NETWORK ORCHESTRATION FOR ENVIRONMENTAL SUSTAINABILITY: THE CASE OF PUBLIC TRANSPORT SERVICES

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Muhammad Usama
Zohaib Khan

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Authors: Muhammad Usama, Zohaib Khan

Supervisor: Rickard Lingren

Abstract:

Network orchestration has intrinsically been a thought provoking and consuming undertaking for the hub firms which happen to be the central leading body carrying out responsibilities as a hub firm. The network orchestration comprises three vital orchestration processes Knowledge Mobility, Innovation Appropriability and Network Stability which help the network orchestrator to communicate with multiple actors in the network. The research work is based on reflection and analysis of performance of hub firm in perspective of network orchestration and innovation project directed towards betterment of public transportation department. With respect to the domain of study there have been thorough perusal and analysis of several academic articles and resources which have hitherto been contributed for the subject in question. Methodology consists of in depth interview of the researchers of Victoria institute which are currently working on ISET program (Innovation for sustainable everyday travel). Our findings seek to answer the main question, that how a hub firm tackles with its emerging challenges to leverage network innovation, in shape of evidences from Viktoria Institute of research and development. Analysis of data is carried out through strategic management tool and descriptive approach. With all due efforts, the work has been afforded with validity and authenticity employing all the requisite elements as per social research is concerned. Discussion follows the analysis and results have been illustrated accordingly.

Keywords: Network Orchestration, Network Design, Innovation Network, Information Technology, Knowledge Mobility, Innovation Appropriability, Network Stability.
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1 INTRODUCTION

1.1 Background

With ever-increasing pressures on organizations to innovate, there’s uncompromising emphasis on the stakeholders to pursue innovation with social and environmental conscience as Chesbrough (2003) puts it. Cisco (2009) agrees that competitiveness in recent corporate scenario is based more on competitive, conscious and purposeful collaboration of different players which help them achieve mutual goals. Collaboration ranks above all the concerns when innovation comes in perspective since Perks and Jeffery (2006) state that the relevant proceedings seek more research, insightful work, and real time feedback. The marvels of innovation have never been able to make way towards progress and culmination unless multiple stakeholders converged their efforts for ultimate success. The question of sustainable development far exceeds the notion of tactics and strategies advocated by Green IT and Green revolution as McKinsey & Company (2009) argues.

In view of Möller and Rajala (2006), the activities and actions which lead to innovation and development in organizational processes are most of the times backed by three types of collaborative mechanisms:

- Institutes such as universities and research entities work together with, in many cases, relevant organizations in order to evolve a technological breakthrough. This process is marked by large degree of cooperation among the stakeholders.

- Two or more organizations come together to work for research and innovation purpose in order to get better understanding of the phenomenon under observation with extended circle of literati and industry experts. Multiple sources i.e. experts from all the participating organizations collectively put in efforts for betterment of products and services in question.

- Commercial initiative of application network makes business application useful via technological innovation.
The research is based on analysis of the patterns followed by stakeholders in the first of above mentioned three collaborative mechanisms. Purpose of achieving sustainability, in innovative initiatives, calls for more than reduction in human carbon footprints, i.e. sustainability is now counted also on the economic and social fronts. This research is based on analysis of operations and initiatives taken by a hub firm Viktoria Institute of Research and Development in order to cope up challenges posed by orchestration so as to leverage network innovation. The phenomenon of network orchestration is one of areas of innovation development that exacts great deal of research and comprehensive study from participating organizations and business entities. Network orchestration, Lind & Hjalmarsson (2011) say, seeks to serve the purpose of sustainability with protracted aims of drawing out value in the dimensions of economy and society.

According to Lind & Hjalmarsson (2011), no sustainable innovation could be achieved, in present times, in all of its essence unless organizations get productive in the due process and social elements get safer and comforted than ever before. Sustainable innovation is predicated upon a tripod with environment, economy and society on three vertices as Seebode (2010) avers. The research work put in Viktoria Institute of Research and Development is gauged on the very notion of sustainability of the economics and social developments in addition to environmental. Network orchestration, as Win, Fung & Fung (2009) explains, is a multiple staged process that needs consistency on the part of distribution of resources and meaningfulness to all the participating entities on equality basis. Dhanaraj & Parkhe (2006) argue that network orchestration couple with innovativeness, tend to fall short on equal distribution of resources to the partnering organizations. When business entities and other stakeholders channelize their efforts for achievement of mutual goals, there is little room for a single or few member organizations taking the lead over all, swaying whole of the system and relevant developments.

There’s a set of activities that play pivotal role in enabling hub firm function with equity based view for member organizations and this set includes: Knowledge mobility, innovation appropriability and network stability as Dhanaraj and Parkhe (2006) enumerate. Each of the
activity is made up of sub activities which altogether ensure that the network orchestration seeps into the system with sought after precision in the process. Hurmelinna-Laukkanen & Nätti (2012) state that knowledge mobility emphasizes timely availability and exchange of valuable information among the players, innovation appropriability enables the stakeholders reap benefits produced by innovation and network stability helps the stakeholders keep a positive growth rate with expanding cluster in the wake of hub firm’s improved repute.

As the network orchestration goes beyond producing positive results for environmental factors by working out network innovations in the public transport domain, the domain of research carried out by Viktoria Institute of Research and Development also gets complicated. The network orchestration, in opinion of Lind & Hjalmarsson (2011), is supposed to afford benefits to the public transportation department as well in the form of increased productivity and public safety along with decreased carbon footprints of the commuters. In view of Harrison & Håkansson (2006), the research and development sectors make innovation activities quite complicated for both the orchestrators and other actors especially when fair pattern of behavior is also counted in the research domain on the part of hub firm. Harrison & Håkansson (2006) discuss the issues that researchers face in the due process: network’s dynamism, collaboration and competition of members within the network, work patterns and mannerism assumed within the network, ambitions of the network firms both for short term and long term and others.

1.2 Problem Statement

With respect to the brief overview of the research enunciated above, the statement of problem comes down to this:

“How can a hub firm leverage network innovation by coping well with the orchestration challenges emerging in the due process?
1.3 Purpose of Study

The research serves the purpose of discussion and analysis of the work put in network orchestration by hub firm i.e. Viktoria Institute of Research and Development, so as to how the entity has so far fared on the project. The research focuses on the activities that hub firm carried out to distribute resources among different participating organizations and cluster members in the light of research and development work. The research also draws upon the various issues and problems that stakeholders confronted while distribution and management with limited resources as well as with the distribution of outcomes and benefits among all. Another feature that research takes care of is analysis of the concept of network orchestration and the extent to which it has been purposeful to assist systems so as to resolve pressing issues in a network.

The research aims to peek into the complicated patterns and mechanism that research firms get indulged in as hub firms as they are challenged with various considerations. When research firms work in unison with member organizations for betterment of different private and public concerns, they are probed with serious critique as they work as mediator and adjudge all the proceedings. They are expected to carry out unprejudiced distribution of resources and benefits to the member firms. This research also serves as a critique on hub firm’s progress.

1.4 Research Question(s)

The researchers are to study and peruse different research papers, along with interviewing members of hub firm, in order to ascertain the answers to the following research questions:

- What activities does the hub firm carry out for network orchestration and innovation?
- What kind of challenges the hub firm faces in order to achieve desired goals for the network firms?
- What has so far been the progress of hub firm in the project of network orchestration in public transport domain?
- Has the hub firm been successful or unsuccessful in achieving the objectives? What’s the extent of success or failure?
1.5 Target Group

The target group for this research is the set of organizations included in the cluster for network orchestration and innovation. The primary stakeholders in the projects are public transportation department, government agencies and organizations included in the whole network orchestration and innovation activities.

1.6 Limitations

The limitations of research are based on the fact that the study does not suggest any kind of solution or alternative to the stakeholders involved in the network orchestration activities and innovation research since the aim is solely to assess and analyze the progress the hub firm has achieved so far in a particular direction. Another major limitation is that the hub firm under observation i.e. Viktoria Institute of Research and Development, head quartered in Göteborg Sweden, could not spare us ample time for the research work although we had had comprehensive understanding of their work in the field of network orchestration for public transportation domain. We have put in our best efforts making use of literature related to their work and few interviews that we managed to take from the researchers in Viktoria Institute.

1.7 Expected Outcomes

As a result to our thesis we try to come up with certain answers for our research question, we hope to do that by understanding Viktoria Institute´s role as a hub firm in the ISET project, we hope to analyze its orchestration operations over the tenure it’s actually been working for the project. We also expect to find out and identify certain challenges under each orchestration process i.e., knowledge mobility, innovation Appropriability, and network stability and their remedial strategies adapted by hub firms in order to enhance network innovation.
1.8 Authors’ Profile

Muhammad Usama:

A 28 years Software Engineer, currently doing Master’s in Informatics with specialization in Co-Design of Business and IT from University Of Boras (Sweden). Usama has a diverse background in fields related to IT and has much to offer to the academia through his expertise. His foundation of technical expertise stems from a programmer background in Best Visualization Company, along with project management and implementation experience and he has been eager to make a career in Business Intelligence. Researcher has completed many projects in various technologies like; C# .Net, ASP.Net 2.0, ASP.NET 3.5, SQL Server 2005, SQL Server 2008, SSRS (SQL Server Reporting Services), JavaScript. In another company, i.e. Sidat Hyder Morshed Associates (Pvt) Ltd., he expanded his horizons and learnt to face new challenges by working on Macintosh and Iphone development.

