fit indices (see Table 4.30) suggest a mediocre fit, which requires modification in order to improve the overall fit. In re-specifying the model, further assessment followed best practices in SEM, thereby ensuring compliance with relevant statistical, theoretical and contextual requirements (Anderson and Gerbing, 1988; Bagozzi and Yi, 2012). According to Bagozzi and Yi (2012) attempts at improving the model fit should stem from careful consideration of the magnitude of the factor loadings, standardized residuals and modification indices with appropriate justifications.

**Table 4.30:** Goodness-of-Fit Indices for Specified Overall Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 965.561 |
| NC | ≤5 | 1.395 |
| GFI | ≥0.80 | 0.848 |
| AGFI | ≥0.80 | 0.820 |
| RMSEA | ≤0.08 | 0.040 |
| NFI | ≥0.80 | 0.783 |
| CFI | ≥0.90 | 0.925 |
| TLI | ≥0.90 | 0.916 |

With the exception of E3 (i.e., 0.47), the standardized factor loadings for all the other items on their associated latent variables are greater than 0.5 as stated by Hair *et al.* (2006). Also, the unstandardized error variance for E3 was overly high, i.e. 1.40, as compared to others which are lower than 0.60 (see Figure 4.23). Accordingly, item E3 was deleted and the model reassessed, however the generated fit indices still suggested some misspecifications. Therefore, the standardized residual and modification indices (MI) were examined in order to identify likely errors. Specifically, the indicators (i.e. T1, P1, P2 and U1) have standardized residual values greater than the lowest cut-off point of 2 (Joreskog and Sorbom, 1986; Kenny, 2012). Also, the MI values associated with each of these indicators revealed appreciable regression weights to other latent variables and correlations with their indicators thereby indicating cross-loading. In re-specifying the model, the suggested covariance error paths for these indicators could be correlated, however must be theoretical justified. Otherwise the re-specified model becomes a product of chance and unsubstantiated (Anderson and Gerbing, 1988; Bagozzi and Yi, 2012).

Consequent, the most appropriate solution at this stage was the removal of the problematic indicators. As a result, each of these items was excluded one after the other, and the model was reassessed. The goodness-of-fit indices for the ensuing re-specified measurement model are summarized in Table 4.31. As seen from this table, the $\chi^2$ value of 965.561 for the specified model has dropped to 645.956, while the values of GFI, AGFI, CFI, and TLI have appreciated to 0.880, 0.852, 0.957 and

0.950, respectively. Thus, the re-specified model is of a better fit than the specified model. The standardized re-specified overall measurement model is depicted in Figure 4.24.

**Table 4.31:** Goodness of Fit Indices for Re-specified Overall Measurement Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 645.956 |
| NC | ≤5 | 1.259 |
| GFI | ≥0.80 | 0.880 |
| AGFI | ≥0.80 | 0.852 |
| RMSEA | ≤0.08 | 0.032 |
| NFI | ≥0.80 | 0.825 |
| CFI | ≥0.90 | 0.957 |
| TLI | ≥0.90 | 0.950 |

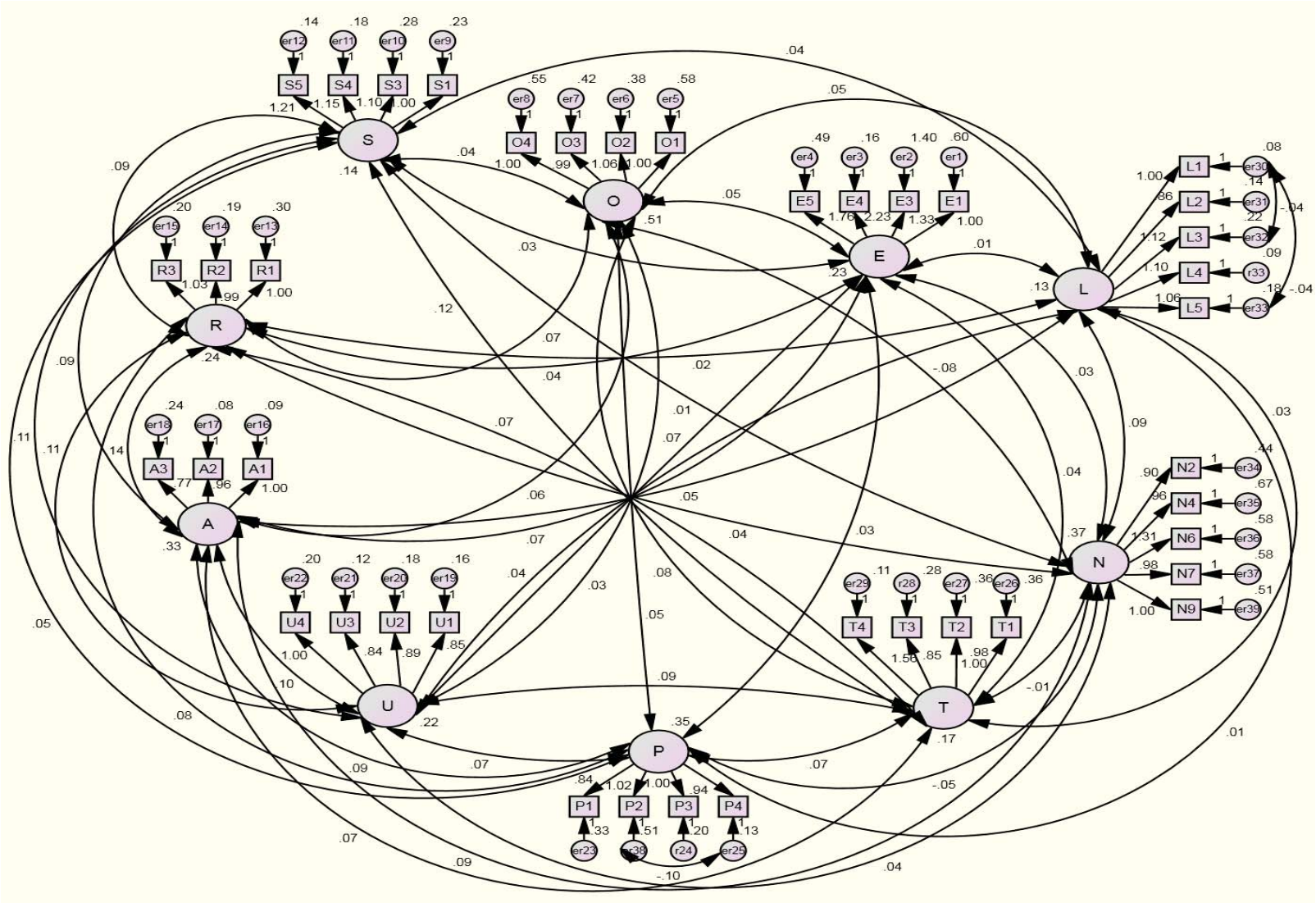


**Figure 4.23:** Specified Overall Measurement Model (Unstandardized)

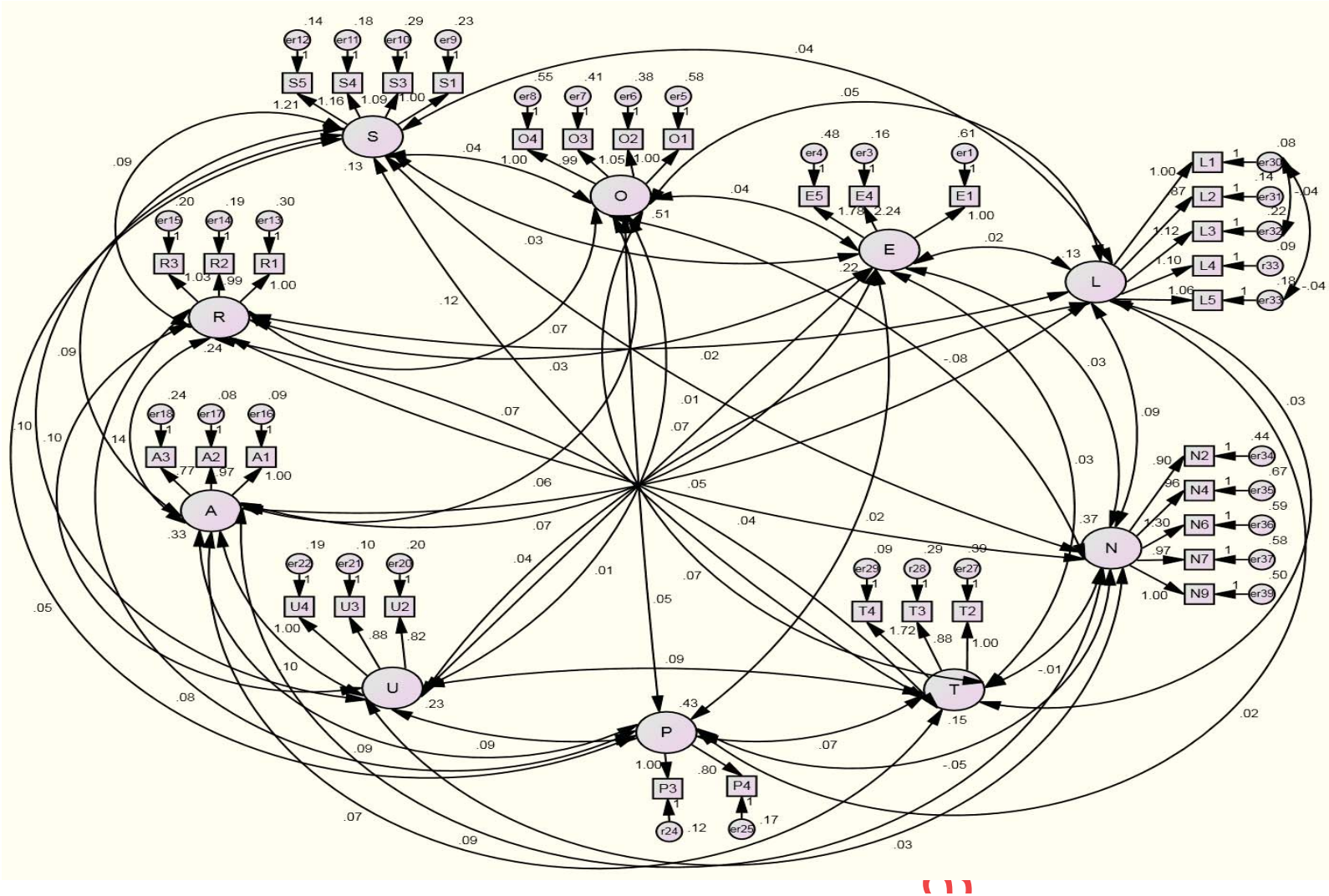


**Figure 4.24:** Re-specified Overall Measurement Model (Unstandardized)

## 4.8 Assessment of Construct Reliability and Validity for SEM

The hallmark of a well-developed quantitative study is the establishment of the construct's reliability and validity. Accordingly, using the re-specified measurement model (see Figure 4.24), this study assessed the reliability and validity of all the constructs as detailed below.

### 4.8.1 Construct Composite Reliability and Average Variance Extracted

The need for multiple measures of reliability, especially with SEM has been underscored (Fornell & Larcker, 1981; Hair *et al.,* 2010). Thus, in addition to the evaluation of Cronbach's alpha, as presented in Section 4.3, this section reviews the computation of composite reliability for each of the latent variables. The composite reliability is an assessment of the internal consistency of a set of indicators. This is basically the examination of the extent of the relationship between the latent variable and the associated indicators. Higher values are an indication that the latent variable explains more of the variance in the each indicator. In essence, unlike Cronbach's alpha, composite reliability is computed from the model estimates as measures of construct reliability (Holmes-Smith, Cunningham and Coote, 2006). Based on the standardized estimates from the re-specified overall measurement model, the composite reliabilities for all the latent variables were computed as shown in Table 4.32. As presented in this table, all the composite reliability values exceed the cut-off criterion of 0.7 (Fornell and Larcker, 1981; Hair *et al,* 2010).

**Table 4.32:** Computation of CR and AVE for Latent Variables

| Latent Variables | Item | Standardized Estimates (SE) | Squared Standardized Estimates $(SE)^2$ | Error Term $(1 - (SE)^2)$ |
|---|---|---|---|---|
| Prior Experience (E) | E1 | 0.518 | 0.268 | 0.732 |
| | E4 | 0.935 | 0.874 | 0.126 |
| | E5 | 0.771 | 0.594 | 0.406 |
| | Total | 2.224 | 1.737 | 1.263 |
| | $(Total)^2$ | 4.946 | | |
| | CR = 4.946 / (4.946 + 1.263) = 0.797<br>AVE = 1.737 / (1.737 + 1.263) = 0.579 | | | |
| Need for Cognition (N) | N2 | 0.638 | 0.407 | 0.593 |
| | N4 | 0.578 | 0.334 | 0.666 |
| | N6 | 0.718 | 0.516 | 0.484 |
| | N7 | 0.612 | 0.375 | 0.625 |
| | N9 | 0.650 | 0.423 | 0.578 |
| | Total | 3.196 | 2.054 | 2.946 |
| | $(Total)^2$ | 10.214 | | |
| | CR = 10.214 / (10.214 + 2.946) = 0.776<br>AVE = 2.054 / (2.054 + 2.946) = 0.410 | | | |
| Learning goal orientation (L) | L1 | 0.795 | 0.632 | 0.368 |
| | L2 | 0.640 | 0.410 | 0.590 |
| | L3 | 0.655 | 0.429 | 0.571 |
| | L4 | 0.808 | 0.653 | 0.347 |
| | L5 | 0.666 | 0.444 | 0.556 |
| | Total | 3.564 | 2.567 | 2.443 |
| | $(Total)^2$ | 12.702 | | |
| | CR = 12.702 / (12.702 + 2.443) = 0.839<br>AVE = 2.567 / (2.567 + 2.443) = 0.513 | | | |
| Performance Approach Goal Orientation (O) | O1 | 0.686 | 0.471 | 0.529 |
| | O2 | 0.775 | 0.601 | 0.399 |
| | O3 | 0.740 | 0.548 | 0.452 |
| | O4 | 0.696 | 0.484 | 0.516 |
| | Total | 2.897 | 2.103 | 1.897 |
| | $(Total)^2$ | 8.393 | | |
| | CR = 8.393 / (8.393 + 1.897) = 0.816<br>AVE = 2.103 / (2.103 + 1.897) = 0.526 | | | |
| Partner Support (P) | P3 | 0.882 | 0.778 | 0.222 |
| | P4 | 0.782 | 0.612 | 0.388 |
| | Total | 1.664 | 1.389 | 0.611 |
| | $(Total)^2$ | 2.769 | | |
| | CR = 2.769 / (2.769 + 0.611) = 0.819<br>AVE = 1.389 / (1.389 + 0.611) = 0.695 | | | |