Zohaib Khan:

Educational background comprises of MS in informatics with specialization in co design of business and IT (2010 - 2012) from Boras University (Sweden), Bachelor in Information Technology (2005 - 2009) from Punjab University, Lahore (Pakistan), ICOM Intermediate Education (2002 - 2004) from Punjab College of Commerce, Lahore, Pakistan. And as far as professional experience geos, the researcher has worked as a part of proactive teams of support staff responsible for delivering a high quality, customer-focused professional service in different organizations, provided highest level of technical support and customer service to internal staff. The skills and tools include Networking Skills such as Active Directory Services: DNS, DHCP, WINS, Samba, Apache Ethernet, LAN/WAN, Static/Dynamic Routed Cisco Series Routers, Routing Protocols: RIP/RIPv2 and Made Network Cables. Technical skills include SQL, PLSQL, Java script, PHP, XML, XHTML, HTML, Java, .NetFramework, Visual Basic,B.I2.0, B.I3.0 Macromedia Dreamweaver, Microsoft FrontPage, Microsoft Office, Microsoft Excel,
PowerPoint Rational Rose, Microsoft Visio, Microsoft Project, Microsoft, Microsoft Access Netbeans, Unix ,Linux, Adobe Photoshop and Sharepoint.

1.9 Thesis Structure

Structure of the thesis has been tailored with respect to the detail orientation of the area under consideration. Below chapters are included in the work and succinct explanations follow:

1.9.1 Introduction:

Introduction chapter broaches the research topic with utmost clarity of aims and objectives of the researchers. Highlights have been provided in this chapter as to how the work intends to progress in the coming sections.

1.9.2 Research design:

It has more to it than only nondescript description of methodology and research tools since the chapter opens up with debate and discussion over the philosophical underpinnings of the social research. Technique have been explanations along with the counter explanations for all the tools and techniques which are employed and also of those which have not been employed but discussed in relation as potential or unlikely alternatives..

1.9.3 Theoretical Study:

Theoretical study aims at exploring and taking in consideration all the pertinent areas which make up the phenomenon of network orchestration all along. Theoretical considerations play most significant role in evolution and complement of research works and in this particular piece
of work, conscious endeavors have been made to include key areas of the subject and explicate the important matters related to subject.

1.9.4 **Empirical Study:**

Empirical study is all about exploring the findings extracted through primary data collection tool or technique of in depth interview. An interview was carried out with key stakeholder of the firm in question and findings have been listed accordingly in this chapter so as to make grounds for further sections of analysis and discussions.

1.9.5 **Analysis:**

Analysis part contains researchers’ attempts and efforts that have been put in comparison with the known areas of the subject. Different angles have been applied to the findings in order to study them and scrutinize the findings. A matrix from management studies has been included in the work for in depth analysis of the extracted findings so as the results could be discussed in conducive manner.

1.9.6 **Discussion:**

With respect to all the chapters mentioned above, this chapter includes debate and discussions of the results and findings in relation to the analysis put together in the previous section.
2 RESEARCH DESIGN

2.1 Research Perspective

Research work is generally based on specific theoretical paradigm which by definition, as Mertens (2005) states, is: “The theoretical framework, as distinct from a theory, is sometimes referred to as the paradigm and influences the way knowledge is studied and interpreted.” Against the choice of research paradigm, Burrell & Morgan (1994) state, the researchers get to equip themselves with certain position and philosophical stance with respect to ontology, epistemology, human nature, and methodology. The research has been carried out with a positivist perspective and Goles & Hirschheim (2000) explain regarding this perspective as a framework or theoretical nature that goes ahead to assess the phenomena in social world as they are investigated in the natural environs. Positivism and interpretivism are philosophical perspectives that have been at cross purposes with all their strengths and weaknesses included in conflict as Harrits (2011) puts it. Researchers are always desired to put most rigorous research methods to work so as to make their work as effective as possible. With respect to this research, the phenomenon of organizational performance has been scrutinized. Goles & Hirschheim (2000) elaborate that most of the works in organizational studies have been marked by positivist perspective and the very complexity and pervasiveness of such approach have engendered boundary and phenomena shifts.

Design Science Research (DSR), as Harrits (2011) states, is a paradigm positioned for problem solving. Design Science Research is based on the aspect of innovation which further defines ideas and notions, practical implications, technical capabilities, and products. All of the mentioned factors assist analysis, design, implementation and management as Harrits (2011) affirms. According to Hevner et al. (2004), design science is pragmatic to the core in nature but despite this fact it engulfs own ideas related to philosophy of science. Hevner et al. (2004) also believe that artifacts developed in the light of such characteristics are driven with definite purpose in backdrop. Philosophies of ontology, epistemology, methodology, and axiology are
examined with precision herein against design science research’s underpinnings. These philosophical approaches serve as approval of uniqueness of metaphysical assumptions in view of Vaishnavi & Kuechler (2004):

- Ontological stance reflects the reality of nature and in view of Gruber (2009) ontological connotations are related to modeling of knowledge base as per specific set of representational primitives. According to Vaishnavi & Kuechler (2004), there are numerous world states on the basis of variedly located alternatives that ontological stance ascribes to within the domain of design science research.

- Epistemological stance seeks the nature of knowledge. Steup (2011) says that epistemological stance is about study of beliefs that are justified and part of traditional knowledge. Vaishnavi & Kuechler (2004) says that in accordance with design science researcher, epistemological stance is about gaining knowledge with effort and the construction of gain is constrained objectively within a context.

- Methodological stance pertains to the knowledge of approaches used to extract data in order to obtain knowledge and to understand the phenomenon as Guba & Lincoln (1994) state. Gregg et al. (2001) are of the view that methodological approach relates to design science researcher, primarily, is developmental.

- Axiological stance pertains to the study of value on the lines of philosophy. Hart (1971) states that the value is commonly ascribed to the value in design science researcher per se with respect to ethics and aesthetics as Vaishnavi & Kuechler (2004) put it. In accordance with the design science researcher, axiological stance is ascribed to creative manipulation and influence of environment as per Vaishnavi & Kuechler (2004).

The design science research paradigm is ingrained in pragmatism with unique principles of ontological, epistemological, methodological and axiological approaches. The philosophical
stance of the design science research paradigm is in compliance with the pragmatic worldview of network orchestration. The research, with reference to all of the above stated, is duly immersed with design science tenets for proper investigation of the observed phenomenon.

2.2 Research Strategy

The research work put up in this piece is entirely based on cases study research strategy. The case study revolves around the endeavors that a hub firm has so far put into the works of network orchestration for innovation purposes so as to benefit public transportation department and its stakeholders. Drawing upon the preceding and succeeding sections related to details of the project, it suffices for researchers to state that research work is largely based on studying and assessing the level of input and rigor the hub firm has employed in a particular direction as per the desired of the stakeholders. Saunders, Lewis, & Thornhill (2009) consider the research strategy mainstay of any research work since the strategy in what initiates or helps researcher to initiate a research work all along. Harrits (2011) avers that the research strategy determines the ways researchers carry out the work and embark on a journey of exploration and analysis of available and recently extracted data and information. Mazzola & Kellermanns (2010) elaborates the research strategy as a phenomenon that a research can never make do with as it’s a plan and framework upon which the stakeholders predicate every move and step in the process.

Research strategy actually makes researcher come to terms with knowledge of tools and methods they require along the way of research process. Darke, Shanks & Broadbent (1998) explain, the research strategy is also operative the other way round since many times researchers choose a particular strategy only when they are completely aware of the tools and methods they will be applying in the research. Working with a specific research strategy brings numerous benefits to the researchers as Saunders, Lewis, & Thornhill (2009) discuss. Saunders, Lewis, & Thornhill (2009) also reflect the importance of using research strategies with the fact that most of the times questions are also influenced by the strategy researchers intend to employ. R.I.C. (2007) is of the view that having a research strategy in perspective, the researchers have acuter sense of the questions that could extract precise information.
On the part of other research strategies, Greener (2011) says that several of them have sprouted in previous decades but these have dominated the research scenario in recent times: survey strategy, experimentation strategy, action research strategy, archival research strategy, ethnographies and grounded research strategy.

2.3 Case Study Research Strategy

With respect to case study research strategy, Bryman & Burgess (2002) state that Yin (1983) had come up with the notion of this strategy for research. Name of Yin (1983) elaborates that case study research strategy enables the stakeholders to carry out a detailed and profound scrutiny of the phenomenon under observation. It goes without mention that several operations and functions are marked by secrecy in the organizations and many proceedings are intentionally kept under wraps as required by management in view of Greener (2011). Case study research, as Bryman & Burgess (2002) comment, assists researchers to unearth such matters by dint of prying nature of the study. Williams (2007) says that by employing case study research strategy, researchers might find the data or information that is not intended but is useful. This element of surprise appears to be beneficial for the researchers as they may be able to find more to the research area which requires scrutiny. Greener (2011) is all for the strategy since it is believed that case study doesn’t only get the questions answered in desired way but the researchers are also able to draw out more value in the long run in the form of increased insight about the phenomenon. Williams (2007) adds that the case study approach for research makes a work profound in many ways. Beall (2010) agrees that not any research strategy other than case study affords researcher with much to rely upon and in case of cultural issues such a research strategy could work wonders. In view of Harrits (2011), there can be found inordinate issues lying under wraps such as behaviors and mannerisms to be assessed through detail orientation in the due research process.

With research strategies in perspective, following account briefly discusses the case study research strategy against other strategies. Schell (1992) discusses that case study helps researcher
in extracting the responses related to questions of why and how. It is also explained by Bryman & Burgess (2002) that case study research strategy doesn’t require any control of surroundings since phenomena are observed with respect to natural and untouched environment. In view of Bryman & Burgess (2002) view that case study research strategy is immersed in detail orientation and the approach works even better when mixed with other relevant tools for data collection such as combined with the questionnaires. On the part of research strategies of experiments, archival analysis and historical analysis, they all appear to have comparatively less appeal. Beall (2010) mentions that other strategies for research are focused on either controlled surroundings or historical facts and data and but both of these factors are not part of this research.

2.4 Data Collection Methods and Tools

The collection of data has been thought of on the lines of depth and profundity in findings. To make findings rigorous researchers have made use of in depth interviews in capacity of data collection tools for the specific research work. In depth interviews, in opinion of Creswell (2009), have been popular with case study research strategy and others as well for their very ability to extract answers related to the observed area. Data collection for this research is intended to consist of details regarding the progress of hub firm on the subject so as to enable researchers debate and analyze the hitherto progress of the same. There are several other tools and techniques in view of Creswell (2009) that researchers employ which include survey questionnaires. For this research, researchers didn’t see other techniques as conducive as in depth interviews since no other data collection tool is marked by such indulgence into the research area.

Dillman (2000) agrees with the significance of in depth interviews as they make various implications come live before eyes of researcher. In case of proceedings of hub firm regarding network orchestration, in depth interviews have potential to extract near precise data from interviews including psychographic patterns.
2.5 In-depth Interview Technique

Interviews per se have been so remarkably quoted by researchers for effectiveness of data collection methods that scholars and industry erudite have declared in depth interview technique one of the most effective tools for data collection. Seidman (2006) elaborates that in depth interviews are carried out in situations that require grilling of the respondents. R.I.C. (2007) justifies the usefulness of in depth interviews with the fact that researchers find it easy to unearth hidden facts with help of increased rapport and candidness levels with the interviewees. Petter et al. (2010) agree that interview techniques get further effective if the person at the helm of affairs is able gregarious at heart and can make people speak from the core of their heart.

For research in discussion, the interviews are carried out with help of semi structured interview questions. Seidman (2006) regards such questions effective enough as well as efficient. Efficiency is evident in the fact that researchers can do more with less since researchers can modify questions to extract more information with regard to present situation. According to Seidman (2006), there may be some instances during interviews when researcher gets the air of things which can be helpful for understanding the phenomenon but were not thought of before. These strokes of luck might get the research more revealing and comprehensive than initially intended by stakeholders. Unstructured interview has been kept at bay since researchers wanted to have some pattern to the findings with semi structured questions in the interview.

2.6 Data Analysis Procedures

Employment of specific research strategy and data collection tools in the research work reflects the work’s ability to produce consistent data types. According to Hevner et al. (2004), design Science research demands proper analysis and assessment of the process and artifacts so as to justify their rectification and performance respectively. The data collection methods of in depth interviews and relevant documents’ perusal generate non numerical data in general. In the due course of primary data collection, the information extracted serves as the basis and genesis of the
designed artifact. In view of Creswell (2009) the designed artifacts need constant assessment during the research process and this exercise if iterative in definition.

2.7 Qualitative Data Analysis

The data, extracted out of data collection tools, are textual so the analysis of the same is of qualitative nature. Creswell (2009) state that qualitative data are product of research works predicated upon case studies, ethnographies, and action research. Psychology Press Ltd. (2004) sees data analysis as a continuous process that starts from the very beginning of research work reflecting upon the succeeding parts of work. Collation of interview data in textual form precede the analysis of empirical data since researchers get facilitates once the raw data is in form and ready to be analyzed. Petter et al. (2010) affirm that data collation makes the analysis much easier and consummate researchers take special care regarding data making sense after all. Psychology Press Ltd. (2004) consider it important for researchers to read throughout the collated data from primary research phase since this exercise enables them to tell the “relevant to research” apart from “avoidable details”. The data is categorized duly in different themes as per the relevant areas of research topic. Oates (2006) explains that it is inductive approach to data analysis as researcher embarks on a journey to explore and analyze data with an open mind perspective. Finally the data analysis ends up reviewing the findings against secondary data so as to identify if the proceedings of hub firm have been successful or unsuccessful in achieving its objectives.

2.8 Validation of Findings

Validation of research findings has always been a crucial part of the literary works of scholars and researchers. This validation serves the purpose of guarantee for rigor and authenticity of research findings. Creswell (2009) explains that strategies for validation of data include triangulation, assessment by member, participation in modes of research, and justification from
for any researcher bias. Oates (2006) explicates that triangulation method converges or tends to converge numerous distinctive data collection approaches for a singly research work. Creswell (2009) is of the view that there can be so much to a single research area and the different data sets could reveal different realities regarding the observed phenomenon. In such cases, the due diligence can be immersed in the proceedings by exhibiting consistencies via overlapping sets of data and findings. With respect to the detailed accounts given in sections above, the research work is based on pragmatic philosophy. Pragmatic philosophy makes use of data collection methods which dominate differing theoretical paradigms. Implications of positivism and interpretivism are reflective in the research work since philosophical approach rooted in pragmatism is not limited to any specific data type.

According to Petter et al. (2010), following criteria are used in order to justify if the proposed conceptual model agrees with:

1. Plausibility – Scrutiny into logical underpinnings of the work. Researchers can achieve plausibility in work by coming up with a basis of theory interlinking the research work and overall research domain.
2. Effectiveness – Scrutiny into the perceptive underpinnings of the work. Researchers can achieve effectiveness in work by guaranteeing that pertinent concepts are recognized and addressed in the solution proposed.
3. Feasibility – Scrutiny into the workable underpinnings of the work. Researchers can achieve feasibility in work by getting respective critics employed for the due review on conceptual models put into work.
4. Prediction – Scrutiny into the productive underpinnings of the work. Researchers can achieve predictability in work by investigating if the work is able to produce results in a desired way. Predictability relates to internal validity of the data and it serves as guarantee of compliance among research design components.
5. Reliability – Scrutiny into the reliable underpinnings of the work. Researchers can achieve reliability in work by guaranteeing the empirical validation of concepts.
2.9 Result Presentation Method

The data provided in research work is amply presented to justify the results. Constant endeavors have been put to exhibit relevance & rigor of data along with the logical consideration and pertinent design decisions. A great deal of information and data are gathered from the secondary and primary sources. The results from all the findings are presented in the form of tables, graphs, pie charts, models, and textual data. The referencing is all done with Harvard Referencing System.
3 THEORETICAL STUDY

The research study is based on phenomena of network orchestration and its sub categories or sections. Apart from them, there also are some relevant areas that work behind the research area and such phenomena are discussed as per their relevance in the study.

3.1 Key Concepts

3.1.1 Network orchestration

Network orchestration is carried out with few or numerous stakeholder entities in loop since the objective in view relates to their collective well-being. It is an endeavor that Neumann & Holzmüller (2007) hail as progressive research among various partner organizations in which the innovative efforts are highlighted and bolstered. Activities that go into such innovative research are backed by intentions of all of the participating entities. Danaraj and Parkee (2006) states that all of the participating organizations converge their potentials so as to achieve common goal of organizational effectiveness and efficiency. In a due course of obtaining decisive prospects, the research activities for innovation purposes run the risk of going awry. Gnyawali & Madhavan (2001) warn that network orchestration can be found lurching on the brink if activities are not properly acted upon or decided upon. The phenomenon of networked enterprise is described by Friedman (2005) who, keeping in perspective the tenets of network orchestration, has faced critics in favor of the concept.

Organizations are able to create opportunities instead of constantly looking out for them. Gnyawali & Madhavan (2001) state that network orchestration manages to come up with networked enterprises for the betterment of stakeholders in the long run. Works, which organizations undertake in effort to orchestrate network, demand precision and alacrity. Grant and Bader (2004) say that Partnering organizations are required to contribute to an ideal extent but also have to be careful not to hurt their own integrity while sharing internal information. In opinion of Hurmelinna-Luckkanen & Mähönen (2009), the agenda of all participating
organizations is same and especially for fast moving industries the stakes are even higher as they have to race in the due process of learning and unlearning. Gulalilawrence and Puranam (2005) take exception to the situation that network orchestration activities make up since theirs is little room left for security of secrecy. It is crucial that networking is carried out with partnering organizations having their chances of buying opportunities intact. The mayhem can cause whole effort go in vain hurting on or few of partners’ organizational interests as Woolthishillebrand and Nooteboom (2005) put it. Teece (2000) adds that situation becomes tougher as sharing of information with partners is inevitable so that the whole effort could gain valuable input for orchestration of network.

There are several activities and initiatives pooling in the effort of network orchestration on both smaller and larger scales. Danaraj and Parkee (2006) explain that there already is greater extent of supervision and monitoring going on by hub firm but the very important aspect of such supervision is the establishment of certain guidelines and tenets for organizations to comply with. Harrison & Håkansson (2006) affirm that hub firm is supposed to come up with the rules and specific scheduling of activities so that the organizations could gel in with each other with reduced alarming tendencies. Hub firm can manipulate the situation in a positive manner by coordination and distributing the activities and innovative concerns among the networking firms along with constant monitoring. What makes supervision and monitoring kind of a challenge for hub firm is what Möller and Rajala (2007) hail as complex and time consuming nature of innovative activities and that too on multiple levels of hierarchies.