**Table 4.32:** Computation of CR and AVE for Latent Variables (…Continued)

| Latent Variables | Item | Standardized Estimates (SE) | Squared Standardized Estimates $(SE)^2$ | Error Term $(1 – (SE)^2)$ |
|---|---|---|---|---|
| Trust in Partner (T) | T2 | 0.522 | 0.305 | 0.695 |
| | T3 | 0.527 | 0.278 | 0.722 |
| | T4 | 0.914 | 0.835 | 0.165 |
| | Total | 1.993 | 1.418 | 1.582 |
| | $(Total)^2$ | 3.972 | | |
| | CR = 3.972 / (3.972 + 1.582) = 0.715<br>AVE = 1.418 / (1.418 + 1.582) = 0.473 | | | |
| Ability to Recognize (R) | R1 | 0.667 | 0.445 | 0.555 |
| | R2 | 0.741 | 0.549 | 0.451 |
| | R3 | 0.747 | 0.558 | 0.442 |
| | Total | 2.155 | 1.552 | 1.448 |
| | $(Total)^2$ | 4.644 | | |
| | CR = 4.644 / (4.644 + 1.448) = 0.762<br>AVE = 1.552 / (1.552 + 1.448) = 0.517 | | | |
| Ability to Assimilate (A) | A1 | 0.885 | 0.783 | 0.217 |
| | A2 | 0.893 | 0.797 | 0.203 |
| | A3 | 0.670 | 0.449 | 0.551 |
| | Total | 2.448 | 2.030 | 0.970 |
| | $(Total)^2$ | 5.992 | | |
| | CR = 5.992 / (5.992 + 0.970) = 0.861<br>AVE = 2.030 / (2.030 + 0.970) = 0.677 | | | |
| Shared cognition (S) | S1 | 0.611 | 0.373 | 0.627 |
| | S3 | 0.600 | 0.36 | 0.640 |
| | S4 | 0.713 | 0.508 | 0.492 |
| | S5 | 0.766 | 0.587 | 0.413 |
| | Total | 2.690 | 1.828 | 2.172 |
| | $(Total)^2$ | 7.236 | | |
| | CR = 7.236 / (7.236 + 2.172) = 0.769<br>AVE = 1.828 / (1.828 + 2.172) = 0.457 | | | |
| Ability to Utilize (U) | U2 | 0.663 | 0.440 | 0.560 |
| | U3 | 0.798 | 0.637 | 0.363 |
| | U4 | 0.738 | 0.545 | 0.455 |
| | Total | 2.199 | 1.621 | 1.379 |
| | $(Total)^2$ | 4.836 | | |
| | CR = 4.836 / (4.844+1.376) = 0.779<br>AVE = 1.621 / (1.621 + 1.379) = 0.540 | | | |

### 4.8.2 Assessment of Construct Validity

Although, high reliability value implies the presence of low measurement error, such is not a guarantee for the accuracy of the measurement scale. This can be assured through further assessment of construct validity (Hair *et al.*, 2010). According to Bagozzi and Yi (2012), construct validity is the extent to which the indicators associated with a construct measure what they are supposed to measure. Therefore, aside from evaluating the level of agreement among the supposed indicators for a given construct, validity also distinguishes the indicators associated with a given construct from those of others. To satisfy the validity assumption, the indicators must converge properly on the associated construct, and should not exhibit appreciable relationship with other measures. Thus, the basic notion underlying validity is the extent of correlation. For convergence, theoretically linked indicators are expected to be highly correlated with a specific construct, while the correlations of measures for a supposed construct must be lower than the measures of other constructs in order to satisfy the requirement for discrimination. Consequently, in addition to convergent and discriminant validity, this study also demonstrates the presence of content validity. The following subsections examine the measures of validity employed.

#### 4.8.2a Content Validity

As detailed in Chapter 3, all the operationalized constructs in the survey instrument were either adopted or adapted from extant measurement scales. Furthermore, this instrument was initially subjected to pre-screening and pilot testing. The finalized survey instrument incorporated the suggestions and comments obtained from this initial assessment. Therefore, the content validity of these constructs can be assumed given the contributions of academics and practitioners with relevant experiences in the context of study in the assessment of the extant measurement scales (see Section 3.4.2).

### 4.8.2b Convergent Validity

The main condition for convergent validity as earlier noted in Section 3.5.3b is the presence of significant correlations for multiple measures of a supposed construct (Hair *et al.*, 2010). Theoretically, a set of indicators are expected to correlate with the associated latent variable, and this is expressed as the factor loading. The square of this factor loading is the measure of the amount of variance in the indicator, which the latent variable is able to explain (i.e., shared variance). Thus, the average variance extracted (AVE) is computed as the average of the variance for all the theoretically associated indicators with a given latent variable (see Table 4.32). Several techniques have been suggested in order to demonstrate convergent validity. This study considers two such techniques, as discussed below.

First, in order to ascertain the convergent validity of the latent variables, the AVEs were considered. The recommended value of AVE for convergent validity is equal to or greater than 0.50 (Fornell and Larcker, 1981). As shown in Table 4.32, with the exception of need for cognition (NFC), shared cognition, and trust in partner, all the other AVE values reached the cut-off point of 0.50. Moreover, a cut-off point of 0.40 is deemed appropriate in behavioural studies (Fraering and Minor, 2006; Duarte and Raposo, 2010) wherein the accepted value for factor loading is set at 0.40. The lowest AVE reported in this study is 0.41, for need for cognition, but this is higher than the reported value of 0.361 in Duarte and Raposo (2010). Nevertheless, the low AVE value for the NFC measure can also be attributed to the shortening of the original scale or the dominance of the reversed coded items, which could have resulted in misinterpretations during the survey. Nevertheless, considering the underlying theoretical notion, this construct holds significant conceptual relevance to the model. In retaining this construct, consideration was given to its high CR score and significant factor loadings for the items (Chin, 1998).

Moreover, the convergent validity was also ascertained based on the consideration of the unstandardized factor loadings of the observed items for the overall measurement model (see Table 4.33). Following Anderson and Gerbing

(1988) convergent validity can be assumed when the estimated coefficient for each observed item on its linked factor is significant (i.e., greater than twice its standard error). As summarized in Table 4.33, the values of standard error are of lower magnitude, as compared to their corresponding standardized loading factors. Specifically, the former ranges from 0.060 to 0.297, and the latter from 0.770 to 2.241. Also, the unstandardized estimates for all the items on the linked factor are significant at 0.001, with the critical value ranging from 6.175 to 16.216. Thus, convergent validity is assumed for all the constructs. Accordingly, based on the satisfactory outcomes as presented in Table 4.33, the convergent validities of all the latent variables are assumed.

**Table 4.33:** Assessment of Convergent Validity

| Latent Variables | Items | Unstandardized Estimates | Standard Errors | Critical Values |
|---|---|---|---|---|
| Prior Experience (E) | E1 | 1.000 | Nil | Nil |
| | E4 | 2.241*** | 0.297 | 7.538 |
| | E5 | 1.781*** | 0.223 | 7.985 |
| Need for Cognition (N) | N2 | 0.900*** | 0.114 | 7.927 |
| | N4 | 0.957*** | 0.130 | 7.343 |
| | N6 | 1.302*** | 0.152 | 8.577 |
| | N7 | 0.973*** | 0.127 | 7.685 |
| | N9 | 1.000 | Nil | Nil |
| Learning goal orientation (L) | L1 | 1.000 | Nil | Nil |
| | L2 | 0.865*** | 0.091 | 9.470 |
| | L3 | 1.124*** | 0.128 | 8.749 |
| | L4 | 1.103*** | 0.096 | 11.477 |
| | L5 | 1.058*** | 0.118 | 8.998 |
| Performance Approach Goal Orientation (O) | O1 | 1.000 | Nil | Nil |
| | O2 | 1.054*** | 0.107 | 9.878 |
| | O3 | 0.987*** | 0.103 | 9.597 |
| | O4 | 1.000*** | 0.109 | 9.167 |
| Partner Support (P) | P3 | 1.000 | Nil | Nil |
| | P4 | 0.796*** | 0.129 | 6.175 |
| Trust in Partner (T) | T2 | 1.000 | Nil | Nil |
| | T3 | 0.878*** | 0.138 | 6.368 |
| | T4 | 1.724*** | 0.220 | 7.821 |
| Ability to Recognize (R) | R1 | 1.000 | Nil | Nil |
| | R2 | 0.992*** | 0.113 | 8.815 |
| | R3 | 1.030*** | 0.117 | 8.842 |

**Table 4.33:** Assessment of Convergent Validity (…Continued)

| Latent Variables | Items | Unstandardized Estimates | Standard Errors | Critical Values |
|---|---|---|---|---|
| Ability to Assimilate (A) | A1 | 1.000 | Nil | Nil |
| | A2 | 0.969*** | 0.060 | 16.216 |
| | A3 | 0.770*** | 0.066 | 11.665 |
| Shared cognition (S) | S1 | 1.000 | Nil | Nil |
| | S3 | 1.094*** | 0.143 | 7.669 |
| | S4 | 1.161*** | 0.134 | 8.691 |
| | S5 | 1.213*** | 0.133 | 9.096 |
| Ability to Utilize (U) | U2 | 0.823*** | 0.090 | 9.103 |
| | U3 | 0.881*** | 0.086 | 10.197 |
| | U4 | 1.000 | Nil | Nil |

### 4.8.2c Discriminant Validity

Discriminant validity is an assessment of the extent to which a set of indicators associated with a supposed latent variable discriminates from other latent variables (Hair *et al.*, 2010). This implies that the variable explains a larger amount of variance in its associated indicators than in measurement error or other variables within the conceptual framework. Otherwise its validity and that of the associated indicators is suspect (Fornell and Larcker, 1981). The presence of high correlation between independent variables is not desirable, because the predictive effect on the dependent variable will also be shared (Hair *et al.*, 2010). Nevertheless, appreciable correlation is necessary between the independent and dependent variables, in order to demonstrate the possibility of the hypothesized effect (Shiu, Pervan, Bove, and Beatty, 2011).

Discriminant validity is assumed when the shared variance between a pair of latent variables is of lesser magnitude than the average variance extracted (i.e., AVE) for each variable (Fornell and Larcker, 1981). As earlier stated, the AVE is the measure of the average amount of variance a latent variable is able to account for in its theoretically associated indicators. And the square of the correlation between a pair of construct is known as shared variance, which corresponds to the amount of

variance a construct can account for in another construct (Farrell, 2009). In Table 4.34, the AVE values for each latent variable are presented on the diagonal, while the squares of correlations between a pair of latent variables are located off the diagonal. Basically, the latent variables exhibit a high amount of discriminant validity, in that the AVE for each variable is of greater magnitude than the square of correlation between it and another variable.

**Table 4.34:** Assessment of Discriminant Validity

| | E | L | O | N | R | A | S | U | P | T |
|---|---|---|---|---|---|---|---|---|---|---|
| **E** | (.58) | | | | | | | | | |
| **L** | .008 | (.51) | | | | | | | | |
| **O** | .019 | .031 | (.53) | | | | | | | |
| **N** | .008 | .165 | -.034 | (.41) | | | | | | |
| **R** | .020 | .011 | .040 | .017 | (.52) | | | | | |
| **A** | .064 | .062 | .019 | .071 | .257 | (.68) | | | | |
| **S** | .018 | .095 | .024 | .001 | .235 | .166 | (.46) | | | |
| **U** | .072 | .053 | .001 | .012 | .200 | .124 | .361 | (.54) | | |
| **P** | .006 | .003 | .005 | -.010 | .044 | .008 | .023 | .008 | (.70) | |
| **T** | .035 | .043 | .036 | .004 | .072 | .080 | .328 | .248 | .031 | (.47) |

### 4.8.2d Multicollinearity

Further to the reported values of shared variance for the latent variables, as shown in Table 4.32, the presence of low correlations between pairs of variables were ascertained. The main condition for establishing multicollinearity is the presence of high correlation between each pair of variables. For example Tabachnick and Fidell (2012) suggest a correlation value (r) of 0.90 or greater as an indicator for the presence of multicollinearity. Consequently, the absence of multicollinearity is assumed here given that the highest value of reported shared variance, which is the square of correlation between shared cognition (S) and ability to utilize knowledge (U) is 0.361 (see Table 4.35).

## 4.9 Structural Model

Construct reliability and validity are preconditions for a plausible structural model (Anderson and Gerbing, 1988; Baggozi and Yi, 2012). Furthermore, consistent with Anderson and Gerbing (1988), the re-specified measurement model (see Figure 4.24) was transposed into a structural model by delineating the independent and dependent variables. Specifically, all the covariance paths (i.e. double-headed arrows) associated with the latter were deleted, while relevant structural paths (single-headed arrows) were introduced (see Figures 4.25 and 4.26). Furthermore, a residual error term was placed on each of the dependent variables in order to account for the presumed error associated with the prediction.

The specified structural models are depicted in Figures 4.25 and 4.26, respectively. The latter includes the values of unstandardized regression weights, covariance and variance, while the former shows the values of the standardized regression weights, correlations and squared multiple correlations. The generated goodness-of-fit indices from the assessment of the specified structural model revealed a fairly well fitted model (see Table 4.35). Given that the structural model was transposed from the re-specified measurement model, the likely mis-specification errors related to item correlations as obtained from the standardized residual values have been resolved. Thus, the modification indices were examined in order to identify other sources of errors which could be re-specified to improve the model fit. Based on the modification indices, several covariance error paths were suggested, however, the corresponding changes in parameter estimates are very small (i.e., <0.1). Also, the incorporations of such paths are only recommended with adequate justification, otherwise the search for re-specification is open to chance thereby limiting the generalizability of the study (Bagozzi and Yi, 2012; Schreiber *et al.*, 2006).

**Table 4.35:** Goodness-of-Fit Indices for Specified Main Structural Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 676.317 |
| NC | ≤5 | 1.283 |
| GFI | ≥0.80 | 0.874 |
| AGFI | ≥0.80 | 0.850 |
| RMSEA | ≤0.08 | 0.034 |
| NFI | ≥0.80 | 0.817 |
| CFI | ≥0.90 | 0.952 |
| TLI | ≥0.90 | 0.945 |

Moreover, the modification indices suggested a regression path from prior experience to team ability to utilize knowledge with an associated change in parameter estimates of 0.174. Aside from the appreciable change associated with this path, its relevance to understanding the micro-antecedents of ACAP cannot be over-emphasized (see Section 5.3.1). Thus, this path was incorporated while the hypothesized but non-significant paths were deleted. Further assessments, were conducted to establish the superiority of the re-specified model, as detailed below.

Mueller and Hancock (2007) recommend the analysis of alternate models in order to obtain the best model fit for the data. Accordingly, appropriate statistical tests were performed to compare alternative models based on the introduction of significant and deletion of non-significant paths (Mueller & Hancock, 2007; Schumacker & Lomax, 2010). In addition to incorporating the significant regression path from E to U, three other nested comparison models were specified to constrain each of the non-significant paths, i.e., L to R, O to A, and E to R, to zero (0). The results from these comparisons indicate that no differences exist between the default model and the constrained models (see Table 4.36). Thus, based on the nested model comparison, the hypothesized paths with non-significant estimates were deleted thereby reducing the complexity of the model.

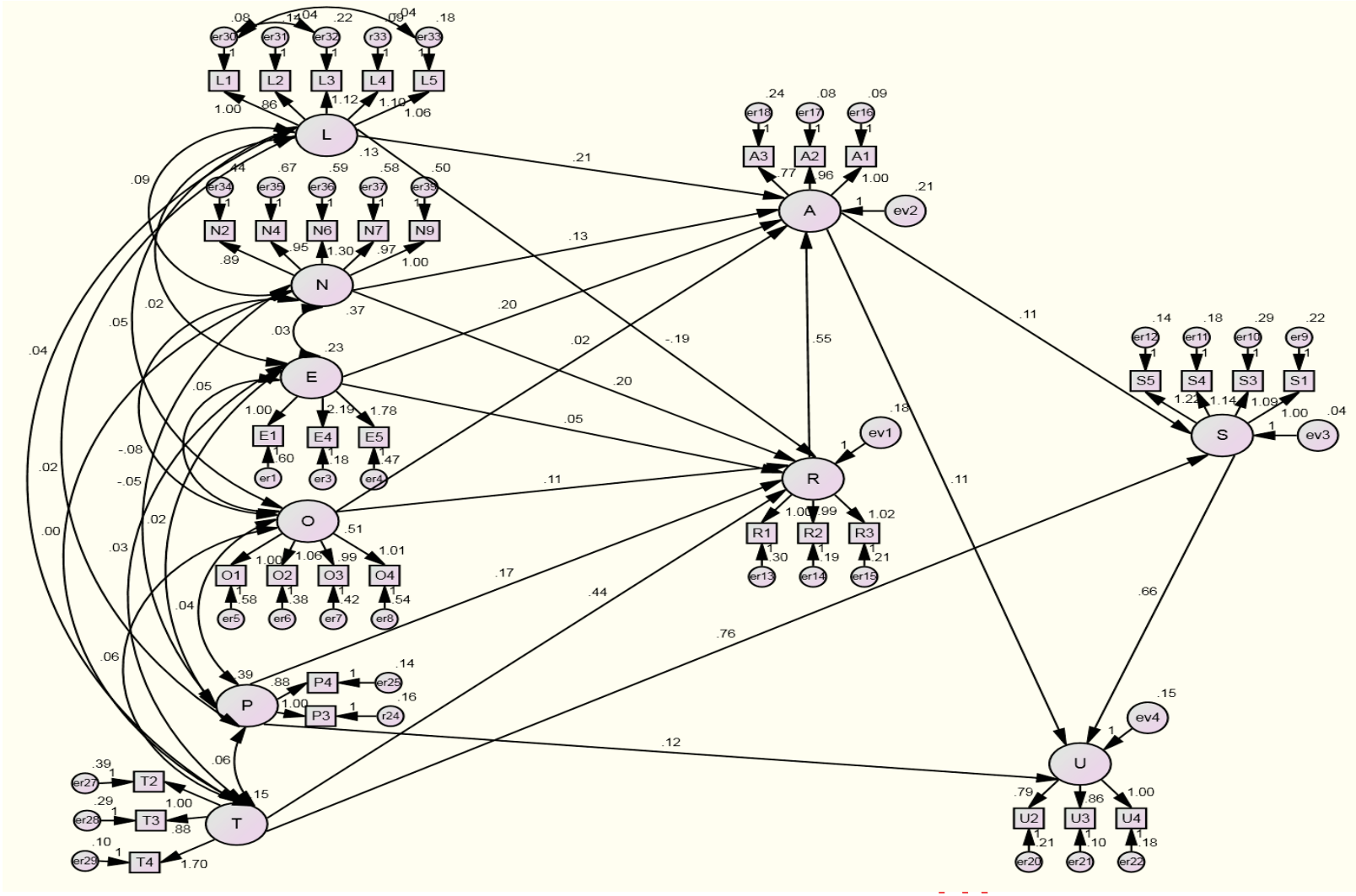


**Figure 4.25:** Specified Structural Model (Unstandardized)

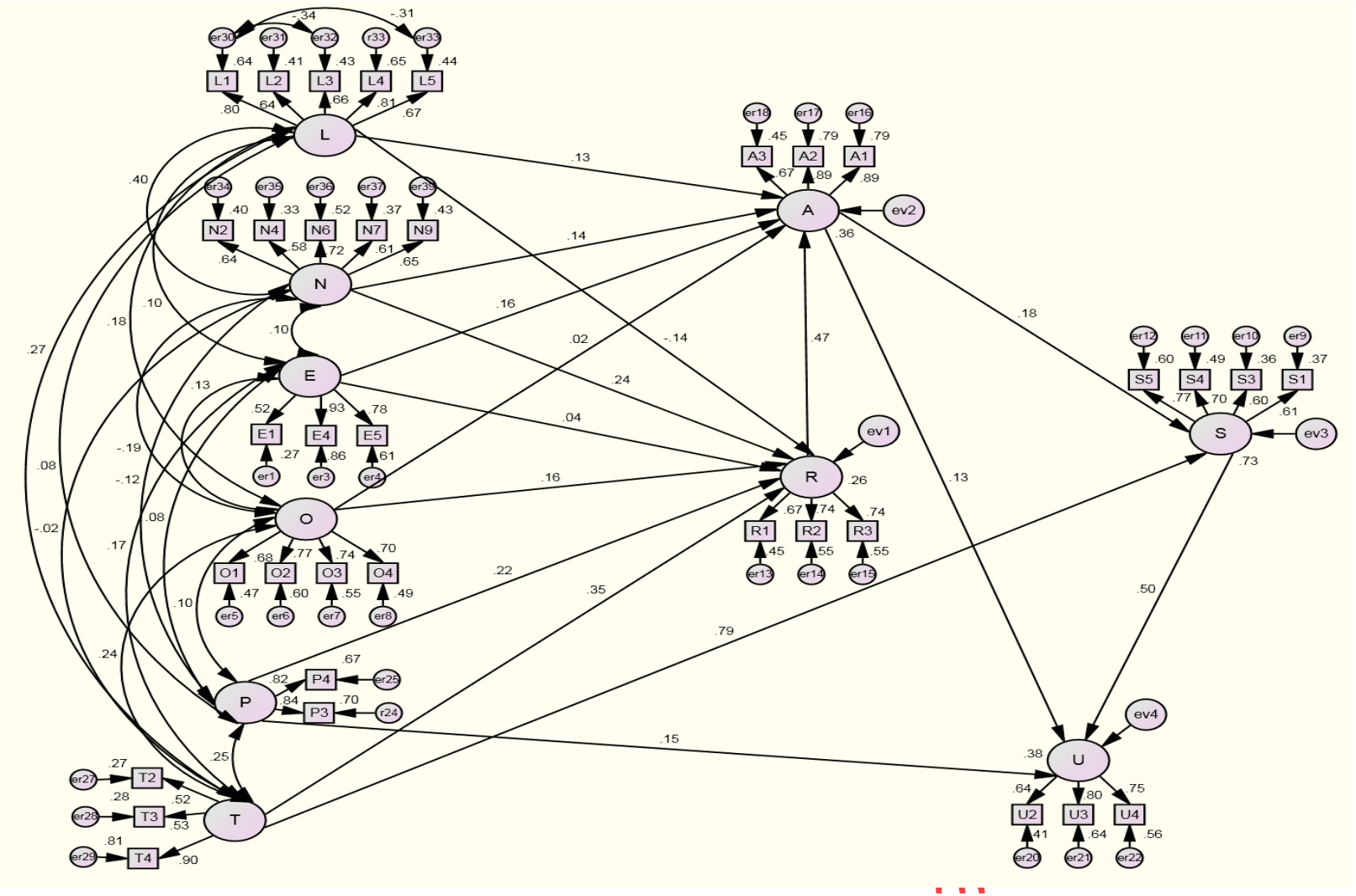


**Figure 4.26:** Specified Structural Model (Standardized)

Assuming the re-specified model is a better fit than the specified model (see Table 4.37); therefore the hypothesized relationships were tested, based on the former. The re-specified model unstandardized regression weights, covariance, and variance are shown on Figure 4.27, while the standard regression weights, correlations and squared multiple correlations are printed on Figure 4.28. A summary of the parameter estimates for the re-specified model is presented in Table 4.38.

**Table 4.36:** Results of Model Comparisons for Non-Significant Paths Constrained to Zero

Assuming model Default model to be correct:

| Model | DF | CMIN | P | NFI Delta-1 | IFI Delta-2 | RFI rho-1 | TLI rho2 |
|---|---|---|---|---|---|---|---|
| Model Number 2 (L to R) | 1 | .008 | .927 | .000 | .000 | .000 | -.001 |
| Model Number 3 (E to R) | 1 | 1.661 | .198 | .001 | .001 | .000 | .000 |
| Model Number 4 (O to A) | 1 | .177 | .674 | .000 | .000 | .000 | .000 |

*Note: p > 0.5, implies there is no significant difference between default and constrained models. The differences in fit indices are also very small (i.e., 0.001)*

**Table 4.37:** Goodness of Fit Indices for Re-specified Structural Model

| Goodness-of-fit Indices | Desirable Range | Measurement Model |
|---|---|---|
| $\chi^2$ | Low figure | 676.317 |
| NC | ≤5 | 1.283 |
| GFI | ≥0.80 | 0.874 |
| AGFI | ≥0.80 | 0.850 |
| RMSEA | ≤0.08 | 0.034 |
| NFI | ≥0.80 | 0.817 |
| CFI | ≥0.90 | 0.952 |
| TLI | ≥0.90 | 0.945 |

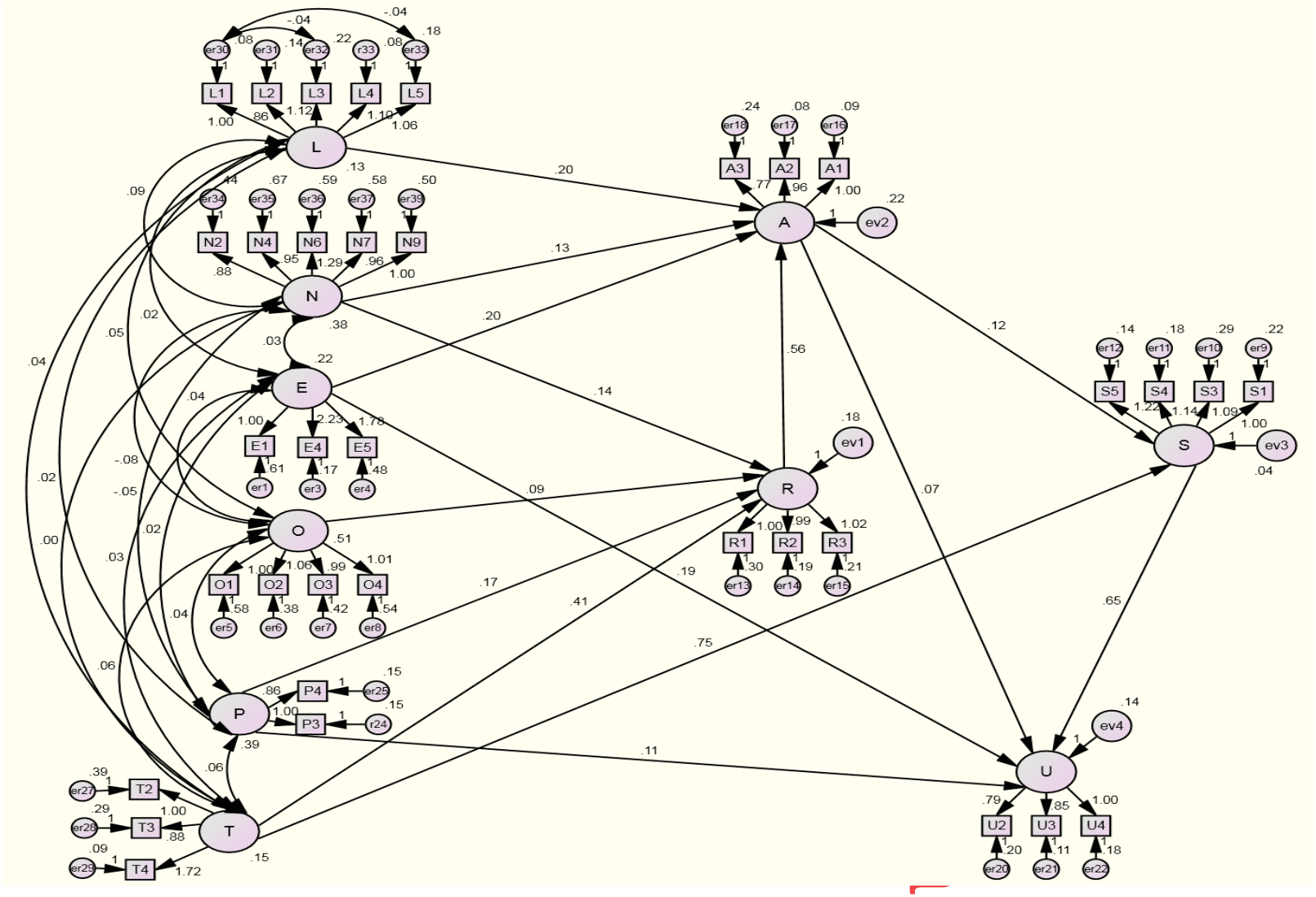


**Figure 4.27:** Re-specified Structural Model (Unstandardized)

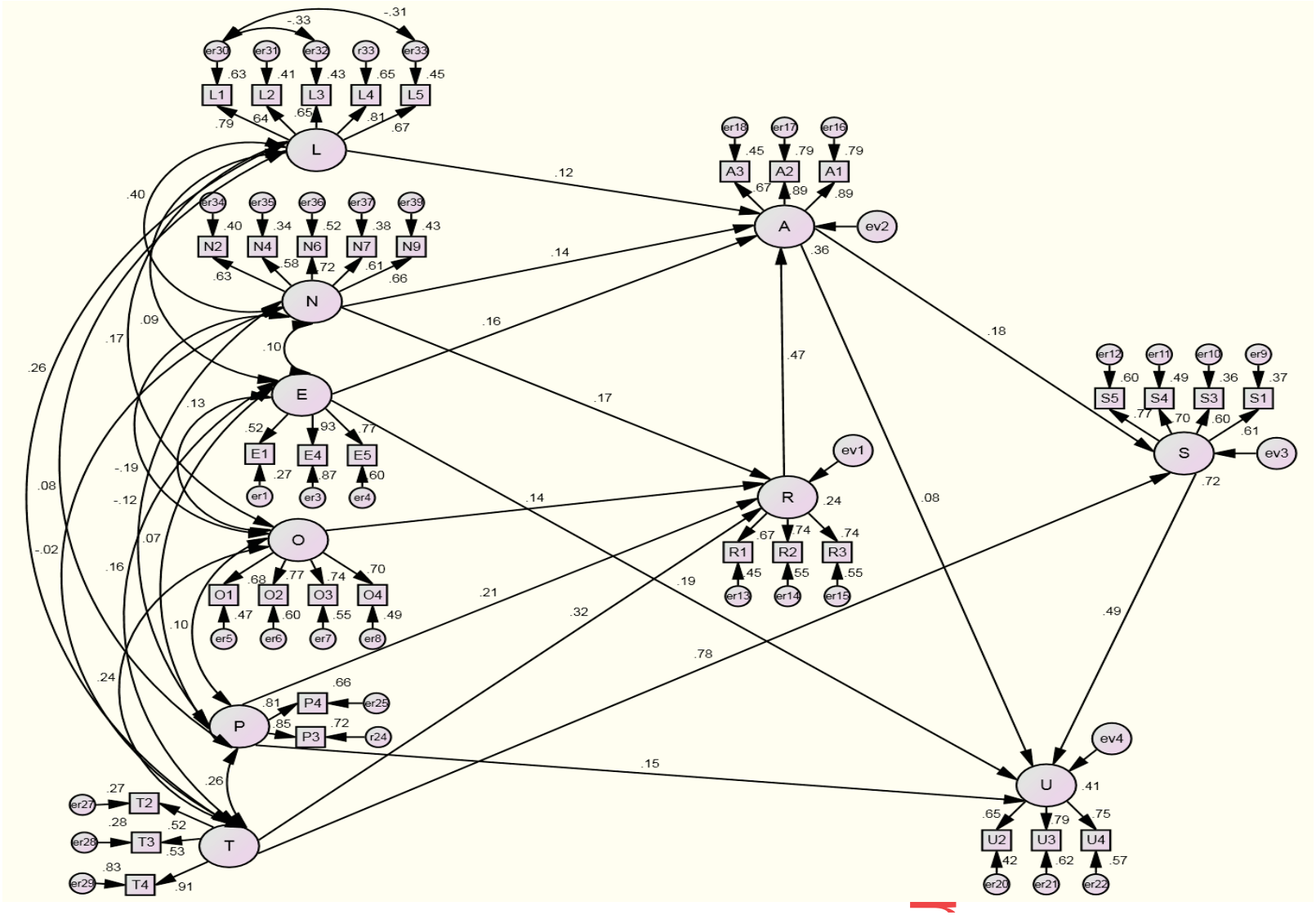


**Figure 4.28:** Re-specified Structural Model (Standardized)

**Table 4.38:** Parameter Estimates for Re-specified Structural Main Model

| Paths | Unstandardized Estimates | Standard Error | Critical Ratios | p-value |
|---|---|---|---|---|
| N ⟶ R | 0.139 | 0.064 | 2.176 | 0.030* |
| O ⟶ R | 0.094 | 0.054 | 1.728 | 0.084† |
| P ⟶ R | 0.166 | 0.064 | 2.599 | 0.009** |
| T ⟶ R | 0.408 | 0.113 | 3.595 | 0.000*** |
| E ⟶ A | 0.201 | 0.079 | 2.544 | 0.011** |
| L ⟶ A | 0.197 | 0.113 | 1.747 | 0.081† |
| N ⟶ A | 0.128 | 0.070 | 1.812 | 0.070† |
| R ⟶ A | 0.560 | 0.094 | 5.966 | 0.000*** |
| A ⟶ S | 0.117 | 0.038 | 3.056 | 0.002** |
| T ⟶ S | 0.755 | 0.118 | 6.376 | 0.000*** |
| P ⟶ U | 0.114 | 0.056 | 2.032 | 0.042* |
| S ⟶ U | 0.650 | 0.122 | 5.331 | 0.000*** |
| A ⟶ U | 0.069 | 0.062 | 1.117 | 0.264[c] |
| [a]E ⟶ U | 0.194 | 0.073 | 2.660 | 0.008** |
| [b]E ⟶ R | Not Significant | | | |
| [b]L ⟶ R | Not Significant | | | |
| [b]O ⟶ A | Not Significant | | | |

Note: † *p < 0.10;* * *p < 0.05;* ** *p < 0.01;* *** *p < 0.001;* N = Need for *Cognition; O = Performance Approach Goal Orientation; E = Prior Experience; L = Learning goal orientation; R = Ability to Recognize Knowledge; A = Ability to Assimilate Knowledge; S = Shared Cognition; U = Ability to Utilize Knowledge; P = Partner Support; T = Trust in Partner.*

[a] *Non-hypothesized but significant path introduced based on MI regression weights to improve overall model fit.*

[b] *Hypothesized but non-significant path deleted based on Nested Model Comparison (see Table 4.37).*

[c] *Subject to assessment of direct path in the course of investigating mediating effect.*

### 4.9.1 Mediating Effect of Shared Cognition

The mediating effect of shared cognition on the relationship between an individual's ability to assimilate knowledge and a team's ability to utilize knowledge has been incorporated into the re-specified main structural model in Figure 4.28. To

investigate this path, this study compared the results obtained from Baron and Kenny's (1986) approach with the bootstrapping technique. Basically, mediation is ascertained when a prior significant relationship between independent and dependent variables, is constrained upon the introduction of a third variable, i.e. a mediator.