It is undoubtedly one of the most difficult and challenging tasks that research and development firms do that they coordinate and allot activities to the participating firms. According to Möller and Rajala (2007) the business entities work on principles of multiple performance levels. This mechanism and desired modus operandi is also followed by networking firms so it is evident that role of hub firm is significant enough in overall network orchestration. Within the network orchestration activities, there have been formed vast knowledge bases, alliances and different kinds of network activities which, Doz and Hamel (1998) exclaim, become even complex and sophisticated as the network spans more on horizon.
Henttonen (2008) states that while working on networks, the organizations categorize networks as interdependent, dependent, dynamic & stabilized collaboration competition globally or locally. Henttonen (2008) also adds that networks are also seen as formal, informal, short term or long term plans that managers deal with. In view of Dhanaraj and Parkhe (2006) there are three dimensions on which the phenomenon of network orchestration is predicted. These dimensions are knowledge mobility, Innovation approbability and network stability. Every challenge, which organizations face within the network, relates to either of the mentioned dimensions. The sections below are reflective of all the dimensions discussed in details. The description of dimensions is accompanied by identification of challenges that these dimensions pose to network orchestration activities.

### 3.1.2 Knowledge Mobility

Knowledge mobility, as the term reflects, is all about transfer of knowledge among different stakeholders that partner together in the networks for orchestration purposes. In words of Dhanaraj and Parkee (2006), knowledge mobility is: “the ease with which knowledge is shared acquired and deployed within the network.” Crossan & Inkpen (1995) and Kogut & Zander (1996) explicate that very foundation of knowledge mobility comes from collaboration among multiple stakeholder organizations working for network orchestration.

Conventional wisdom supports the economic tenet of organization’s having to do a lot with scarce resources but the need of modern consumers require organizations’ endeavor to go out of bounds. Mazzarol and Reboud (2008) express their positive concerns for such contemporary dynamics of increased mobility of resources among partnering organizations. Consumers have gone more demanding than ever before and that is due to advent of information technology and wireless communications. Business opportunities have been ringing well enough with several organizations in the same or different industries. Blomqvist et al. (2005) say that opportunities are there to compel organizations to come together for network orchestration. It has become important business to business activity in the present corporate world to multiply value despite facing challenges of exceeding physical geographies.
Knowledge has become more vital in today’s networked scenario and appropriate yet flawless sharing of the same determines organizational effectiveness. Street & Cameron (2007) say that networks count heavily upon knowledge management in order to carry out activities such as procurement, internationalization, and innovation. Knowledge mobility is one of the most significant areas that network organizations count in since there are few discrepancies to address. In view of Möller and Rajala (2007), firms in network are aware of the level of risks they take but compromising on information and knowledge sharing causes greater risks than anything else. This particularly is the reason for which Möller and Rajala (2007) explain that several management issues are to be taken in perspective while making up a network for research and development purposes. The concern gets acuter when organizations come together from beyond national boundaries as cultural differences and traditional conflicts and connotation come into play. Möller and Rajala (2007) affirm that there can be other characteristic of obscurity due to which a novel approach of management is required within the network contrasting the traditional management.

Factors that could work well with such managerial issues are yet to be unearthed through further research as Gnyawali & Madhavan (2001) comment. It is also important to note that researchers have argued for long in order to find out and recognize the most decisive and determining factors of success for network innovation and orchestration. Ritala et al. (2012) elaborate the issue in light of the fact that differences rear their heads with respect to perceptions of network organizations for management. Möller and Rajala (2007) explain that few organizations in the network consider management from stricter angle while others may see organizations as malleable ad fluid so as to adapt to the environmental pressures. Going lenient on management connotations can afford the networks with air of strategic community development where knowledge is shared at ease. Büchel & Raub (2002) and Chesbrough et al. (2006) demonstrate such ease with views that innovation becomes visible against initiatives of open innovation especially with respect to new information and knowledge.

Fichter (2009) and Neumann & Holzmüller (2007) state that management concerns, if seen with rigid perspective in network organizations, can hinder the generation of ideas and innovation
concepts having commercial viability and value. Dhanaraj and Parkhe (2006) argue that certain level of managerial direction is desirable in order to get the network orchestration end up in a valuable proposition with some established rules.

Role of hub firm is significant in distribution and transfer of knowledge among the participating organizations in network orchestration. Danaraj and Parkee (2006) delve deeper into the area of knowledge mobility and maintain that hub firm takes care of knowledge mobility with the processes of knowledge absorption, network identification and inter-organizational socialization in view. Knowledge gets transferred and distributed but what makes the difference in the end is whether such information is imbibed in the long run for the value rests in knowledge absorption let alone the magnitude of sharing. Network identification tends to eliminate any kind of discrimination that network originations could see within the networks. Network identification makes partnering organizations share knowledge without any sense of deprivation as Heiman & Nickerson (2004) suggest. Increased inter organizational socialization assists network organizations assume new knowledge all along when different parts of information come together on converging point in the form or networks. Heiman & Nickerson (2004) express concerns over the abilities of networking organizations and aver that all firms are made sure to have considerable knowledge to share in the network so as to strike balance and create synergy in the networking scenario.

**Challenges identified**

Challenges that the hub firm faces in the domain of knowledge mobility, in relation to the research area, are:

- Maintaining ease in the knowledge flow throughout the network, especially when the network is dynamic and growing.
- Ensuring adequate progress in relation to knowledge absorption, network identification and inter organizational socialization.
- Ensuring that the members of the innovation network are motivated enough to share knowledge in the network
- Ensuring that each member, along with every new member has an adequate ability to share knowledge
3.1.3 Innovation Appropriability

After having taken care of knowledge mobility, there is a need to make sure that knowledge doesn’t get leaked to unwarranted sources or ulterior stakeholders. Hurmelinna- Laukkanen and Puumalanien (2007) argue that knowledge transference to an unintended outsider may end up in commercial exploitation of the data or information. Innovation appropriability is all about distribution of value among all the networking organizations for orchestration. Danaraj and Parkee (2006) explain that innovation appropriability is possible in light of the fact that there are provisions of licit nature for the said purpose. The hub firms play role of moderator in order to strike an agreement with help of contractual agreement that assures safety and equity are exercised while knowledge is transferred among organizations. Hub firm’s responsibility is also to provide assistance to the networking firms in order to enable them enhance their intellectual property.

Macaulay (1963) and Williamson (1985) describe that innovation appropriability is based more on mutual trust of networking firms rather than contractual agreements. Knowledge sharing among organizations should be sufficient guarantee for the stakeholders to secure their collective interests. As a result the sense of reciprocity would ring well enough in the long run and in direction of betterment of inter-organizational rapport. According to Danaraj and Parkee (2006), the process of innovation is obscure since things in progress have always been near uncertainty. The knowledge is also of tacit nature in addition to the same nature of sharing of knowledge rather than physical or visible sharing. Different parts of information and data from various partners tend to produce single or few results. Kim & Kaplan (2006) are of the view that consequently organizations run for entitlement by hoarding of ideas but dispensation of procedural justice has been effective solution in such instances in network orchestration.

Daraj and Parke (2006), discussing innovation appropriability in its essence, explain that hub firm requires going through a specific procedure to merit the decision’s credibility among the networking firms. Hub firm can dispense the justice by having arranged bilateral communication
between the members. The hub firm subsequently possesses authority to use the final discretion i.e. wither approving the decision or refuting it. Hub firm’s consistency in follow-ups of inter-organizational or bilateral communications may assist efficient innovation appropriability in the wake of effective procedural judgments. On the lines of leakage of information to competitor, there also is a similar issue in networks of organization hailed as free riding partnering concerns. Teece (2000) sees the problem of free riding in context of synergy that definitely gets hurt in the due process of sharing and transferring knowledge from partner to partner. Opportunistic behavior and expression of self-interest have always been divisive in teams and groups and the same level of destruction creeps in the networks of organization if one or few seek to carry away the credit and benefits.

Researchers and industry scholars have peaked into the phenomenon of innovation appropriability and have managed to come up with a remedial initiative known as joint asset ownership as Teece (2000) puts it. Joint asset ownership is described by Danaraj and Parkee (2006) as many organizations possessing ownership of single asset in a way that they all have residual rights and access to the asset. Joint asset ownership also implies that organizations sharing the asset actually hold veto power and have ample discretion to access the asset. Such endeavors are important since all partnering firms consider the shared assets and knowledge their domain and aspect of joint asset ownership serves as appropriate guard against any leakage.

**Challenges identified**

Challenges that the hub firm faces in the domain of innovation appropriability, in relation to the research area, are:

- Ensuring safe knowledge transfer within the innovation network to decrease commercial exploitation of innovation ideas by signing various contractual agreements with the network members.
- Building of trust among the members, to inhibit hoarding of ideas
- Maintenance of joint asset ownership and reciprocity to prevent problems like free riding and opportunistic behavior among the members
- Maintaining bilateral communication among the members in order to insure procedural justice.

### 3.1.4 Network Stability

Third dimension that network orchestration works with is network stability which is related to creation and extraction of value through efforts in the network. Kenis and Knoke (2002) are of the view that stability of network is crucial part to be taken care of with respect to innovation. In the wake of network orchestration, the partnering organizations possess loosely coupled bits of knowledge and information. All of networking organizations seek to expand their own share of value from the network. The issues raise their heads when hub firm’s goals are to be met by every organization but the latter have their respective strategic goals at conflict thus causing instability in the network. Dhanaraj and Parkhe (2006) explain that detailed understanding of the phenomenon reveals that network instability is not a threat all along. Operational capabilities may afford hub form with ample opportunities to settle the stability issues in network. Dhanaraj and Parkhe (2006) also state that network instability can become imminent when members get isolated all of a sudden or when key members leave for competitor networks. Vervest et al. (2005) comment that such solation of members or their dissociation could result in attrition of network in the long run.