Following Baron and Kenny (1986), three structural models were estimated. The first model estimated the structural path between the independent variable, i.e. ability to assimilate knowledge and dependent variable, i.e., ability to utilize knowledge. This involved the elimination of the mediator, i.e., shared cognition, from the structural model. In the second model, the mediator was re-introduced and its structural path with the independent variable was assessed. The third model involved the assessment of the structural path among the independent, mediator, and dependent variables, wherein the effect of the independent was controlled by considering the mediator as another predictor of the dependent variable. Given that all the three structural models generate acceptable goodness-of-fit indices (see Table 4.39), further statistical tests were conducted in order to assess the statistical significance of the assumed mediating effect.

In line with Baron and Kenny's (1986) suggestion, a full mediation effect is assumed, in that the prior significant relationship between ability to assimilate and utilize knowledge (i.e., $\beta = 0.218$; $p = 0.000$; $z = 3.448$) in model 1 becomes insignificant ($\beta = 0.056$; $p = 0.403$; $z = 0.836$) after the inclusion of shared cognition in model 3. As shown in Table 4.40, the outcome of Sobel's test on model 3 reveals a significant mediating effect, which implies that the reduction in the predictive effect of the independent variable is statistically significant. Thus, shared cognition is considered as a full mediator of the relationship between ability to assimilate and utilize knowledge.

**Table 4.39:** Goodness of Fit Indices for the Mediation Structural Models

| Goodness-of-fit Indices | Desirable Range | Structural Model 1 (A⟶U) | Structural Model 2 (A⟶ S) | Structural Model 3 (A⟶ S⟶U) |
|---|---|---|---|---|
| $\chi^2$ | Low Figure | 547.698 | 801.593 | 800.903 |
| NC | ≤5 | 1.349 | 1.510 | 1.511 |
| GFI | ≥0.80 | 0.883 | 0.859 | 0.859 |
| AGFI | ≥0.80 | 0.857 | 0.833 | 0.833 |
| RMSEA | ≤0.08 | 0.038 | 0.045 | 0.045 |
| NFI | ≥0.80 | 0.824 | 0.818 | 0.817 |
| CFI | ≥0.90 | 0.947 | 0.913 | 0.912 |
| TLI | ≥0.90 | 0.939 | 0.902 | 0.902 |

**Table 4.40:** Baron and Kenny's (1986) Hypothesized Mediating Effect

| Unstandardized Coefficient of Structural Model 1 A⟶U | Unstandardized Coefficient of Structural Model 2 A ⟶S | Unstandardized Coefficient of Structural Model 3 A ⟶ S ⟶ U | Test Statistics for Indirect Effect (Sobel Test) |
|---|---|---|---|
| 0.218*** | 0.293*** | 0.056 | 3.754*** |

*** $p < 0.001$, *A = Ability to Assimilate Knowledge, S = Shared cognition, U = Ability to Utilize Knowledge.*

Although, the outcome of Sobel's test revealed a significant mediating effect of shared cognition (see Table 4.40), however, the appropriateness of Baron and Kenny (1986) approach as well as the test has been questioned. Williams *et al.* (2009) suggest instances, most especially with complex models, when compliance with the first and last procedures of Baron and Kenny's (1986) four steps could lead to improper inference on the mediation effect. Also, the complementary Sobel's test has been found to be unreliable in cases where there is slight deviation from normality, which is almost the norm due to the product term involved in the computation of the mediating path (MacKinnon *et al.*, 2002 Shrout and Bolger, 2002; Preacher and Hayes, 2004; Preacher and Hayes, 2008).

Subsequent to the above, recent attempts at investigating mediation have adopted a more robust approach, i.e., the bootstrapping technique (Preacher and Hayes, 2004; Zhao, Lynch, and Chen, 2010). This offers a non-parametric resampling procedure for the observed data, in order to generate a sampling distribution for the indirect path (Preacher and Hayes, 2004). Therefore, unlike Baron and Kenny (1986), the bootstrapping only tests for the significance of the indirect effect with the aid of the confidence intervals to generate a more accurate estimation of the mediation (*Zhao et al.*, 2010). Thus, the bootstrapping option in AMOS was selected and employed in the assessment of the mediating path. As shown in the Table 4.41, the indirect effect of an individual's ability to assimilate knowledge on a team's ability to utilize knowledge through shared cognition is 0.217, with a 95% confidence interval of 0.121 to 0.328 and significant at 0.001.

**Table 4.41:** Bootstrapping Test of Mediating Effect

| Standardized Indirect Effect | Lower Bound | Upper Bound | p-value |
|---|---|---|---|
| .217 | 0.121 | 0.328 | 0.001*** |

****p < 0.001*

Expectedly, the result of the mediation test using the bootstrapping technique validates the mediating effect of shared cognition, which was earlier established using Baron and Kenny's (1986) approach.

## 4.10 Results of Hypotheses Testing

Based on the assessment of the re-specified structural models, the hypotheses were tested. The comprehensive results are summarized in Table 4.42.

**Table 4.42:** Results of Hypotheses Testing

| H | Paths | Unstandzd. Estimates | Std. Error | Critical Ratios | p-value | Results |
|---|---|---|---|---|---|---|
| H1a | E → R | Not Significant | | | | Not Supported |
| H1b | E → A | 0.201 | 0.079 | 2.544 | 0.011** | Supported |
| | E → U | 0.194 | 0.073 | 2.660 | 0.008** | Supported |
| H2a | L → R | Not Significant | | | | Not Supported |
| H2b | L → A | 0.197 | 0.113 | 1.747 | 0.081† | Supported |
| H3a | N → R | 0.139 | 0.064 | 2.176 | 0.030* | Supported |
| H3b | N → A | 0.128 | 0.070 | 1.812 | 0.070† | Supported |
| H4a | O → R | 0.094 | 0.054 | 1.728 | 0.084† | Supported |
| H4b | O → A | Not Significant | | | | Not Supported |
| H5a | P → R | 0.166 | 0.064 | 2.599 | 0.009** | Supported |
| H5b | P → U | 0.114 | 0.056 | 2.032 | 0.042* | Supported |
| H6a | T → R | 0.408 | 0.113 | 3.595 | 0.000*** | Supported |
| H6b | T → S | 0.755 | 0.118 | 6.376 | 0.000*** | Supported |
| H7 | R → A | 0.560 | 0.094 | 5.966 | 0.000*** | Supported |
| H8 | A → U | 0.069 | 0.062 | 1.117 | 0.264 | Not Supported |
| H9 | A → S | 0.117 | 0.038 | 3.056 | 0.002** | Supported |
| H10 | A → S → U | 0.217 | 0.053 | | 0.001*** | Supported |
| H11 | S → U | 0.650 | 0.122 | 5.331 | 0.000*** | Supported |

Note: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$,

*Unstandzd. – Unstandardized, N = Need for Cognition, O = Performance Approach Goal Orientation, E = Prior Experience, L = Learning Goal Orientation, R = Ability to Recognize Knowledge, A = Ability to Assimilate Knowledge, S = Shared Cognition, U = Ability to Utilize Knowledge.*

### 4.10.1 Hypothesis 1

H1a: Prior experience in related knowledge is positively associated with the individual ability to recognize the value of foreign partner knowledge in joint project team.

H1b: Prior experience in related knowledge is positively associated with the individual ability to assimilate foreign partner knowledge in joint project team.

As hypothesized, the possession of prior related work experience by local employees engaged in joint projects with foreign partners was positively associated with the ability to assimilate new knowledge ($\beta = 0.201$; $z = 2.544$; $p = 0.011$). Surprisingly, this study did not support the hypothesized relationship between prior experience and the ability to recognize the value of knowledge, but the non-hypothesized relationship with the team's ability to utilize knowledge was supported ($\beta = 0.194$, $z = 2.660$, $p = 0.008$).

### 4.10.2 Hypothesis 2

H2a: Need for cognition is positively associated with the individual ability to recognize the value of foreign partner's knowledge in joint project team.

H2b: Need for cognition is positively associated with the individual ability to assimilate foreign partner's knowledge in joint project team.

The outcome of SEM supports the hypothesized relationships between need for cognition and individual's ability to (a) recognize the value of foreign knowledge ($\beta = 0.139$, $z = 2.176$, $p = 0.030$) and (b) assimilate the knowledge ($\beta = 0.128$, $z = 1.812$, $p = 0.070$). It is appropriate to note that the relationship was significant for the former (i.e., $p < 0.05$), but moderate for the latter (i.e., $p < 0.10$).

### 4.10.3 Hypothesis 3

H3a: Learning goal orientation is positively associated with the individual ability to recognize the value of foreign partner knowledge in joint project team.

H3b: Learning goal orientation is positively associated with the individual ability to assimilate foreign partner's knowledge in joint project team.

The outcome of analysis supported the hypothesized relationship between learning goal orientation and individual ability to assimilate foreign knowledge, although this was significant at $p < 0.1$ (i.e., $\beta = 0.197$; $z = 1.747$; $p = 0.081$). On the contrary, the hypothesized relationship with the ability to recognize the value of knowledge was not significant, even at $p < 0.1$. Therefore a moderate effect of learning goal orientation was reported on individual's ability to assimilate foreign knowledge.

### 4.10.4 Hypothesis 4

H4a: Performance approach goal orientation is positively associated with the individual ability to recognize the value of foreign partner's knowledge joint project team.

H4b: Performance approach goal orientation is negatively associated with the individual ability to assimilate foreign partner's knowledge in joint project team.

As hypothesized, the relationship between performance approach goal orientation and individual ability to recognize the value of foreign partner's knowledge was significant at $p < 0.01$ (i.e., $\beta = 0.163$; $z = 2.856$; $p = 0.004$), however, its relationship with the ability to assimilate knowledge was not significant. Juxtaposed with the supported effect of learning goal orientation on ability to assimilate knowledge, the present findings affirm the relevance of dual goal orientation (Barron and Harackiewicz, 2001) (see Section 5.3.3).

### 4.10.5 Hypothesis 5

H5a: Individual perception of the foreign partner support in joint project team is positively associated with individual ability to recognize the value of foreign knowledge.

H5b: Individual perception of the foreign partner support in joint project team is positively associated with team ability to utilize the foreign knowledge.

Both hypotheses were supported, with the relationship between partner support and individual ability to recognize foreign partner knowledge significant at $p < 0.01$ ($\beta = 0.166$, $z = 2.599$, $p = 0.009$), and at $p < 0.05$ for team ability to utilize the foreign partner knowledge ($\beta = 0.114$, $z = 2.032$, $p = 0.042$).

### 4.10.6 Hypothesis 6

H6a: Individual perception of trust in foreign partner is positively associated with individual ability to recognize the value of foreign knowledge in joint project team.

H6b: Individual perception of trust in foreign partner is positively associated with shared cognition in joint project team.

Both hypotheses were supported, with both relationship significant at $p<0.001$ - individual perception of trust in partner and ability to (a) recognize foreign partner knowledge ($\beta = 0.408$, $z = 3.595$, $p = 0.000$) and (b) team's shared cognition ($\beta = 0.755$, $z = 6.376$, $p = 0.000$).

### 4.10.7 Hypothesis 7

H7: Individual ability to recognize the value of foreign partner knowledge is positively associated with individual ability to assimilate the knowledge in the joint project team.

The hypothesized relationship between individual ability to recognize the value of foreign partner knowledge and the individual ability to assimilate the knowledge was supported ($\beta = 0.560$, $z = 5.966$, $p = 0.000$).

### 4.10.8 Hypothesis 8

H8: Individual ability to assimilate foreign partner knowledge is positively associated with the team ability to utilize the knowledge in the joint project team.

The hypothesized relationship between individual ability to assimilate partner knowledge and team ability to utilize the knowledge was not supported (β = 0.083, z = 1.276, p = 0.202). This should be considered with recourse to the mediating effect of shared cognition (H10), in that with the elimination of shared cognition from the structural model, the hypothesized relationship was found to be significant (β = 0.218, z = 3.448, p = 0.000). Thus, individual ability to assimilate foreign partner knowledge has no direct relationship with team ability to utilize knowledge.

### 4.10.9 Hypothesis 9

H9: Individual ability to assimilate foreign partner knowledge is positively associated with shared cognition in joint project team.

The hypothesized relationship between individual ability to assimilate foreign partner knowledge and shared cognition was supported (β = 0.117, z = 3.056, p = 0.002).

### 4.10.10 Hypothesis 10

H10: Shared cognition mediates the effect of individual ability to assimilate foreign partner knowledge on team ability to utilize the knowledge in the joint project.

As earlier noted in Section 4.10.8 (i.e., Hypothesis 8) the full mediation of shared cognition was supported for the relationship between individual ability to assimilate foreign partner knowledge and team ability to utilize the knowledge (β = 0.217, p = 0.001). Thus, individual ability to assimilate foreign partner knowledge

has no direct relationship with team ability to utilize the knowledge, but rather an indirect relationship through shared cognition.

### 4.10.11 Hypothesis 11

H11: Shared cognition positively is positively associated with the team ability to utilize foreign partner knowledge in the joint project team.

Further to the full mediating effect, shared cognition also demonstrated significant association with team's ability to utilize knowledge ($\beta = 0.650$, $z = 5.331$, $p = 0.000$).

## 4.11 Summary of the Chapter

This chapter presents the comprehensive results of the statistical analyses underlying the research. With the aid of figures and tables, the results of the analyses are summarized. Having considered the demographic profiles of the sample, the descriptive statistics examined the normality, linearity and reliability of all the research variables. Furthermore, the EFA was performed as a prerequisite for the CFA in order to demonstrate the non-significance of common method variance. The CFA assessed the fit for each of the measurement models for the latent variables, and in line with the two-step approach, the overall measurement model was also validated. The assessment of the hypothesized effects through the SEM technique was discussed, and the corresponding findings summarized accordingly.