Orchestration networks require hub firms to have certain repute among member organizations so that they could keep long turn commitment honored from the stakeholders’ sides. Büchel & Raub (2002) elaborate that hub firm can protract the organizations’ interest in network by guaranteeing and exhibiting reciprocity. According to Danaraj and Parkee (2006) a hub firm can inculcate positive stability in network with robust market presence backed by categorical presentation of reputation and proven track record of leadership. Hub firm can expand the depth of inter-organizational relationships in network by enhancing multiplexity, i.e. providing organizations multiple opportunities to work on numerous projects simultaneously. In these mentioned few ways hub firms have been able to render networks stable with orchestration.
activities carried out in the long run. All in all, stability in networks is of prime significance as it justifies the value creation within the innovation network.

**Challenges identified**

Challenges that the hub firm faces in the domain of network stability, in relation to the research area, are:

- Ensuring a dynamic stability, whilst maintaining a good reputation within innovation network.
- Preventing problems of isolation of members within a network or migration of key members to other competitive networks.
- Maintaining stability, coping under the concept of multiplexity, where multiple partners may enter or leave the network.

Putting it decisively, the knowledge mobility, innovation appropriability and network stability increase the chance that members within the network shape ambitions and achieve goals to reach the position of hub firm by appropriating same competence.
3.2 Relevant Subject Areas

3.2.1 Sustainable Innovation

The overall concept of network orchestration leads to sustainable development of novel ways of doing business. Vervest et al. (2005) say that the focus of firms on achieving green technology has been transformed into the emphasis on achieving environmental friendly goals with economic value intact. With respect to modern needs of global corporate scenario, innovation demands sustainability. This amenity could only be achieved by maintaining positive outcomes in the domains of environment, economy and society. Elkington (2009) explains that sustainable innovation is preceded by groundbreaking yet simple steps taken in the direction of economic and social value apart from environmental betterment. Seebode (2011) elaborates economic value for the partnering firms in an innovation network in the form of improved productivity or new businesses added to the portfolio. In the same way, the social value could be driven out of the innovation networks in the form of amusement and enhanced safety for members of society where the partnering firms belong. Chesbrough et al. (2006) consider three bottom line pillars – Economic, Social and Environmental value - the mainstay of sustainable innovation.

Sustainable innovation is a wholesome phenomenon in view of Kim and Mauborgne (1998). The opportunities abound for companies to jump on the bandwagon of green revolution and innovation strategy but the very factors of social and economic value require protection from being sidelined. Elkington (2009) points out that most frequently the aspect of sustainability is seen in perspective of a tussle that always is found with the extraction of social, environmental and economic values. The figure below illustrates the overlap with clarity in view of Seebode (2011):
In relation to the Figure, Neumann & Holzmüller (2007) take exception since all of the three are usually considered discrete in their own areas while the opposite is actually the case. The concept that these are separate in their own domains supports conventional wisdom in corporate world that there are trade-offs when organizations seek environmental stability. Profit generation, as Koppius & van Heck (2005) comment, seems to get threatened when organizations go for social and environmental benefits’ dispensation to the external consumers. Sustainability in business is essential on the part of external consequences since profits tend to replace environmental and social well-being as Neumann & Holzmüller (2007) state that wealth is what matters at last.

Thinkers in this field suggest an alternative nested model that more accurately portrays the interdependencies between economy, society and environment. The economy depends on society and the environment (although for many people, society did and still does exist without a formal economy). And nature will continue to exist without humanity and human activity. This holistic view breaks down barriers between sectors and disciplines. It allows for diverse, currently unaligned and even competing players to work together. This interconnectedness is the key to sustainable development. Above all, sustainable innovation is wide ranging and people-focused. Social cohesion and new ways of living are an integral part of Vision 2050, fostering an understanding of what it means to be interdependent and responsible for one’s own actions, for each other, for the planet and for future generations. Innovations in technology and science are enablers, but not the drivers. In practical terms, bringing about the Vision 2050 world depends as much on social constructs – legislation, community organization and business models – as it
does on technology. We are moving towards the age of socially-led innovation described in Powerful momentum, and explained more extensively by Josephine Green in Democratizing the Future.

3.3 Results from the Theoretical Study

Results extracted from the theoretical study are positioned to draw upon the relevance between the research question and research area as discussed in capacity of a subject. Researcher has tried his best to accommodate all the relevant concepts herein for better understanding of the stakeholders and readers. Research literature has provided a definite framework in order to see the sub questions in perspective thus managing a systematic structure to the study.
4 EMPIRICAL STUDY

The empirical study in this research is based on the data extracted from an interview carried out with an employee or stakeholder from the hub firm that i.e. Viktoria Institute. Moreover the highlights are also drawn upon the literature available on relevant internet platforms that serve as valid sources for researcher to construe the proceedings on the part of hub firm. There have been responses against the questions asked of respondent and all those responses have been peeked into in the following detailed account of the empirical study. The questions have been intended to draw out as much information from the interview process as possible regarding the progress and dynamics of the project in view i.e. ISET (Innovation for Sustainability Every Day travelling) program.

4.1 Core elements of the project:
When the interviewee was asked to comment as to what elements are considered at the core of the project, the response came: “It’s consists of currently three projects which bends over three phases. Infrastructure Innovation, Service Innovation and System Innovation and these three phases divided into different time layer.” As far as the provenance of project is concerned, Innovation for Sustainability Every Day travelling (ISET) was commenced in capacity of a fully-fledged research program in early months of year 2009. The three phases were elaborated by the respondents as:

4.1.1 Infrastructure Innovation

“The first phases Infrastructure Innovation spanned from 2009 to 2011 and in this phase the third party developers were involved to make prototype of this service. The main focus of this infrastructure is development of digital arena by developers, an arena in which different actors can publish their data to the third party developers.” A significant part of the project to count into consideration is the variety of actors participating in it. Backgrounds of all the participant entities vary as they belong to both the public and private sectors so it becomes unclear as to which particular structure this infrastructure Innovation adopts. No organization in the network
can come up with a wholesome infrastructure innovation but there’s one – “SamTrafiken” who has been assigned with this particular task. SamTrafiken is actually responsible for all the public transportation companies in Sweden as it owns all of it. SamTrafiken has assumed the task of coming with ideas for infrastructure innovation so that it could make the ideas of Viktoria Research turned into a fully-fledged developed zone in 2011. With help of such developed zone all the multiple actors would be able to publish their APIs, and interaction among different data owners and developers.

### 4.1.2 Service Innovation

Second phase of service Innovation Phase is based on designing and delivering on a competition called West Coast Travel Hack – mainstay of this competition is to build a prototype of mobile services within 24 hours with help of which the data from “Trafiklab” could be used. The data are used in order to increase awareness among populace for consumption of public transport rather than private transportation. This competition cropped up in the mid of 2011. The respondent went on: 
*One month after completing this competition the Trafiklab first time released its digital arena in the form of digital infrastructure innovation. This infrastructure innovation was marked towards the public.* He also added: 
*This digital arena in the form of Travel Hack competition arranged the competition where twenty teams including 67 participants attended the Travel Hack Competition to build a prototype while using the data from the Trafiklab.*
4.1.3 System Innovation

Third phase of System Innovation phase takes input form the data generated by competition and prototype built in first and second phases. It is an ongoing phase that promotes and facilitates the commercialization of prototypes in the form of market ready services such as Android, Appstores (using in I Phones). Interviewee says: “The aim of the third phase is to stimulate that prototype which is won in the Travel Hack event and make those prototype market ready services.”

4.2 Achieving sustainability:

A question was asked as to how the hub firm achieves sustainability within the network orchestration domain while dealing with diversified stakeholders such as government, supplier, developer and consumers. The response was: “While achieving the communication with different actors Viktoria spent three to four years to make this communication materialized and understand the ISET program, then it was narrowed down and focus on a service innovation phase in the form of Travel Hack event.” Main objective of the Travel Hack event was to ease communication levels among different actors in the network. It was also discussed that the developer of Travel Hack competition was also entrusted with the development of viable and appealing services for the consumers as per Victoria Institute’s decision. The response further goes: “To make this service developed, the developers get the data from Trafiklab. However in order to build services that support the consumer the developers also have understanding of consumer needs as to when they have to travel the most or least.”

The developers are not provided with simple data items but real time information regarding travelling habits of populace as it was pictured while participating in competition Travel Hack. This information was based on illustrations of people travelling during travel situation, so during the competition’s 24 Hours, the developers not only received information for assistance in
development of services but also obtained the vivid accounts of daily travelling routines of the future consumers of those services. The response for the question also included the statement: “In order to meet the needs and situations of the consumers they were also supplied with the third resource and that was description from the government about the ambition of sustainable transportation as the government of Sweden was eyeing the sustainability all along.”

Governmental sources were of the view that till the year 2020 the public transportation should increase manifold. Main focus of hub firm’s activities was that developers use information from service innovation phase in order to build services. In addition to that responsibility, the developers in the network were also accountable to count in government’s consideration in their efforts while developing the services. Victoria Institute was supposed to use all the consumer information to do both the tasks simultaneously. All the relevant communications were carried out via www.travelhack.se – a website which was created for the competition in order to promote or stimulate the communication of data user information and also the communication of government vision.

4.3 Managing Knowledge Mobility, Innovation Appropriateness and Network Stability

The interviewee was asked to comment on the partner firms who are responsible in their own domain for managing Knowledge Mobility, Innovation Appropriateness and Network Stability. Response that followed was: “If the researchers look at the managing innovation appropriateness this domain is under the General Assembly for ISET program who decides on issue regarding innovation appropriateness and this General Assembly which is held two times in a year if there is a problem or issue occurred in innovation appropriateness. Dart group helped Victoria formulate a common business language which was implemented throughout the network for knowledge exchange.” Meetings are carried out in order to monitor and track the progress of respective firms on the part of Innovation Appropriateness. The tasks are taken care of in the form of work packages which span across few years between 2009 and 2013. In the
same manner, the progress on the part of network stability is monitored, for which the response went like this: “In order to achieve network stability during the work being done during these work packages there is a regular follow up meetings every month during this work package and there is a leader of every work package attend the meeting via face to face or by phone to tell the progress in these work packages to the project manager.”