# CHAPTER 5

## DISCUSSIONS AND CONCLUSION

### 5.1 Introduction

This chapter reviews the research process and explicates the implications of the findings**.** Section 5.2 provides an overview on the study with a summary of th**e** conceptualization of the model and findings from the assessment. These findings are discussed in detail in Section 5.3, with sub-Sections dedicated to each of the constructs. In Section 5.4, the contributions of the study are delineated into two sub-sections on theoretical and practical implications. Section 5.5 considers both the theoretical and empirical limitations of the study, while Section 5.6 suggests areas for future research. The overall conclusion of the study is presented in Section 5.7

### 5.2 Overview on the Study

The main objective of this study was to address the need for micro-foundational understanding of ACAP within the social context of a joint project team. Revisiting the original concept of ACAP, as propounded by Cohen and Levinthal (1990), the individual level of analysis was reintroduced. Drawing on conceptually related constructs like creative capacity and organisational learning, the individual antecedents (prior experience, need for cognition, learning goal orientation, and performance goal performance approach goal orientation) were suggested for related ACAP dimensions. Specifically, ACAP was delineated into four dimensions of individual abilities to (i) recognize the value of foreign knowledge, and (ii) assimilate the knowledge, and team's (iii) shared cognition and (i) ability to utilize knowledge. Furthermore, strategic alliance literature was considered in hypothesising the effect of social context (i.e., partner's support and trust in partner) on the multidimensional ACAP construct.

The conceptual model was synthesized from the extensive review of literatures on ACAP, organisational learning, creativity capacity, and strategic alliance, as expatiated in Chapter 2. First, the ACAP concept was explained, with detailed discussion on its origin and status. Thereafter, the micro-level antecedents, social context and multidimensional ACAP were synthesized from socio-psychological theories in creative capacity and organisational learning, with the incorporation of the strategic alliance literature. Consequently, the relevant hypotheses were formulated. The underlying methodology for this study was presented in Chapter 3 with the operationalization of the research constructs and discussion on the statistical procedure for data analyses. Chapter 4 presents the results of data analyses, which include the descriptive and exploratory statistics, as well as confirmatory factor analysis and structural equation modelling.

The first research objective is expressed as hypotheses on the effects of micro antecedents on ACAP's individual dimensions of ability to recognize the value and assimilate partner's knowledge (see H1a to H4b). The second research objective relates to the hypothesized relationships between social context (i.e., partner support and trust in partner) and the multidimensional ACAP constructs (i.e. individual ability to recognize the value of knowledge, as well as team shared cognition and ability to utilize knowledge) (see H5a to H6b). The last three research objectives are addressed through hypotheses on the multidimensional ACAP construct (see H7 to H11).

All the above hypotheses were assessed using SEM with the aid of the AMOS software package. The SEM attained acceptable goodness-of-fit indices and the structural model was examined to make pertinent inferences on the hypothesized paths (see Section 4.9). Based on the outcome of the analysis, empirical support was obtained for fourteen (14) out of a total of eighteen (18) hypotheses. An additional non-hypothesized path was found to be significant and was incorporated in order to enhance the model fit. A summary of all the statistically significant paths as follows:

1. Prior experience in related knowledge is positively associated with the individual ability to assimilate foreign partner knowledge in a joint project team.
2. Prior experience in related knowledge is positively associated with the team ability to utilize foreign partner knowledge in a joint project team.
3. The need for cognition is positively associated with the individual ability to recognize the value of foreign partner knowledge in a joint project team.
4. The need for cognition is positively associated with the individual ability to assimilate foreign partner knowledge in a joint project team.
5. Learning goal orientation is positively associated with the individual ability to assimilate foreign partner knowledge in a joint project team.
6. Performance approach goal orientation is positively associated with the individual ability to recognize the value of foreign partner knowledge in a joint project team.
7. Individual perception of foreign partner support is positively associated with the individual ability to recognize the value of partner knowledge in a joint project team.
8. Individual perception of foreign partner support is positively associated with the team ability to utilize partner knowledge in a joint project team.
9. Individual perception of trust in foreign partner is positively associated with individual ability to recognize the value of partner knowledge in a joint project team.
10. Individual perception of trust in foreign partner is positively associated with the team shared cognition in a joint project.
11. Individual ability to recognize the value of foreign partner knowledge is positively associated with the individual ability to assimilate the knowledge in a joint project team.
12. Individual ability to assimilate foreign partner knowledge is positively associated with the team shared cognition in the joint project team.
13. Team shared cognition is positively associated with the team ability to utilize foreign partner knowledge in a joint project team.

14. Individual ability to assimilate foreign partner knowledge has an indirect relationship with the team ability to utilize the knowledge through shared cognition.

The four (4) non-supported hypothesized paths are:

1. Prior experience in related knowledge has no significant relationship with the individual ability to recognize the value of foreign partner knowledge in a joint project team.
2. Learning goal orientation has no significant relationship with the individual ability to recognize the value of foreign partner knowledge in a joint project team.
3. Performance approach goal orientation has no significant relationship with the individual ability to assimilate foreign partner knowledge in a joint project team.
4. There is no significant direct relationship between individual ability to assimilate foreign partner knowledge and team ability to utilize the knowledge in a joint project team.

## 5.3 Discussions of Findings

### 5.3.1 Prior Experience

Drawing on literature from entrepreneurial studies (Venkataraman, 1997; Shane, 2000), this study defines prior experience as the distinctive knowledge possessed by an individual about a subject matter, which enables him or her to identify learning opportunities. Expectedly, an individual's prior knowledge has varying effect on ACAP as indicated in earlier studies (Cohen & Levinthal, 1990; Crossan et al., 1999; Sun and Anderson, 2010; Mainbaeva *et al.* 2003). Although, prior experience was found not to have a significant effect on ability to recognize the value of knowledge, its significant effect on the ability to assimilate the knowledge demonstrates its relationship with individual's ACAP. While the lack of support for

H1a in the present study is contrary to the theoretical definition of ACAP (Cohen & Levinthal, 1990; Zahra & George, 2002). This result is consistent with the outcome of Singh's (2012) in-depth case analysis on the effect of prior knowledge on an individual's ACAP in the New Zealand Tourism industry. Similarly, Lane and Lubatkin (1998) demonstrated that the relationship between R&D spending (i.e., prior knowledge) and variance measures of ACAP are uncorrelated.

Cohen and Levinthal's (1990) proposition suggests that an individual's mental model about a phenomenon develops along the path of exposure and is stored in memory. Thus, unless concerted effort is channelled towards exploring new things, an individual's interpretation of future phenomena could be limited by the mental model already registered in the memory. Accordingly, the possession of prior knowledge in areas related to the joint project could facilitate understanding; however, it could also limit the capability to recognize the value of new knowledge. Crossan *et al.* (1999) corroborate that the ability to recognize new knowledge is conditioned on the recognition of a similar pattern in memory. It is therefore essential that individuals keep abreast of developments related to the project task in order to facilitate their evaluation of the underlying knowledge.

Despite the lack of support for ability to recognize value, prior experience proves to be an important antecedent for both individual and team ACAP. Further to its significant impact on individual's ability to assimilate partner's embedded knowledge, it can also facilitate the collective ability to utilize knowledge at the joint team level. The possession of prior related knowledge by local team members could shorten their learning curve thereby impacting on engagements in the joint team.

Furthermore, the lack of support for ability to recognize the value of knowledge can be explained from the empirical context. The sampling frame in this study consisted of employees, who were engaged in a joint project, however the tasks of recognizing and acquiring new knowledge are the preserve of specific individuals like boundary spanners or gate keepers (Cohen & Levinthal, 1990). Thus, notwithstanding the level of prior related knowledge, the ability to recognize the

value of knowledge might be docile in certain groups of individuals, thereby masking the expected relationship.

Given the demography on length of engagement in the oil industry, the majority of the respondents for this study can be classified as being at the middle level of their career (see Section 4.2). Accordingly, they would have gained good awareness on happenings in their field and therefore the need for recognition of value might already have been fulfilled. However, the level of their prior knowledge might be more important to understanding and assimilating related knowledge. The effect of prior knowledge on the ability to recognize the value of related knowledge could be masked by the extent to which the local partners as well as foreign partners are exposed to advanced engineering tasks.

In summary, aside from bridging the gap on the direct effect of an individual's prior knowledge on absorptive capacity, the present study also advances recent conceptualization on multidimensional ACAP (Zahra and George, 2002; Todorova & Durusin, 2007; Sun & Anderson, 2010). Following Zahra and George's (2002) proposition on potential and realized ACAP, the study demonstrates the significance of prior knowledge on both. Specifically, further to the effect of prior experience an on individual's ability to assimilate related knowledge, the team's ability to utilize knowledge was also found to be predicted by the prior experience of individuals constituting the team.

### 5.3.2 Need for Cognition

The present findings support the hypothesized relationships between an individual's need for cognition and the ability to recognize the value of and assimilate knowledge. Need for cognition is defined as "people's tendency to engage in and enjoy thinking" (Cacioppo and Petty, 1982:130). Basically, an individual's action emanates from underlying behaviour patterns, which determine the level of engagement within a social context. Thus, an individual's disposition towards thinking is expected to impact their level of curiosity, which can facilitate the

recognition as well as understanding of new concept. A similar position has been advanced in educational psychology literature, wherein a high score on need for cognition was found to correlate to the extent of effort committed to knowledge acquisition, reasoning and problem solving (Cacioppo *et al.,* 1996).

Although, studies have validated the positive effect of need for cognition in performance within the classroom environment (Cacioppo *et al.,* 1996; Bors *et al.,* 2006; Verplanken *et al.* 1992), less investigation has been done on its effect on performance within the work domain. This study offers insight into the implication of this construct on an individual's ability to recognize the value of and assimilate knowledge embedded in partners. The significance of this construct was higher towards the ability to recognize the value of knowledge ($p = 0.040$), as compared to assimilating the knowledge ($p = 0.078$). This is consistent with Glaser *et al.'s* (1988) proposition on the relationship between an individual's cognition and information recognition.

Indeed learning new things requiring thinking is more relevant in engineering projects where team members engage in systematic and intuitive thinking focused on recognizing and integrating methods pertinent to problem solving (Deng *et al.,* 2008). Through engagement in thinking, an individual is likely to focus attention on the underlying logic for a given task; thereby he/she would easily identify and access the associated knowledge. Therefore, the disposition of employees from the less competent partners towards thinking could be of significant impact in facilitating knowledge transfer in joint project teams.

### 5.3.3 Learning and Performance Approach Goal Orientation

Following VandeWalle (1997) this study considered learning goal orientation as the disposition of an individual towards committing the necessary effort for the mastery of a given task. This construct originates from scholarship in educational psychology wherein learning capability is premised on the student's drive towards the achievement of goals (Eison, 1981; Nicholls, 1975; Dweck, 1996). Accordingly,

by extending the conceptual relatedness between learning capability and ACAP (Cohen & Levinthal, 1990) the individual orientation towards learning is hypothesized as a predictor of ACAP. The findings revealed that individual drive for task mastery is related to ability assimilate knowledge but not to the ability to recognize the value of that knowledge. Therefore, learning goal orientation did not have a significant impact on the ability to recognize the value of knowledge. However, its significant effect on the ability to assimilate knowledge proffers useful insight into how learning disposition impacts on learning capability.

Although studies are yet to investigate the direct relationship, the significant effect of learning goal orientation on ability to assimilate partner knowledge within the joint project team context can be grounded in extant literature (Kankanhalli *et al.*, 2012; Rogers and Spitzmueller, 2009). Learning goal-oriented people engage in a project team, with a mind-set that they can develop the necessary skills for the assigned task. Studies have demonstrated such people to be opened to experiencing new things (Brett and VandeWalle, 1999), self-efficacious (Ames and Archer, 1988) and self-directed (Yeh, 2008). Therefore, they are more likely to break barriers and cross boundaries in their drive towards task mastery, especially when they perceive their skill set as inadequate. This drive also characterizes knowledge assimilation, in that the development of in-depth understanding about a concept requires concerted effort on the part of the learner (Ojo, Raman and Chong, 2014; Nemanich *et al.*, 2010). Similar findings have been uncovered in previous studies (Kankanhalli *et al.*, 2012; Rogers and Spitzmueller, 2009). Kankanhalli *et al.* (2012) demonstrated learning goal orientation as the most significant predictor of learning effectiveness, among other factors.

Learning goal-oriented individuals are driven to acquiring in-depth insight on a given task thereby impacting their knowledge assimilating abilities. According to Shuell (1992) they assume full responsibility for learning in order to enhance their knowledge base. Bell and Kozlowski (2002) emphasize the resolute inclination towards building new skills when faced with challenging tasks. Basically, such individuals are pragmatic and conscious of their engagement in the project team, and

open to considering other experience in their drive towards understanding. Literature also attests to their willingness to committing appreciable amounts of resources to keep abreast of development, technological opportunities, and connections with external networks (Howell and Shea, 2001; Laursen and Salter, 2006).

The significant relationship between performance approach goal orientation and the ability to recognize the value of new knowledge is consistent with Barron and Harackiewicz's (2001) notion on the complementary relevance of the multiple goal orientation as against the single perspective. According to this proposition, students with a high level of interest for a cognitive task could be learning goal-oriented, but their drive for high level performance cannot be divorced from performance approach goal orientation. Unlike performance approach goal-oriented people, the ultimate goal of learning goal-oriented people is to understand, and they are insensitive to others' perception of their competencies. Tung-hsien's (2001) experimental investigation of the comprehension of English language revealed that learning goal-oriented students proffered systematic clues to understand unknown vocabulary but further efforts were constrained by the inability of the clues to meet expectation. This may be because performances are not evaluated in comparison to others, and therefore they are less incentivised to clarify unknown vocabulary, but only driven by the thirst for understanding.

This study confirms the significance of dual goal orientation in the project team context thereby extending the construct that had already been validated in the classroom environment (see Barron & Harackiewicz, 2001; Tung-hsien, 2001; Linnenbrink, 2005) to the work domain. As the present findings revealed, individual team members with dual goal orientation are more likely to recognize and assimilate knowledge embedded in the competent partners, in the course of joint project execution.

At the initial stage, individuals' engagement in the project team evolves through performance approach goal orientation, wherein the drive to appear more competent than others facilitates the search for short term evaluative advantages.

Given the engineering project context, this could be expressed as being the first to discover new concepts or identify procedures / methods underlying the task. Furthermore, task performance and interaction with others are most likely to be used to gain accolades and prove competencies. Nevertheless, without the complementary orientation towards learning, these are not likely to translate into assimilated knowledge. As earlier noted, the correlation between learning goal orientation and ability to assimilate knowledge could be explained from the drive towards understanding. Learning goal-oriented individuals perceive the project team as a learning context and are driven to commit the necessary efforts in order to gain mastery of procedures / methods underlying the task.

Therefore, the two components of individual ACAP, i.e., ability to recognize the value of and ability to assimilate knowledge can be predicted by performance and learning goal orientation, respectively.

### 5.3.4 Social Context: Partner Support and Trust in Partner

From a broader perspective, the context in which the alliance operates also exerts significant impact on partner perception of learning opportunities and outcomes (Beamish, 1985; Lyles and Salk, 1996; Beamish and Berdrow, 2003; Park, 2010). The empirical significance of the social context on workplace learning has been demonstrated in extant literature (Lane *et al.*, 2001; Liu, 2011; Bryans and Smith, 2000; Korte, 2007). This study advances the implications of the social context in terms of individual perception of the support from and trust in the foreign partner on knowledge acquisition in the joint project team.

As hypothesized, the significant effects of foreign partner support on individual ability to recognize the value of knowledge and team ability to utilize the knowledge were supported. Given the differential level of capabilities, the joint project partners are likely to have divergent objectives while the local team members could demonstrate readiness to acquire new knowledge; the foreign members might prevent the actual transfer of knowledge in order to remain relevant. Therefore, the

acquisition of knowledge by the local team members could be fast tracked when the foreign partners facilitate the adapted and dissemination of the embedded knowledge to the local team members. Through the provision of technical support and active engagement in the joint project team the expatriate foreign partners can enable the local team members to access their specialized knowledge.

The target knowledge is tacit and embedded in practice so that team member interactions can build stronger ties and share experience and perspectives with others (von Krogh et al., 1994). By providing adequate support to and engaging actively with the local partner, the foreign partner can deepen the strength of social ties within the joint project team (Kale, Singh and Perlmutter, 2000; Uzzi & Lancaster, 2003). Thus, the extent of support provided by the expatriates grafted into the joint project team, as perceived by the local members, could impact the outcome of interaction.

When the expatriates are perceived as helpful, the local members are better disposed to approach them for assistance. Likewise, the former will take proactive measures to facilitate problem resolution. Due to the ensuing supportive collaboration, the abilities of the local team members of the joint project are harnessed to identify the knowledge embedded in the foreign partner. These individuals are in close contact with the expatriates and connected enough to seek clarification, when appropriate, without fear of rejection. Basically, the expatriates can take ownership of the project by communicating the underlying value of the knowledge to the local members in order to impact their dominant logic as well as enhance collective performance.

For the acquired knowledge to be efficiently applied, a mechanism would be needed to ensure its institutionalization in the project team. As noted by Steensma and Lyles (2000) knowledge could be seamlessly institutionalized when the transferor becomes actively engaged in supporting the acquirer to adapt it within the specific context. Therefore, as validated in the present study, the extent of support provided by the foreign partner could impact joint team effectiveness, by enhancing knowledge utilization ability. The present findings affirm the recent case study on the

acquisition of Toyota's knowledge by GM through the NUMMI alliance (Inkpen, 2008). Inkpen (2008) concluded that the early detachment of the grafted expatriate from the project domain resulted in GM's initial failure to appreciate and leverage the alliance knowledge.

Moreover, the current study found support for the hypothesized impact of trust in the foreign partner on individual ability to recognize the value of knowledge and team shared cognition in the joint project. Trust is considered as the perception of the individual team members on the trustworthiness of foreign partner individual team members in the joint project. This is the social mechanism through which the joint project is operated and controlled so as to ensure the mutual benefit of the collaborating partner. Consistent with extant literature (Uzzi, 1997; Dyer and Nobeoka, 2000; Steensma and Lyles, 2000) the present findings underscore the significance of trust in facilitating relational collaboration and bridging gaps in understanding among partners. Trust is essential to handling the unexpected outcomes of collaboration, which might not be explicitly defined in the terms of the contract. When the partner perceives the other as trustworthy the collaborating relationship becomes characterized with the willingness to share and receive resources. Thus, the less competent partner would consider the involvement of the competent partner as an opportunity to learn new things, while the latter would not be threatened by the former's acquisition of the underlying knowledge.

Certainly, the significance of trust cannot be overemphasized, most especially in joint projects involving partners from different cultural backgrounds. Trust facilitates the socialization mechanism, which conditions individual behaviour and action within the project context. According to Inkpen (2008), the GM managers were able to develop awareness of the value and realized the benefit of the alliance knowledge after ascertaining the commitment of their NUMMI alliance partner, Toyota. In line with Husted and Michailova (2009), individual members of joint projects are confronted with dual allegiance, i.e., to their parent firm and collaboration team. Therefore, members' perception of trust on the partner could influence their decision and behaviour in the course of interaction. When the

collaborative interaction is devoid of opportunistic behaviour, individual allegiance would be towards the mutual benefit of the team. Thus, the competent partner would be willing to invest in upgrading the competencies of the less competent partner in order to enhance the collective outcome. Otherwise, the interaction would be characterized by the readiness to exploit the others' weaknesses.

Furthermore, the role of trust in enabling shared understanding between the partners is quite evident. The partnering firms might exhibit initial hesitation and apprehension as to the nature of collaboration, but as the interaction deepens over time, the focus might shift towards building a relationship. Consequent on trust, the partners could commit resources and effort into the development of a relational interaction. Inkpen (2008) credited to trust the creation of common understanding among the members of the collective integration and application of embedded knowledge. Accordingly, the learning disposition and corresponding capabilities for Toyota's knowledge diffused to the entire team. The empirically significant effect of trust on shared cognition in the present study further reinforces the underlying mechanism through which collective understanding is ensured.

### 5.3.5 Multidimensional ACAP

The relationships among ACAP dimensions are hypothesized as H7, H8, H9, H10 and H11, with the last three describing mediating effects. In line with recent conceptualization of ACAP as a multidimensional construct (Zahra and George, 2002; Nemanich *et al.,* 2010) the present findings demonstrated the specific level corresponding to each dimension. As advanced by Zahra and George (2002) the abilities to recognize value and assimilate knowledge were found to be dominant at the individual level.

As hypothesized in H7, a significant path (i.e., $\beta = 0.560$; $p = 0.000$) was found between the ability to recognize the value of foreign partner knowledge and the ability to assimilate it. Following Todorova and Durisin (2007) the ability to recognize the value of new knowledge requires the generation of a cognitive map

through which associative patterns are created to compare the concept stored in the memory with the new knowledge. Therefore, an appreciable ability for the recognition of value would impact individual search effort, by channelling the effort to the most valuable knowledge thereby facilitating assimilation ability. This result also a support Nemanich and colleagues' (2010) findings wherein team members' capability to evaluate external knowledge was found to be a significant predictor of the ability to assimilate external knowledge.

Hypothesis, H8 examined the direct positive effect of ability to assimilate external knowledge on team ability to utilize such knowledge. Although this relationship was found to be non-significant, however, the indirect effect mediated through shared cognition, as hypothesized in H10 (i.e., $\beta = 0.217$, $p = 0.000$) was supported. Furthermore, the necessary conditions for mediation were met (Baron & Kenny, 1986). H9 hypothesized the relationship between ability to assimilate and shared cognition ability, which was found H9 (i.e., $\beta = 0.117$, $p = 0.000$); H11 stated that the team's shared cognition is associated with the ability to utilize knowledge, which was also confirmed (i.e., $\beta = 0.650$; $p = 0.000$).

The above support Zahra and George's (2002) exposition on potential and realized ACAP wherein the organisation is better positioned to exploit the knowledge which has been assimilated by the members, with the shared cognition of the team as the mechanism through which individuals' potentials are aggregated to be realized collectively. The development of deeper understanding of new concepts is underscored by individual assimilating ability, which could impact interaction with others. Individuals with good awareness of a concept are most likely to engage with others in deliberating within the area of competency. Thus they are better equipped to contribute to project execution. Accordingly, acquisition of deeper understanding by team members could aggregate to value exploitation at the collective level when there is a mechanism to support collective interpretation. This is consistent with a recent in-depth analysis of Royal Dutch Shell, which revealed that firm members' behavioural dispositions could facilitate the link between internal capability and external change (Ben-Menahem, Kwee, Volberda, Van Den Bosch, 2013).

As demonstrated in this study, the significance of collective assimilation, which is facilitated through shared cognition, has been acknowledged in organisational learning. Crossan *et al.* (1999) contend that assimilating capability is predicated on intuitive skills, which could also facilitate engagement in the collective interpretation process. Moreover, studies on group learning suggest that the aggregation of individually embedded knowledge is a necessary precondition for team effectiveness in a knowledge intensive work domain, especially when creativity and problem solving skills are required. Walsh and Ungson's (1991) proposition on situated context attributed the creation of shared understanding among team members to the existence of common language as well as continuous engagement. Through engagement, the exchange of knowledge among individuals can be extended thereby incentivising the enactment of the knowledge sharing processes (Yli-renko, Autio, and Sapienza, 2001).

Also, the present result is consistent with Nahapiet and Ghoshal's (1998) findings on learning effectiveness within the group. Shared cognition can be expressed in terms of the extent of similarity in individuals' representation and interpretation of knowledge, which are the main determinant of effective learning interaction within the group. More importantly, the context of this study, i.e., engineering projects, is knowledge intensive wherein there is a high level of task interdependence. Moreover a project is considered complete when individuals' knowledge is interpreted and integrated in reaching a consensus decision and solving a relevant problem at the team level (Knight *et al.*, 2004). Thus, collective cognitive capability through shared cognition ability is critical to the application of individually assimilated knowledge at the joint team level.

## 5.4 Contributions of the Study

ACAP originates in Cohen and Levinthal's (1990) seminal explanation of explain firm's incentive for learning through investment in R&D. Nonetheless this concept has been extended to explain firm's ability to acquire knowledge through

inter-organisational relationships particularly with competent partners (Lyles & Salk, 1996; Lane *et al.*, 2001; Zhao and Anand, 2009; Park, 2011) yet extant conceptualizations have not fully built on its multifaceted nature. Originally, Cohen and Levinthal (1990) draw on individual cognition and behavioural theories in explaining it as a firm-level phenomenon, however limited attempts have revisited this. Leading scholars (Lane *et al.*, 2006; Easterby-Smith *et al.*, 2008; Volberda *et al.*, 2010; Lewin *et al.*, 2011) have canvassed for more clarification on the micro-foundational antecedents of ACAP in order to deepen understanding on its multilevel existence. This study thereby offers a conceptually and empirically validated model to explain these micro antecedents and implications of the social context.

### 5.4.1 Theoretical Contributions

Theoretically, this study advances understanding on the need for multilevel conceptualization of ACAP by situating the role of individuals in the acquisition of knowledge through joint engineering project teams. Scholars have acknowledged individual ACAP as the foundation for the firm-level construct (Cohen and Levinthal, 1990; Zahra & George, 2002). However, the exact relationship underlying this multilevel link remains unclear (Volberda *et al.*, 2010). This study offers clarification by conceptualizing the relationships among the micro-level antecedents, social context and multidimensional ACAP, thereby contributing to extant theoretical understanding.

First, in an attempt to clarify the specific level for each dimension of ACAP, the individual and collective components are demarcated. The first two dimensions, i.e., ability to recognize the value of and assimilate new knowledge are associated with the individual, while the ability to collectively assimilate and utilize new knowledge is considered at the team level. Aside from the validation of these dimensions, the empirical assessment also demonstrated the significance of shared cognition in the transformation of individual ability to the team level. Although scholars suggest the need to consider the effect of social mechanisms on the ability to integrate and utilize individually assimilated knowledge at the collective level (e.g.,

Zahra and George, 2002; Lane *et al.*, 2006), limited attempts have been advanced. Therefore, consistent with multilevel theory in organizational learning (Crossan *et al.*, 1999), shared cognition was established as the mechanism through which individual ability to assimilate knowledge is transformed into collective ability to utilize knowledge at the joint team level.

Second, it advances socio-psychological theory to define the predictability of micro-level antecedents (i.e., prior experience, need for cognition, and learning and performance goal orientation) on the ACAP dimensions. As noted by Volberda *et al.* (2010), clarification of individual differences is significant to developing unambiguous understanding on the role of individuals in ACAP. Based on the case studies of four manufacturing and service firms, Pedrosa, Valling and Boyd (2013) found support for the individual level of ACAP, by associating the acquisition of external knowledge with distinct manager's characteristics. Furthermore, this study demonstrates the employees' characteristics pertinent to the absorption of external knowledge. Although, the management can coordinate the transfer of knowledge, by motivating the local personnel, and also facilitate the organisational processes to support strategic renewal (Lyles and Salk, 1996), nevertheless, without the personnel demonstrating the capability to learn, the acquisition of partner's knowledge is unrealistic. Thus, the empirically validated SEM model supported prior experience and learning goal orientation as predictors of individual's assimilation ability, while the ability to recognize the value of partner's knowledge is underpinned by performance approach goal orientation. Moreover, the impact of need for cognition resonates on both dimensions, prior experience was found to influence team ability to utilize foreign partner knowledge.

Third, based on extant conceptualizations of ACAP in the strategic alliance literature, the social context was expressed in terms of trust in foreign partner and level of support (Lyles and Salk, 1996; Lane *et al.*, 2001; Park, 2010). As hypothesized, this study found support for the influence of partner support on individual ability to recognize the value of knowledge, and team ability to utilize knowledge. Likewise, trust in partner was found to influence individual ability to

recognize the value of knowledge and shared cognition. Thus, the significances of individual team members' perceptions on trust and partner support were demonstrated in predicting the associated dimensions of ACAP.

Fourth, this study contributes to knowledge management literature within the international business context by empirically investigating the notion of ACAP in IJVs from the perspective of a developing economy. Empirical research on inter-organisational learning (IOL) from developed and developing economies report conflicting results (Dyer and Nobeoka, 2000). Nevertheless, most studies in IOL in developing economies (Chen and Chen, 2003; Liu, Ghauri and Sinkovics, 2010) adopt firms from developed economies as their unit of analysis, with limited emphasizes on partners from the developing economy. Most especially there is a general drought of empirical research from sub-Saharan African countries (Narteh, 2008). Apparently, in order to expand the scope of global management knowledge, more research is expected from developing economies which will explicate the effect of contextual issues on organizational phenomena so as to deepen the understanding of international managers on the implications of relevant cross-context issues (Meyer, 2007; Zhao *et al.*, 2009).

In sum, this study bridges the above gaps by demonstrating the effect of individual differences on both the individual and collective components of ACAP as well as validating the impact of social context on the hypothesized dimensions of ACAP.

### 5.4.2 Practical Implications

Strategic alliances or joint ventures (JVs) create learning opportunities for partnering firms. Firms in developed economies mainly partner with others in an attempt to assess their specialized knowledge, while less competent firms from non-developed economies consider JVs as a platform for acquiring competent partner's knowledge (Grant and Baden-Fuller, 2004; Buckley, Glaister, Klijn, and Tan, 2009). As previously noted, the main constraint for successful acquisition in the latter's

context is ACAP. Thus, given the significance of ACAP in the acquisition of capabilities, managers of less competent firms need to develop awareness of its antecedents in order to enhance knowledge acquisition from competent partners. This study offers some practical insights to management in the designing of joint project teams with competent partners.

Further to the collective level construct, there is an individual level perspective to ACAP (Zahra and George, 2002). This study addresses such by conceptualizing ACAP as a multidimensional construct and demonstrates the specific antecedents for each dimension. Thus, the conceptual model advances ACAP by proposing the psychological and social contexts for the pertinent dimensions of the construct. Based on the empirically validated model, practical suggestions are offered on the selection of team members and the overall design of joint project teams.

The management of local partner firms should ensure that the selected team members have related prior experience as well as possess high disposition toward thinking and learning. Learning is cumulative, and knowledge gained through prior experience could create the required foundation for further learning. Therefore, team members with related experience to the joint project should be engaged. Considering the empirical support for dual goal orientation, teams should be constituted by individuals who are both learning and performance approach goal-oriented towards their tasks. The starting point of knowledge acquisition is the recognition of need, then performance approach goal orientation propensity for short term evaluative advantage comes into play. Moreover, the ability to assimilate requires the development of deep insight, which is evident in the mastery of procedures / methods underlying the task. Thus, team members engaged in a joint project must be simultaneously driven to demonstrate performance and mastery in order to be able to recognize and assimilate partner knowledge. Equally, individuals with strong disposition towards thinking are well suited to expend the effort necessary for the acquisition of knowledge. Therefore, individuals with the above characteristics are expected to demonstrate high ability in recognizing the value of and assimilating partner's knowledge, both of which constitute an individual's ACAP.

Given the significance of shared cognition on the integration of individual and team ACAP, management should ensure that the selected team members are adequately trained for engagement in collective dialogue. The focus of training programmes should be on the development of skills for effective communication and decision making through dialogue. Engineering projects involves huge interdependence and interaction among individuals, thus task performance is facilitated through integration of perspectives and consensus on an appropriate solution. Accordingly, team members' capacities for dialoguing and consensus building could be enhanced through focused training thereby creating the appropriate climate for the integration individual's assimilated knowledge at the collective level. Team members should also be exposed to tasks in other functional area through job rotation in order to gain wide perspectives. Also, the right incentive should be devised to encourage networking across team and organisations boundaries. In addition, the project team should be designed to accommodate formal procedure which can facilitate and guide the exchange of knowledge among team members.