All the relevant areas and issues come into limelight in the meetings if they have not been mentioned by the stakeholders earlier. In this way the activities are easy for hub firm to monitor and supervise. Issues are autopsied with much consideration from all the partnering firms and substantial criterion is tailored in order to resolve the issues. The work packages are autonomous in their own domain and they assist the knowledge mobility as well to a great extent. Monitoring and checks on the performance and transactions of work packages are significant in the long run. Project managers contribute to larger extent to the internal communications of the network and try to find clues if the proceedings are going on in desired direction. The response for the question also included: “And also there is a meeting in network stability with General Assembly where all the participating organization sees the initiatives of Viktoria Institute. They all come together and talk onto the sensitive issue of the program.”

4.4 Achieving eco-goals:

A question was posed so as to know what the hub firm has been doing to achieve eco goals while working on the project. The question was positioned to know what percentages has the hub firm achieved in achieving the eco goals with respect to eco-equity, eco-effectiveness and eco efficiency. The response that followed sufficiently showed that this project’s result is not supposed to be a one-time product but a capability of achieving the desired goals for the network. Response was: “The capability is provided by Trafiklab which provided data for the competition. It also explained as to how innovation could be stimulated via digital innovation contest. Therefore it is tough to say what percentages of eco-goals are set to be achieved. So if we had had a product in view, we would have been able to calculate as to how much we have been successful in achieving eco goals.” But the very nature of its produce, i.e. the capability, stakeholders have underperformed in measuring the eco effectiveness or eco efficiency of the project.”
The capability that network aims to achieve is itself based on the very tenet of coming up with eco effectiveness and eco efficiencies. The response also included: “If we look at the results from the competition of Travel Hack.se all these twenty services which were produced during the competition in some degree aim towards achievement of either of the eco-goals.” “Many of the developed service in travelhack.se competition had aims to achieve eco-efficiency goals. But there are also some examples of eco-effectiveness and eco equity.” With respect to the prospects of the project, Respondent went on to state: “In achieving eco-goals the Viktoria researchers tell us more about the ISET program that are currently the ISET program which is to be ended in 2013 and it is probably starting two more program after ending the first program in 2013 and there deadline is 2020.”

In future the first aim of ISET program is to produce capability during 2013 to 2017 but the aim will be modified so as to produce a design to implement that capability in the form of real service. The next leg in ISET program and the goal for 2020 is focus on smart mobility. The question would be that how smart mobility could be achieved based on the capability being produced in the first leg 2013 and the third leg focuses on different scopes.

4.5 How the activities are interlinked

Interviewee was asked as to how the activities are interlinked within the network having different partners and those too with individual agendas. The question was actually posed to extract the hub firm’s views on achieving sustainable innovation for every day travelling. Response was: “In ISET program the hub firm can communicate and create multiple links with different parties such Trafiklab and General Assembly etc.” The hub firm builds a scenario before the stakeholder partied go for Travel Hack event including developer zone and workshops. Even before all of such proceedings, we have a start-up or warm up project in place that assists us to achieve the agenda and government visions. This setup of modus operandi makes proceedings, in the
workshops, meetings and the digital platforms important as far as Network Stability is concerned.

The mentioned digital arenas are considered, by interviewee, significant in maintaining network stability all along. With respect to internal diversity within the network, respondent said: “From the experience of Viktoria researchers, it has been deduced that these kinds of projects are not stable in their own because there are a lot of innovations going on.” Efforts on the part of innovation get even acuter when we involve different parties and stakeholders that have different agenda and differing visions. Interviewee also said: “These meetings, workshops and the digital platform act as a framework which help to coordinate the work and achieve the network stability during the work packages.”

4.6 Information Flow in Network Stability

Recipient was asked regarding the key functions that assist flow of information in network stability as there is communication going on with various actors. Answer that followed was: “The key functions for ease and facilitation of flow of information for network stability are meetings and workshops. These meetings are held at different levels like coordination meetings, General Assembly meetings and the workshops meetings.” Meetings and coordination are managed both on strategic and tactical levels. As far as workshops are concerned, respondents said: “The operative level meetings called operation meetings which are designed for the workshops. So these key functions are important while establishing network stability.” He also added: “First leg of the ISET program has a framework consisting of Trafiklab and Travel Hack and these frameworks include different web pages which help stakeholders and parties to communicate on multiple levels.” In this way stability becomes ingrained in the network and information remains available to multiple stakeholders making every firm aware of outcomes in different conditions and resources being consumed. Interviewee said: “These outcomes help to communicate the work being done by the ISET program”
4.7 Conflict Resolution in ISET project

Interviewee was asked as to how the hub firm resolves any problem caused during digital communications for network stability concern. Highlights of response are: “If there is a problem, hub firm doesn’t immediately jump on to try to solve it but the problem actually triggers a dialogue and we at the hub firm bring into light the relevant details of the issue.” With respect to prerequisite consideration for conflict resolution, the respondent said: “The stakeholders during meetings, under supervision of hub firm, discuss the issues in advance as members happen to be perceptive with their respective experiences. Well, after cropping up of problem it is first discussed in coordination meetings. On stakeholders’ failure to address or resolve the issue in these meetings the issues are taken to the General Assembly meetings.” It means that hub firm by itself is not able to resolve such issues but the meetings and coordinating events come to rescue for conflicts’ resolution. This role of communications management by the hub firm makes Victoria Institute a substantial support for the whole network stability.

Respondent added: “It doesn’t mean that hub firm is totally incapacitated for issues resolution but the hub firm is strong and influential enough to spark a dialogue within the meetings. Victoria Institute, as any other hub firm, it can’t afford to sit idly at all seeing issue rearing their heads one after another.” A hub firm ends up with a high quality mechanism for innovation network and it develops a capability through the Trafiklab and Travel Hack.

4.8 Implications of energy efficiency on social norms

Interviewee was asked as to how ISET project changes the social norms of citizen to increase energy efficiency. Response was: “One way to adjust and make settlements in order to make
amends for the environmental losses is managing pertinent data. One has to have certain
database in order to track environmental losses and carbon footprints. Daily commuters’
records and database are important to be kept in perspective.” The hub firm has managed to
maintain such database for further developments. This is the reason the hub firm is able to trace
the environmental impacts of daily commuting of the populace. ISET project itself is not a
wholly responsible body to bring in revolution in social norms but it actually makes stakeholders
come up with social norms’ revitalization. The enhancement in values got entrenched in overall
process in the wake of emphasis of stakeholders on developers for developing services that could
change the social norms for positive. “The ISET program in the first leg involves the consumer
focus however we don’t consider indicators revealing as to how many travelers have changed
their behavior. This would be probably done in the third leg which is 2017 until 2022.”
Respondent said.

4.9 Achieving Environmental Stability

There was a question that researchers asked regarding the awareness of population for
environmental stability as per the developed capability. Respondents asked: “Trafiklab is
running full throttle and it is being managed by Samtrafiken. The Travel Hack was carried out
with great success and it acts as an inspiration for similar digital innovation contest in the future
for management of all travel, environmental and traffic data.” Other kinds of data are also
available in order to build services that help people not only to travel in environmental friendly
ways but also to travel more efficiently. Respondent added: “To provide a service that supports
people during the day and the weekend and these capabilities like Trafiklab, Travel Hack and
similar digital competition, all strive to support the developers for building services that meet the
vision.” Via Trafiklab and Travel Hack with the help of these showcases the hub firm
materialized the capability.
5 ANALYSIS

5.1 A brief background

The Victoria Institute was established in 1997 at west region in Sweden. The mission of this research is to perform research and innovation on applied information technology to help the Swedish automotive transport, reduce carbon emissions for a sustainable environment for future generations. Victoria institute works as a Hub firm, leading the innovation projects, where the focus is to build innovative information systems which support either production or promotion of sustainable vehicles which are beneficial for the environment or sustainable processes. Victoria Institute started an innovation and research program in 2009 with the name of ISET (Innovation for sustainability in everyday travel). ISET is situated in the Vastra Gotaland region of Sweden, focusing on developing a new digital information infrastructure and related services for the promotion of public transport system to protect environment. In this entire project there are several stakeholders at different levels and Viktoria Institute orchestrates them as a hub firm.

5.2 Importance performance analysis

Importance-Performance Matrix is considered an analytical tool as many industry experts and researchers have been benefitted much till date. The tool is employed by the researchers in order to ascertain the strategic poise of organizations. In view of Wade & Eagles (2003) the tool is used to evolve a larger picture of strategic intent of the organizations considering the elements they have prioritized in a certain manner so that their preference smack of overall organizational intent. With respect to the present research, there have been certain scores that researcher have associated to the elements with respect to the nature of responses to questions. As per the tenet of the matrix as listed below, the elements have been mapped in accordance with their respective to four predefined quadrants (Defined clockwise):
1st Quadrant - Concentrate here: A factor gaining a position in this quadrant explains that it has not been taken care of the way it was supposed to be. It means that stakeholders need to put more emphasis on the factor so as to treat it commensurate with its importance.

2nd Quadrant - Keep up the good work: A factor gaining a position in this quadrant explains that it has been taken care of so far and the stakeholders’ performance with respect to the said factor has been remarkable. Both the axes i.e. x and y are there to elaborate the factor’s performance against each other.

3rd Quadrant - Possible overkill: A factor gaining a position in this quadrant explains that it has been overworked with respect to the importance and performance standards assigned to it.

4th Quadrant - Low priority: A factor gaining a position in this quadrant explains that it has not been performed on well in addition to consigning it to lower importance all along.

With respect to empirical study in previous section the researchers have worked out the matrix as illustrated below and the elements of managing Knowledge Mobility, Innovation Appropriateness, Network Stability are analyzed in detail as these are crucial concerns in the whole study overall and they have been prime focus of the study and interview for primary data collection. Researcher didn’t ask the respondent as to what scores they would like to impute to the factors discussed but the researchers have themselves done this job in the backdrop of responses extracted. Researchers have attributed certain scores to the nature of responses i.e. from scores of 1 to 5. The level of scoring actually depicts the following statuses.

5: Absolutely certain.

3: Neutral.

1: Absolutely deny.

Variables which have been considered pivotal while interviewing and while putting scores in the matrix are as follows, along with the scores assigned to each one of them:
<table>
<thead>
<tr>
<th>Code</th>
<th>Variables</th>
<th>Importance Scores (y-axis)</th>
<th>Performance Scores (x-axis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Infrastructure Innovation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>Service Innovation</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>System Innovation</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>Achieving sustainability</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>Achieving Knowledge Mobility</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>F</td>
<td>Achieving Innovation Appropriateness</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>G</td>
<td>Achieving Network Stability</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>H</td>
<td>Achieving eco-goals</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>I</td>
<td>Interconnectedness of Activities</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>J</td>
<td>Information Flow for Network Stability</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>K</td>
<td>Conflict Resolution</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>Implications of energy efficiency on social norms</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>M</td>
<td>Achieving Environmental Stability</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Following sections put the findings against preconceived notions in the wake of secondary research and there scores on the matrix have also been elaborated:

5.3 **Core elements of the project:**

As per the findings, Infrastructure Innovation has been dealt with utter detail orientation on the part of hub firm and this is why the scores associated to them have made the Infrastructure Innovation take place in 2nd quadrant. Service Innovation has also been looked after by the hub firm with somewhat delicate underpinnings of low performance as per the findings so this variable has also been positioned in the 2nd quadrant. System Innovation has also scored well in accordance with the matrix and this variable has assumed place in 2nd quadrant again with scores of importance on 5 and performance on 4.
5.4 Achieving sustainability

Hub firm has been successful in achieving sustainability overall in the project as it has been seen in the empirical study and through the perusal of literature. There have been meetings and proper flow of communication in order to sustain the project’s viability in the long run so this factor has gained presence in 2nd quadrant again with both the scores of 5 on the part of importance and performance.

5.5 Managing Knowledge Mobility, Innovation Appropriateness and Network Stability

5.5.1 Knowledge Mobility

We know from various literary sources that mobile knowledge, which is easily accessible by members of innovation networks, where knowledge tends to reside over a diverse platform at different places, is an essential booster to innovation activities. While analyzing Victoria research center as an orchestrator in regards to ISET program, it can be seen that it has made substantive efforts to make sure that the knowledge is accessible to all its network members, their main aim being behind these efforts to achieve the digital service for consumers for future. In fall 2009 in a key innovation event towards common design in innovation network was held under Victoria`s supervision. These phases have been carried out in efforts to sustain the ISET project at such infant stage. Stakeholders and hub firm took special care about enhancing knowledge mobility by focusing on techniques like knowledge absorption, network Identification and inter organizational socialization.

Under this event various partners came together to share expertise and knowledge and identify a rich picture of the problem situations. As a result there were many workshops and interviews conducted during the process due process. This event was characterized by their abilities to recognize, manipulate and incorporate knowledge extracted from the environment. This event also helped Victoria to absorb relevant knowledge from the various members and inculcate it
into its network. Another example of Victoria trying to mobilize knowledge throughout network is that, it consulted Dart – group which is a firm offering high technological communication aids and their different component method software’s, intervention programs and communication strategies, as one of its source to help Victoria formulate a platform or a framework through which knowledge can be robustly transferred.

Taking further their efforts to deliver their goals in achieving sound mobility in late 2009 they stimulated interaction and knowledge transfer by the use of modeling techniques, business language and workshops. It has been deduced from the findings that as an orchestrator Victoria Institute was well aware of the issue regarding whether the members would be ready and eager to share the knowledge in order to create value because in spring 2010 when the ISET program had started Victoria confirming its activities as an orchestrator identified actors, gave well defined roles for the members and formulated procedures that are understood and trusted by all in order to ensure willingness of the members to share knowledge within the network. Infrastructure Innovation was the first phase of ISET program it can be considered Victoria Institutes’ biggest effort to achieve knowledge mobility. This phase was reined over three years’ time in total (2009-2011), where the main idea behind it was to develop a digital arena in which different actors can publish their data to the third party developers who will be responsible to develop the consumer service prototype in future. It was a digital platform, where multiple parties could publish their API’s, could interact with different data owners and third party developers. This was a huge step by Victoria towards their future goal and made it easy for the network members to actually share the knowledge with each other.

As theory argues it is very essential for the hub firm to focus on three specific processes to enhance knowledge mobility which are; Knowledge absorption, network identification and inter organizational socialization and along with these it is hub firm’s job to make sure that as the network expands and become complex members are willing to share knowledge and that they have adequate ability to share knowledge. It has been observed during the primary data gathering phase that Victoria got through all of them. As an orchestrator, it has definitely made sure by the
help of Samtrafiken that the members have an adequate platform in form of a digital infrastructure to share knowledge. It has also ensured willingness of the members to share knowledge by encountering different activities like establishing a common network identity on the digital platform so that everyone is motivated to share knowledge. It has also secured great deal of inter-organizational socialization by the help of DART group initially by establishing business language and then Samtrafiken after their infrastructure innovation phase.

It can be construed in general manner that Victoria as an orchestrator’s mind would have been putting special focus on the absorbing capability of their members. Their mobile Knowledge is well absorbed by the members, one can say that only then they were able to get the knowledge and information through entire network and achieve the level of innovation they have achieved till today, but there is not enough evidence as to what exactly Viktoria Institute being an orchestrator does or what are the ways they imply to ensure that the knowledge which they have made mobile across the network is actually being utilized in the desired way. It concerns us since they promote the concept of multiplexity which signifies that the network is expanding and growing more complex through additional relationships within the network. There is not much transparency as to how Victoria is ensuring knowledge absorption as the network grows more complex or what are those techniques or strategies which is helping them with this particular process. This is the reason that researchers have imputed scores of 5 and 3 on the basis of importance and performance respectively.

5.5.2 Innovation Appropriability

It’s been observed that Victoria Institute, as an orchestrator, believes in the principle of reciprocity and building of trust among its network members rather than just mere signing of lengthy binding contractual agreements with its members in order to ensure appropriability. In the wake of rigor that researchers have put into primary and secondary data collection phases, it can be stated that on the part of conception of ISET made significant efforts to strengthen its appropriability regime by adopting various trust building techniques. In 2010 when the ISET was
about to get commenced, an attempt was made to build an alliance among the network members, by defining roles of various actors and managing the violation agreements among the members to mitigate problems regarding free riding and opportunistic behavior among the members. Provided by Samtrafiken, under the Infrastructure innovation phase, it is observed that Victoria Institute as an orchestrator paid special attention to the process of adding new business partners to the network. This is the reason that researchers have imputed scores of 5 and 4 on the basis of importance and performance respectively.

There were kept various discussions and agreements were made with the existing members on how to achieve the procedural justice to that particular process, additionally there were introduced agreements to intellectual property right for the safeguard of their member’s interest. In this way the hub firm might have built upon their efforts to inculcate additional reciprocity and trust among their members. The internal mechanism of Victoria institute to maintain appropriability is by the dint of a General assembly which addresses to all problems regarding innovation appropriateness. In order to maintain the procedural justice they have enabled multilateral communication among their members and hold a full account of final decision on tough situations. Researchers see through the evidences that Victoria by establishing a developer zone - where APIs are to be published for third party developers - is adapting to the concept of joint asset ownership. With help of joint asset ownership, APIs and publications assets are co-owned by all the members of their network. All of the proceedings are subject to a mutual hostage by all the members so no one can take advantage of one another, this also helps Victoria enhance their commitment towards a shared goal.

5.5.3 Network stability

The first key event to be held under the ISET context in 2009 was first fund approval from Sjuharads Kommunal forbund (7H), in this event work packages were defined as an attempt towards systematic progression of the program, fund approval applications were sent and stakeholders were identified. As per the extracted findings, it’s been assessed that Victoria emerged as
a market leader, performing as a central binding body, managing stability of the network during establishment of an innovation cluster system, which helped it gain a good reputation. It was an important step in achieving network stability as an orchestrator, as theory signifies that when a hub firm attains an increased reputation it gives out positive signals to network members and helps the hub firm to form a ground to build future trusts, because in an innovation network there remains a lot of uncertainty regarding the output of the innovation processes as well as uncertain behavior of other parties involved in such processes.

So in this case a hub firm emerges as a prominent trusted body, which tends to bind members against violation of agreements in an innovation network, especially at an infant stage that Victoria was at that time so it is conceivable that it was a smart strategic step taken by Victoria. Once their funding was approved by Sjuharads Kommunal forbund (7H) they wisely got them to join their network as network members. According to researchers, this is a smooth example of multiplexity which is in itself a smart move in accordance with orchestration. In another event conducted under Victoria Institute`s supervision in 2009 towards “innovation network design actions” the aim behind this event was further funding for the program, so that the planned innovation activities from 2009 to 2013 can start off.