Regarding the implication of social context in practice, the less competent partner should ensure that the contractual agreement with the competent partner explicitly states the level of support to be provided to local individual team members. Inter-personal relationships should be encouraged among team members to facilitate the building of mutual trust. Equally, management should be aware that trust extends beyond an individual's perception, thus institutional trust could be facilitated by developing sanctions, polices, and regulations to guide team members' engagement in the project.

## 5.5 Limitations of Study

In response to calls for clarification on the micro-foundation of ACAP, this study proposed a model and empirically demonstrated the individual antecedents and implications of social context on ACAP. With the aid of AMOS software, the SEM technique was incorporated to assess the hypothesized effects and elucidate the

practicality of the refined models over the baseline model. Nevertheless, some of the limitations of this study need to be expatiated, in order to direct future research and advance the body of knowledge.

### 5.5.1 Cross Sectional Data

This study adopted a cross sectional design, which is of relevance to the collection and comparison of data from a large sample without a time differential. Although studies have adopted similar designs to investigate ACAP (Nemanich *et al.*, 2010; Deng *et al.*, 2008; Zhao and Anand, 2009), the underlying theoretical notion asserts to its evolutionary nature. Given the cumulative and path dependence relationship between learning and ACAP, the longitudinal design is best suited in order to capture the temporal effects of the identified antecedents. However, due to difficulties associated with eliciting long term participation from the sampled population as well as financial and time constraints, the longitudinal approach was not feasible. However, the empirically validated model in this study offers a strong premise for future research based on a longitudinal design wherein responses can be collected from the same respondent at two or more points in time.

### 5.5.2 Self-Report Survey

The collected data emanates from the retrospective accounts of the respondents on their engagement in a joint project team. As a result, the likeliness of biasness and social desirability might not be completely ruled out. Although this study adopted several strategies, both empirical and statistical, to control for such (see Section 3.4), self-report surveys on attitude and behaviour are highly susceptible to biasness (Podsakoff and Organ, 1986; Howard, 1994). For example, in order not to be perceived as less competent, some respondents are unlikely to admit their lack of ability to recognize or assimilate knowledge. Thus, the obtained data might not be the true representation of fact. Nevertheless, self-report data remains the most appropriate and relatively valid approach for obtaining accurate information on

attitudes or behaviour (Spector, 1994; 2006). To buttress the appropriateness of self-reports, Rupp and Spencer (2006) attest that the incorporation of a mediator, as done in the present context, could minimize the impact of response bias.

### 5.5.3 Foreign Partner Perspective

Related to the use of a self-report survey is the need to consider the perspective of foreign partners in joint projects. This study is based on the local partners' employees in order to understand the acquisition of knowledge from the learners' perspective. As discussed in Section 5.4.1 this approach is of significant implications to understanding the developing country perspectives on ACAP, however the incorporation of foreign partners' respondents could enhance the validity of the study. Doing this would require additional resource in terms of money, time, and effort, which was not justifiable for this time bound doctoral thesis.

### 5.5.4 Single Unit of Measurement and Analysis

This study proposes a multilevel conceptualization for ACAP in order to explain the role of individuals in knowledge acquisition and utilization within the joint project context. Given precedence to differences at the lower level, this study considered the individual as the unit of measurement and analysis. However, recent expositions suggest the simultaneous consideration of the unit of theory, measurement and analysis (Ployhart and Moliterno, 2011). Although, such an approach could empirically explicate the emergence of a macro construct from lower level individual differences, limited statistical solutions have been advanced. Specifically most attempts have applied a hierarchical linear model (Marrone, Tesluk, and Carson, 2007; Charbonnier-Vorin, Akremi, and Vandenberghe, 2010). Moreover, the application of the structural equation modeling (SEM) technique is still at the early stage and requires more sophisticated studies in order to verify its appropriateness (see Kostopoulos, Spanos, and Prastacos, 2011).

### 5.5.5 Generalization to Other Contexts

Lastly, the empirical investigation was limited to only local engineering firms in the Nigerian upstream oil industry, thus the outcome should be treated accordingly. It should be noted that differences in social and cultural contexts could affect individuals' engagement in a joint project. Therefore, the generalizability of the conceptual model depends on the collection of data from other knowledge intensive industries as well as developing countries. The analyses of data from these contexts would facilitate the generalization and acceptability of the proposed model.

## 5.6 Future Research

The empirically validated conceptual model offers an initial attempt to clarify the effects of micro-level antecedents and social context on ACAP within joint engineering project teams. However, in response to the above limitations, the following are identified as areas for future research.

### 5.6.1 Longitudinal Survey

As mentioned earlier, the use of longitudinal data could facilitate better understanding of the evolutionary nature of ACAP. This would require the collection of data at different points in time from the same respondents, thereby ensuring that the path-dependent effect of prior learning on ACAP is accounted for. Also, this set of data could be useful in the investigation of the evolution of capability through knowledge acquisition in a joint project team.

### 5.6.2 Triangulation

Further to the usage of structured questionnaires in the collection of data in the present study, future research could utilize data from other sources by adopting "between-method triangulation" (Jick, 1979). The usage of multiple data collection

methods could rectify the underlying bias associated with a self-report survey thereby strengthening the validity of the investigative phenomenon (Greene, Caracelli & Graham, 1989). Jick (1979) attested to the significance of this approach in obtaining a more complete, holistic and context-rich description of the research elements. Accordingly, the validity of the self-report survey could be enhanced by incorporating field observations and in-depth interviews of employees across the local and foreign partners. Specifically, effects of the social context can be better explained by observing the participation of employees in the joint team project. Also, interviews could be conducted to obtain rich description of an individual's capability building through participation in a joint project team.

### 5.6.3 Multi-level Measurement and Analysis

As argued by the proponents of multi-level analysis, future studies are expected to simultaneously consider the levels of theory, measurement and analysis (Ployhart and Moliterno, 2011; Chadwick and Raver, 2012). This approach requires the collection of data, which correspond to the units of measurement from both individual and team levels. The analysis would involve the assessment of individual as well as within and between team differences in order to explicate the significance of team differences on ACAP. The approach for handling such an analysis using structural equation modeling is just emerging, so future studies are implored to consider this (see Kostopoulos, Spanos, and Prastacos, 2011).

### 5.6.4 Cross-Industries and Countries Contexts

In pursuit of a more generalized study, future research is encouraged to investigate this model in other industries and developing countries. The outcome of these studies could offer empirical support and facilitate the acceptability of the model. For instance, the model could be investigated in other knowledge intensive industries like high technology and pharmaceuticals, while joint projects in other African countries as well as developing countries could also be investigated. Also,

comparative studies based on two or more contexts could be considered, in order to further ascertain the validity and dependability of the model.

## 5.7 Conclusion

This study primarily investigated the previously overlooked micro-foundational origin of ACAP within the social context of project teams. By revisiting the original concept of ACAP the study considered conceptually related concepts like creativity and organizational learning in advancing the micro-level antecedents. Based on strategic alliance literature, the social context was expressed in terms of perceptions of foreign partner support and trust in a foreign partner, and hypothesized to influence the relevant dimensions of the ACAP construct. Specifically, the model proposed and demonstrated the relationships among micro antecedents, social context and multidimensional ACAP using data collected from a cross-sectional survey of local team members in joint project engineering teams in the Nigerian oil industry.

The findings revealed that both performance approach goal orientation and need for cognition are positive determinants of individuals' ability to recognize the value of partners' knowledge. The ability to assimilate the knowledge is dependent on team members' prior experience and learning goal orientation. Further to the hypothesized impact on individuals' ACAP, the revised structural model supported the positive effect of prior experience on team ability to utilize knowledge. Moreover, the hypothesized impacts of foreign partner support and trust in foreign partner on the ACAP dimensions were supported. Finally, the hypothesized effects among the ACAP dimensions were supported, with shared cognition demonstrating a full mediating effect on the link from individual ability to assimilate to team ability to utilize knowledge.

Given these findings, the theoretical contributions and practice implications were highlighted. The main theoretical significance of this study is the clarification

of a specific level for each dimension of ACAP with the demonstration of the associated antecedents. Accordingly, managerial implications are offered to guide the selection of team members and the design of a joint project team. Evidently, local partners' potential to learn from foreign partners through joint projects lies in the characteristics of individual team members while social interaction is a determinant of the outcome. Therefore, managers should engage individuals with substantial work experience in related areas having high disposition towards thinking, as well as driven to learn and perform. Also, opportunity should be created for interpersonal engagement and members exposed to training programmes focused on the development of communication and group decision making.

## APPENDIX A

**Request for Participation in Pilot Survey**

**Dear Sir/Ma,**

I am currently conducting a PhD research at the Graduate School of Management, Multimedia University, Malaysia. The study will be investigating the role of individuals in learning through joint project team with competent partner in upstream oil industry, and the effect of the team structure on learning. Both academics and practitioners oriented inquests on organisations in the newly industrialized economies have confirmed that technological advancement is underpinned by the capacity to absorb and utilize foreign knowledge, and international joint ventures have emerged suitable platform for transferring knowledge to organisations in developing economies.

I believe that individuals differ in their ability to absorb knowledge and their perceptions of the work environment can impact on the ability to collectively utilize knowledge. The following survey is designed to help test that belief by measuring what makes individuals different in their ability to absorb knowledge within joint project team and the impact of the team's context on the ability to collectively utilize knowledge. This study is expected to result in a set of concrete recommendations regarding important managerial decisions such as team member selection and structures which can help organisations in maximize the learning opportunities. Your voluntary participation would be most appreciated.

Before I distribute the questionnaire to the respondents, I wish to conduct a pilot study. The purpose of the pilot study is to test the data collection instrument, and in particular, to ascertain if the questions elicit appropriate responses. Thus, I am writing to ask your kind contribution to this pilot test. I would greatly appreciate if you could perform the following:

1) Please note how long it takes you to complete the questionnaire and write this on Section E: Comments.

2) Comment on any unclear directions, unclear questions or any ambiguities you find in the answer.

3) Comment if any questions seem too difficult to answer or make you feel uncomfortable to answer.

4) Please add any comments you feel would improve the questionnaire in any way.

Please be assured that your responses to the following questions will be used for research purposes only and will remain strictly confidential.

Thank you in advance for your kind contribution to this study. Should you require further clarifications, please contact me through email, as stated below.

Yours Sincerely,

Adedapo Ojo, PhD Candidate, Email: adseyi_phil@yahoo.com

***Section A: Demographic Profile***

*This section seeks basic background information on the respondent. Please tick the appropriate option for each of the question; be assured that your responses will be used for research purposes only and will remain strictly confidential.*

QA1: Gender: ☐ Female ☐ Male

QA2: Age: ☐ Below 25 Years Old ☐ 26 - 35 Years Old

☐ 36 - 45 Years Old ☐ Above 46 Years Old

QA3: Marital status: ☐ Single ☐ Married

QA4: Highest education completed:

☐ High School

☐ Diploma

☐ Bachelor Degree / Equivalent

☐ Master Degree

☐ PhD Degree

QA5: Total length of working experience in Oil and Gas industry

☐ Below 3 Years ☐ 4 - 8 Years

☐ 9 - 13 Years ☐ Above 14 Years

QA6: Total length of time engaged in joint project with foreign partners

☐ Greater than 6 months, but less than 1 year ☐ 1 -2 Years

☐ 3 -5 Years ☐ Above 6 Years

QA8: How many times have you participated in joint project with foreign partners?

☐ 1 ☐ 2

☐ 3 ☐ More than 4

***Section B: Individual Differences***

*This section examines differences in terms of prior experience, need for cognition, learning and performance approach goal orientation. You are expected to indicate the*

*extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagreed; (2) = disagreed; (3) = neutral; (4) = agreed; (5) = strongly agreed]. Please circle only one number for each statement.*

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **B1** | **Prior Experience:**<br>**Prior to my engagement in the joint project;** | | | | | |
| E1 | I have acquired related general Knowledge. | 1 | 2 | 3 | 4 | 5 |
| E2 | I have acquired related theoretical knowledge. | 1 | 2 | 3 | 4 | 5 |
| E3 | I have attended some training in related domain. | 1 | 2 | 3 | 4 | 5 |
| E4 | I have acquired industrial experience in related domain. | 1 | 2 | 3 | 4 | 5 |
| E5 | I have acquired some expertise in related domain. | 1 | 2 | 3 | 4 | 5 |
| **B2** | **Learning goal orientation** | | | | | |
| L1 | I am willing to pursue challenging task that I can learn new things from. | 1 | 2 | 3 | 4 | 5 |
| L2 | I often look for opportunities to develop new skills and knowledge. | 1 | 2 | 3 | 4 | 5 |
| L3 | I prefer taking up challenging and difficult tasks at work where I can learn new skills. | 1 | 2 | 3 | 4 | 5 |
| L4 | I am willing to put in extra efforts where necessary, for me to develop new skills and enhance my knowledge. | 1 | 2 | 3 | 4 | 5 |
| L5 | I prefer to work in situations that require a high level of ability and talent | 1 | 2 | 3 | 4 | 5 |
| **B3** | **Performance approach goal orientation** | | | | | |
| O1 | I'm concerned with showing that I can perform better than my co-workers. | 1 | 2 | 3 | 4 | 5 |
| O2 | I try to figure out what it takes to prove my ability to others at work. | 1 | 2 | 3 | 4 | 5 |
| O3 | I enjoy it when others at work are aware of how well I am doing. | 1 | 2 | 3 | 4 | 5 |
| O4 | I prefer to work on projects where I can prove my ability to others. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **B4** | **Need for Cognition** | | | | | |
| N1 | I would prefer complex to simple problem. | 1 | 2 | 3 | 4 | 5 |
| N2 | I like to have the responsibility of handling a situation that requires a lot of thinking. | 1 | 2 | 3 | 4 | 5 |
| N3 | Thinking is not my idea of fun. | 1 | 2 | 3 | 4 | 5 |
| N4 | I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. | 1 | 2 | 3 | 4 | 5 |
| N5 | I find satisfaction in deliberating hard and for long hours. | 1 | 2 | 3 | 4 | 5 |
| N6 | I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something. | 1 | 2 | 3 | 4 | 5 |
| N7 | I like tasks that require little thought once I've learned them. | 1 | 2 | 3 | 4 | 5 |
| N8 | I really enjoy a task that involves coming up with new solutions to problems. | 1 | 2 | 3 | 4 | 5 |
| N9 | It's enough for me that something gets the job done; I don't care how or why it works. | 1 | 2 | 3 | 4 | 5 |
| N10 | I prefer to think about small, daily projects to long-term ones. | 1 | 2 | 3 | 4 | 5 |
| N11 | The idea of relying on thought to make my way to the top appeals to me. | 1 | 2 | 3 | 4 | 5 |
| N12 | Learning new ways to think doesn't excite me very much. | 1 | 2 | 3 | 4 | 5 |
| N13 | I prefer my life to be filled with puzzles that I must solve. | 1 | 2 | 3 | 4 | 5 |
| N14 | I only think as hard as I have to. | 1 | 2 | 3 | 4 | 5 |
| N15 | The notion of thinking abstractly is appealing to me. | 1 | 2 | 3 | 4 | 5 |
| N16 | I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| N17 | I feel relief rather than satisfaction after completing a task that required a lot of mental effort. | 1 | 2 | 3 | 4 | 5 |
| N18 | I usually end up deliberating about issues even when they do not affect me personally. | 1 | 2 | 3 | 4 | 5 |

***Section C: Absorptive Capacity (i.e. capacity to learn)***

*This section examines the capacity to learn from foreign partner through engagement in joint project within a team structure. The first two dimensions are individual's ability to (i) recognize value and (ii) assimilate partner's knowledge, while the other dimensions are joint team's (iii) shared cognition and (iii) ability to utilize partner's knowledge. You are expected to indicate the extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagreed; (2) = disagreed; (3) = neutral; (4) = agreed; (5) = strongly agreed]. Please circle only one number for each statement.*

| **No** | **Questions** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|---|
| **C1** | **Ability to Recognize Value:**<br>**During my participation in joint project team;** | | | | | |
| R1 | I was able to develop awareness on foreign partner tools, practice, and knowledge. | 1 | 2 | 3 | 4 | 5 |
| R2 | I was able to keep track of foreign partner tools, practice, or knowledge, by consulting other sources of information. | 1 | 2 | 3 | 4 | 5 |
| R3 | I was capable at accurately evaluating the worth of foreign partner tools, practice, or knowledge in the project. | 1 | 2 | 3 | 4 | 5 |
| R4 | I was able to identify foreign partner tools, practice, or knowledge with the most significant value to the project performance. | 1 | 2 | 3 | 4 | 5 |
| R5 | I was capable at ascertaining whether foreign partner tools, practice, or knowledge could add value to the project. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C2** | **Ability to Assimilate:**<br>**During my participation in joint project team;** | | | | | |
| A1 | I was able to learn the tools, practice or knowledge associated with foreign partner. | 1 | 2 | 3 | 4 | 5 |
| A2 | I was capable at understanding the tools, practice or knowledge associated with foreign partner. | 1 | 2 | 3 | 4 | 5 |
| A3 | I was adept at interpreting the use of tools, practice or knowledge associated with foreign partner. | 1 | 2 | 3 | 4 | 5 |
| A4 | I was adept at experimenting with the tools, practice or knowledge associated with foreign partner. | 1 | 2 | 3 | 4 | 5 |
| A5 | I was able to discover other use of tools, practice or knowledge associated with foreign partner. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C3** | **Shared cognition:**<br>**With respect to deliberation on project, the joint team:** | | | | | |
| S1 | Was very competent in integrating different views. | 1 | 2 | 3 | 4 | 5 |
| S2 | Had mechanism to support collective assessment. | 1 | 2 | 3 | 4 | 5 |
| S3 | Was able to achieve amicable resolution of conflict and disagreement. | 1 | 2 | 3 | 4 | 5 |
| S4 | Was able to communicate collective view across members. | 1 | 2 | 3 | 4 | 5 |
| S5 | Was able to take appropriate action based on collective view. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C3** | **Ability to Utilize:**<br>**With respect to utilizing knowledge in project execution, the joint team:** | | | | | |
| U1 | Was very competent at exploiting related knowledge in specific activity. | 1 | 2 | 3 | 4 | 5 |
| U2 | Had the ability to effectively apply related knowledge in specific activity. | 1 | 2 | 3 | 4 | 5 |
| U3 | Was able to enhance project delivery by applying related knowledge. | 1 | 2 | 3 | 4 | 5 |
| U4 | Had the capability to maximally exploit the related knowledge in specific activity. | 1 | 2 | 3 | 4 | 5 |

***Section D: Social Context (i.e. joint team's context)***

*This section focuses on the perception of individual team member on the joint team in terms of trust in and level of support by foreign partner. You are expected to indicate the extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagreed; (2) = disagreed; (3) = neutral; (4) = agreed; (5) = strongly agreed]. Please circle only one number for each statement.*

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C3** | **Partner Support:**<br>**With respect to the execution of joint project;** | | | | | |
| P1 | The foreign partner provided adequate technical support. | 1 | 2 | 3 | 4 | 5 |
| P2 | Foreign partner employees actively participated. | 1 | 2 | 3 | 4 | 5 |
| P3 | Foreign partner employees were accessible and helpful. | 1 | 2 | 3 | 4 | 5 |
| P4 | The foreign partner provided adequate training. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C3** | **Trust in Partner:**<br>**With respect to project execution, foreign partner employees;** | | | | | |
| T1 | Met their obligations to you | 1 | 2 | 3 | 4 | 5 |
| T2 | Dealt fairly with you | 1 | 2 | 3 | 4 | 5 |
| T3 | Did not misled you | 1 | 2 | 3 | 4 | 5 |
| T4 | Withheld relevant information | 1 | 2 | 3 | 4 | 5 |
| T5 | Kept their word | 1 | 2 | 3 | 4 | 5 |

***Section E: Comments***

***Thank you for your time.***

## APPENDIX B

**Request for Participation in Survey**

**Dear Sir/Ma,**

I am currently conducting a PhD research at the Graduate School of Management, Multimedia University, Malaysia, under the academic supervision of Professor Dr. Murali Raman. This study will be investigating individual learning capacity through engagement in joint ventures project team with foreign partners and the implications of team structure, in Nigerian upstream petroleum sector.

We know from the experience of firms in newly industrialized economies that technological advancement is underpinned by the capacity to absorb and utilize foreign knowledge. I believe that individuals differ in their ability to absorb knowledge and the structure of the joint team can impact on the collective ability to utilize knowledge. Thus, the following survey is designed to help test that belief by quantifying the underlying concepts. Based on the outcome of the pilot survey, the questionnaire is expected to be completed in less than 20 minutes. Your voluntary participation would be most appreciated.

Our hope is that this study will result in a set of concrete recommendations regarding important managerial decisions such as team members' selection and the structures which can help maximize joint ventures (JVs) learning opportunities.

Please be assured that your responses to the following questions will remain strictly confidential and will be aggregated with those of other respondents for the purpose of conducting statistical analyses only. If you are interested in seeing the statistical summary and analyses, please provide an e-mail address where the report can be sent at the end of this questionnaire.

Thank you in advance for your kind contribution to this study. Should you require further clarifications, please contact me, as stated below.

Sincerely

Adedapo Ojo
Graduate School of Management
Multimedia University
63100 Cyberjaya
Selangor, Malaysia
ojo.adedapo.oluwas10@mmu.edu.my

***Section A: Demographic Profile***

*This section seeks basic background information on the respondent. Please tick the appropriate option for each of the question; be assured that your responses will be used for research purposes only and will remain strictly confidential.*

QA1: Gender: ☐ Female ☐ Male

QA2: Age: ☐ 25 Years and below ☐ 26 - 35 Years Old

☐ 36 - 45 Years Old ☐ Above 46 Years Old

QA4: Highest education completed: ☐ High School ☐ Diploma

☐ Bachelor Degree / Equivalent

☐ Master Degree ☐ PhD Degree

QA5: Total length of working experience in ICT industry

☐ 3 Years and below ☐ 4 - 8 Years

☐ 9 - 13 Years ☐ 14 Years and above

QA6: Total length of time engaged in project(s) with foreign expert:

☐ Less than a year ☐ 1-3 Years ☐ 4-6 Years

QA8: Total number(s) of project(s) completed with foreign expert:

☐ 1 ☐ 2

☐ 3 ☐ 4 and above

QA9: Your position in the project team:

☐ Programmer ☐ System Analyst ☐ System Designer

☐ Project Manager ☐ Other (please specify)……...

***Section B: Individual Differences***

*This section examines differences in terms of prior experience, need for cognition, learning and performance approach goal orientation. You are expected to indicate the extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree; (5) = strongly agree]. Please circle only one number for each statement.*

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **B1** | **Prior Experience: Prior to my engagement in the joint venture;** | | | | | |
| E1 | I had the required general knowledge on the project. | 1 | 2 | 3 | 4 | 5 |
| E2 | I had acquired substantial theoretical knowledge. | 1 | 2 | 3 | 4 | 5 |
| E3 | I had attended extensive training in related area. | 1 | 2 | 3 | 4 | 5 |
| E4 | I had substantial working experience in related area. | 1 | 2 | 3 | 4 | 5 |
| E5 | I had acquired some level of expertise in related area. | 1 | 2 | 3 | 4 | 5 |
| **B2** | **Learning goal orientation** | | | | | |
| L1 | I am willing to pursue challenging task that I can learn new things from. | 1 | 2 | 3 | 4 | 5 |
| L2 | I often look for opportunities to develop new skills and knowledge. | 1 | 2 | 3 | 4 | 5 |
| L3 | I prefer taking up challenging and difficult tasks at work where I can learn new skills. | 1 | 2 | 3 | 4 | 5 |
| L4 | I am willing to put in extra efforts where necessary, for me to develop new skills and enhance my knowledge. | 1 | 2 | 3 | 4 | 5 |
| L5 | I prefer to work in environments that require high level of ability and talent. | 1 | 2 | 3 | 4 | 5 |
| **B3** | **Performance approach goal orientation** | | | | | |
| O1 | I like to demonstrate that I can perform better than my co-workers. | 1 | 2 | 3 | 4 | 5 |
| O2 | I try to figure out what it takes to prove my competency to others at work. | 1 | 2 | 3 | 4 | 5 |
| O3 | I enjoy it when others at work are aware of how well I am doing. | 1 | 2 | 3 | 4 | 5 |
| O4 | I prefer to work on projects where I can prove my competency to others. | 1 | 2 | 3 | 4 | 5 |

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **B4** | **Need for Cognition** | | | | | |
| N1 | I like to have the responsibility of handling a situation that requires a lot of thinking. | 1 | 2 | 3 | 4 | 5 |
| N2 | I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. | 1 | 2 | 3 | 4 | 5 |
| N3 | I find satisfaction in deliberating hard and for long hours. | 1 | 2 | 3 | 4 | 5 |
| N4 | I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something. | 1 | 2 | 3 | 4 | 5 |
| N5 | I really enjoy a task that involves coming up with new solutions to problems. | 1 | 2 | 3 | 4 | 5 |
| N6 | It's enough for me that something gets the job done; I don't care how or why it works. | 1 | 2 | 3 | 4 | 5 |
| N7 | I prefer to think about small, daily projects to long-term ones. | 1 | 2 | 3 | 4 | 5 |
| N8 | The idea of relying on thought to make my way to the top appeals to me. | 1 | 2 | 3 | 4 | 5 |
| N9 | Learning new ways to think doesn't excite me very much. | 1 | 2 | 3 | 4 | 5 |

***Section C: Absorptive Capacity (i.e. capacity to learn)***

*This section examines the capacity to learn from joint venture partner through engagement in joint project within a team structure. The first two dimensions are individual's ability to (i) recognize value and (ii) assimilate partner's knowledge, while the other dimensions are joint team's (iii) shared cognition and (iii) ability to utilize partner's knowledge. You are expected to indicate the extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree; (5) = strongly agree]. Please circle only one number for each statement.*

| No | Questions | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **C1** | **Ability to Recognize Value**<br>**During my engagement in joint project team:** | | | | | |
| R1 | I was able to develop awareness on partner's tools, practice, and knowledge. | 1 | 2 | 3 | 4 | 5 |
| R2 | I was able to keep track of partner's tools, practice, or knowledge, by consulting other sources of information. | 1 | 2 | 3 | 4 | 5 |
| R3 | I was able to identify partner's tools or practice with the most significant value to the project performance. | 1 | 2 | 3 | 4 | 5 |
| R4 | I was capable at accurately evaluating the worth of partner's knowledge in the project. | 1 | 2 | 3 | 4 | 5 |
| **C2** | **Ability to Assimilate**<br>**During my participation in joint project team:** | | | | | |
| A1 | I was able to learn partner's tools or practice. | 1 | 2 | 3 | 4 | 5 |
| A2 | I was capable at understanding the tools, practice or knowledge associated with JV partner. | 1 | 2 | 3 | 4 | 5 |
| A3 | I was adept at interpreting the use of tools, practice or knowledge associated with JV partner. | 1 | 2 | 3 | 4 | 5 |
| A4 | I tried to experiment with the tools, practice or knowledge associated with partner. | 1 | 2 | 3 | 4 | 5 |
| **C3** | **Shared cognition**<br>**With respect to deliberation on project, the joint team:** | | | | | |
| S1 | Was very competent in integrating different views. | 1 | 2 | 3 | 4 | 5 |
| S2 | Had structure to support collective assessment of views. | 1 | 2 | 3 | 4 | 5 |
| S3 | Was able to achieve amicable resolution of conflict and disagreement. | 1 | 2 | 3 | 4 | 5 |
| S4 | Was able to communicate collective view across members. | 1 | 2 | 3 | 4 | 5 |
| S5 | Was able to take appropriate action based on collective view. | 1 | 2 | 3 | 4 | 5 |
| **C4** | **Ability to Utilize:**<br>**With respect to project execution, the joint team:** | | | | | |
| U1 | Was very competent at exploiting related knowledge in specific activity. | 1 | 2 | 3 | 4 | 5 |
| U2 | Had the ability to effectively apply related | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | knowledge in specific activity. | | | | | |
| U3 | Was able to enhance project delivery by applying related knowledge. | 1 | 2 | 3 | 4 | 5 |
| U4 | Had the capability to maximally exploit the related knowledge in specific activity. | 1 | 2 | 3 | 4 | 5 |

***Section D: Social Context (i.e. joint project team's context)***

*This section focuses on the perception of individual team member on the joint team in terms of trust in and level of support provided by joint team. You are expected to indicate the extent to which you agree or disagree with each statement, based on 5-point Likert scale [i.e. (1) = strongly disagree; (2) = disagree; (3) = neutral; (4) = agree; (5) = strongly agree]. Please circle only one number for each statement.*

| **No** | **Questions** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|---|
| **D1** | **Partner Support**<br>**With respect to the execution of joint project;** | | | | | |
| P1 | Partner provided us adequate technical support. | 1 | 2 | 3 | 4 | 5 |
| P2 | Partner provided us relevant training. | 1 | 2 | 3 | 4 | 5 |
| P3 | Partner's employees were accessible and helpful. | 1 | 2 | 3 | 4 | 5 |
| P4 | Partner's employees actively participated. | 1 | 2 | 3 | 4 | 5 |
| **D2** | **Trust in Partner:**<br>**With respect to project execution, partner employees;** | | | | | |
| T1 | Met their obligations to us. | 1 | 2 | 3 | 4 | 5 |
| T2 | Dealt fairly with us. | 1 | 2 | 3 | 4 | 5 |
| T3 | Did not mislead us. | 1 | 2 | 3 | 4 | 5 |
| T4 | Kept their word. | 1 | 2 | 3 | 4 | 5 |

***Optional***

Please provide your email address, if you want to receive the statistical summary and analyses……

***Thank you for your time.***

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# LIST OF PUBLICATIONS

Academic Journals

[1] **Ojo, A. O.,** Raman, M., Chong, S.C, & Chong, C.W. (2014). Individual antecedents of ACAP and implications of social context in joint engineering project teams: A conceptual model. *Journal of Knowledge Management*, Vol. 18, No. 1, pp. 173-197. [ISI Impact Factor 1.275, Scopus]

[2] **Ojo, A. O.,** & Raman, M. (Accepted). Micro perceptive on absorptive capacity in joint ICT project teams in Malaysia. *Library Review*, [MMU Tier 1, Scopus].

International Conference Proceedings

[3] **Ojo, A. O.,** Raman, M., & Chong, C. W. (2014). The role of prior experience, learning orientation and need for cognition in individuals' absorptive capacity in joint project engineering teams. *7th Knowledge Management International Conference (KMICE),* 12-15 August 2014, Langkawi Island, Malaysia. [ISI THOMSON Indexed] - Best Paper Award

[4] Raman, M., **Ojo, A. O.,** & Chong, C. W. (2014). Absorptive Capacity in joint project teams: Evidence from Nigerian upstream oil industry, *6th International Conference on Knowledge Management and Information Sharing,* 21-24 October, 2014, Rome, Italy. [ISI THOMSON Indexed]

Under Review

[5] **Ojo, A. O.,** Raman, M., & Chong, C. W. (Under Review). Micro-antecedents of absorptive capacity: Empirical investigations of joint project engineering teams in Nigerian upstream oil industry. *Journal of Management Studies*

[6] **Ojo, A. O.,** Raman, M., & Chong, C. W. (Under Review). Individual differences and potential absorptive capacity in joint project teams in the Nigerian upstream oil industry. *VINE*

[7] **Ojo, A. O.,** Raman, M., & Chong, C. W. (Under Review). Individual and contextual antecedents of absorptive capacity in joint project engineering teams. *Personnel Review*