Analyzing Victoria Institute`s behavior, it can be said that Victoria was trying to attain dynamic stability by depicting a rich picture of the problem situation to all its stake holders through joint thinking process. This helped them build a common vision between all the stakeholders and the network members. This also would have added to their confidence in Victoria Institute as an orchestrator. In their efforts to strengthen their position as a hub firm and to augment their reputation among member, Victoria in another key innovation event aimed for additional funding for one of their key areas related to service innovation in fall 2009. They took an initiative to work on a prior study focusing on mobile service for ridesharing which elevated the multiplexity concept and added further to attainment of network stability. By spring 2010 Victoria Institute had officially started the ISET program, by identifying the roles and setting rules and procedures
for the network members, at this point Victoria aimed to collaborate further with various partners from national interest and interested parties from other regions by the end of 2010.

Basing on the analysis, it can be considered that Victoria as an orchestrator with a strategy to improve its reputation as a hub firm in the network has achieved stability earlier, in accordance with benchmarks, than other orchestration actions such as knowledge mobility and Innovation appropriability. It is also observed that Victoria has been taking initiative to network stability on two levels of the project phase first where it attempts to achieve stability and the other where it tries to maintain the stability achieved. For instance Victoria is supervising six work packages under its ISET umbrella, for progress checkups they conduct monthly meetings with the heads of each work package to catch on with their current status and resolve problems for them. In 2011 ISET had achieved one of their milestones in the name of travel hack event under their service innovation phase. It was conducted under Trafiklab (one of the network partners) of Victoria in relation to ISET.

Victoria research center decided to provide data and governmental ambitions to third party developers in order to achieve a prototype of a future digital consumer service which would attain sustainably through everyday travel. Under the name of Travel Hack there was set a competition. This Event was huge success; hence it is observed that stability maintaining strategies and activities employed by Victoria research center were effective enough to work for them at that time. This event required a lot of collaboration over months and conduction of workshops which finally paid off for them. However there still is not much evidence that utilizing only meeting and portals and other digital platforms can be hailed as best practices in network stability. This is the reason that researchers have imputed scores of 5 and 4 on the basis of importance and performance respectively.

As theory quotes when the network grows as progression to project`s life cycle efforts to multiplexity and innovative activities make it quite challenging tasks for the orchestrator to find
the right balance between attaining stability and obtaining value from operations. Hub firm tends to strike balance by forming more complex ties with its members and achieving value from innovative initiatives. It is hard to ascertain certainty levels in such kinds of projects since they have not been stable in this regard. This also might lead to problems with or within the network members such as network attrition, cliques, migration and isolation problems which add to network instability; they are resolving these issues by coordination and meetings. Under the light of such theoretical base it can be stated that Victoria as an orchestrator pursing to maintain network stability might need to strategically enhance their current strategies in future time in order to boost value creation through innovative activities as well as mitigate network instability creating factors.

5.6 Achieving eco-goals

On the part of achievement of eco goals the scores have been 5 and 3 on scale of importance and performance respectively. The importance is being exercise by the hub firm but the gauging of all the progress has not been possible to a realistic level so the performance has scored lower in this regard. Eco goals’ achievement has gained position in the 2nd quadrant resultantly.

5.7 Interconnectedness of Activities

Activities and efforts have been interconnected well with each other through meetings, coordination and proper flow of communications. Interconnectedness of activities has assumed position in 2nd quadrant again due to good performance on this part.
5.8 Information Flow in Network Stability

Flow of information as stated above has been remarkably taken care of by all the stakeholders under aegis of hub firm. Flow of information has been considered to take place in 2<sup>nd</sup> quadrant again since the performance has been at par with the importance criterion.

5.9 Conflict Resolution

With respect to conflict and conflict resolution mechanism it has been observed and analyzed that hub firm in itself as not been robust enough to tackle the issues. This is the reason that this factor has scored lowest of all on the scale of performance against importance in the matrix. Now the factor discussed has taken position in the 1<sup>st</sup> quadrant which says that the factor doesn’t enjoy more emphasis with regard to prioritization and requires more concentration for progress.

5.10 Implications of energy efficiency on social norms

The implications have been successfully translated into the social norms’ modification since stakeholders are all ears to the developments in the specified direction of the project’s goal but due to few inadequacies the score on performance has been 3 out of 5 against the importance of 5. Therefore the implications’ part has assumed place in the 2<sup>nd</sup> quadrant.

5.11 Achieving Environmental Stability

This concern also has got a position in 2<sup>nd</sup> quadrant for the hub firm’s good performance on the above mentioned. Environmental stability is underway and the progress has not yet been remarkably well but is going to be sooner than later.
Hitherto progress of the project with respect to hub firm’s efforts has been depicted by the diagram below courtesy Hjalmarsson and Lind (2011):

![Diagram of ISET launch over time]

Figure 2 Launch of ISET over the time (Hjalmarsson and Lind, 2011)

With respect to details above, all the scores have been tabulated in the Importance Performance Matrix as follows, the alphabets signify the factors as put in the grid above which explain it all for the readers to understand:
Figure 3 Performance
6 Discussion

The discussion part is reflection of all the facts and figures that have been extracted from the primary and secondary data and have been analyzed in the previous sections. As it has been mentioned and discusses in detail, the institute chose to serve the purpose of this research is Viktoria Institute Research Center. This institute is basically the mainstay of the work as it’s worked as a hub firm in the ISET project. As far as the role of institute is concerned, it was to achieve the predetermined goal of revitalizing the local transportation pattern with ample concerns of environment sustainability infused in the project. ISET project has network orchestration phase as part and parcel and this research is riveted on this very area and challenges it poses to the hub firm and stakeholders. In order to carry out and complement this research, qualitative study mechanism is employed by the researchers. All the relevant areas of the subject have been worked upon through interviews and perusal of peer reviewed research papers and articles so much so that the emphasis on three major pillars of network orchestration automatically got honed as per the need of the research domain.

It was preferred to carry out one interview with a key stakeholder and member of the hub firm since the focus was to extract data from inside source in order to scrutinize the secondary data and analyze and discuss the findings in the end. The objective of the interview was to see as to how the Viktoria Institute uses the previous researches and make a practical infrastructure or model for the communication in the network among different actors in the network orchestration in their innovation network.

In accordance with Dhanraj and Parkhee (2009) resources created by sharing of knowledge independently within entities don’t get at par with those created within the limitations of hierarchical setup of independence of knowledge sharing entities. The hierarchical mechanism is organizations play a hindering role since the unity of command tends to keep the individuals’ discretion at bay within the partnering organizations. The independence within the network for partner organizations create an aura of synergy which Dhanraj and Parkhee (2009) hail as necessary for growth of the network in the long run. Synergy leads to valuable innovation for the
network altogether. With respect to the identified challenges in the sections above following is a brief account:

Maintaining ease in the knowledge flow throughout the network, especially when the network is dynamic and growing - It was the first goal identified against the domain of knowledge mobility. This is one of the main areas that hub firm has to concentrate upon and the network is believed to be served well if the mobility of valuable information enables the stakeholders come up with effective innovation process. Hargardon and Sutton (1997) are of the view that there could be solutions privy to a particular group which ultimately can solve the problems related to other groups. This is very significant for stakeholders to construe that amalgamation of ideas through sharing of information actually open avenues for them to solve issues multilaterally. Various isolated solution and ideas might appear as substantial source of solution when united or merged together under aegis of hub firm. This is all possible only when the hub firm as well as the partnering organizations afford substance to maintenance of information flow within the network.

It is therefore considered one of the primary tasks entrusted to hub firm that it maintains ease in knowledge sharing. Victoria Institute playing their role as an orchestrator has tried to maintain the ease through various ways such as by conducting collaborative events, workshops and interviews at different times where different stakeholders could come together to share their tacit knowledge so that their process of innovation activities may flourish. Other challenges which were identified by the researchers earlier in the work are ensuring adequate knowledge absorption in the innovation network among multiple actors and network identification along with inter organizational socialization and ensuring that the members of the innovation network are motivated enough to share knowledge in the network and ensuring that each member, along with every new member has an adequate ability to share knowledge. As the nature of descriptions are self-depicting, hub firm in the network orchestration phase has to have certain level of power to exercise the need of allowing maximum sharing of data and knowledge among the members of network.
These are also imperative tasks for an orchestrator to make sure of because if the widespread knowledge is not absorbed by the network members, the much desired innovation might not even take place. If the members of the network do not share knowledge or do not have uniform platforms to share their knowledge this all may cause potential threats to the flow of information which could result in inadequate innovation process. In order to tackle the mentioned challenges Victoria Institute has come up with a digital arena in which all the parties may publish their APIs which are then accessible throughout the network; they have deployed the common identity concept within their innovation network which overrule the free riding problem and keep their members motivated to share knowledge. They also have promoted inter organizational socialization through collaborative different events under ISET like `Travel hack` in which multiple parties come together to achieve the goal of sustainability through mobile applications. To make sure that the knowledge is absorbed again Victoria conducts regular meetings to make sure that all the members know what they are supposed to know and are at par with current progression of the project. These Practices can be generalized and adopted by other orchestrators.

Knowledge mobility, after having been taken care of, begets attention towards Innovation Appropriability which is an ensuing step. Hub firm must take this step to ensure that the value created is distributed equally and that it is perceived as such by the network members. This surety is, more of than not, quite complicated as the factors that chip in with problematic nature include such as free riding and opportunism. Appropriability, therefore, is a central concern in the process of innovation in a network. Some of the challenges which already have been identified include - ensuring safe knowledge transfer within the innovation network to decrease commercial exploitation of innovation ideas. It was achieved by the hub firm via plethora of contractual agreements with the network members while building trust among the members that ideas would not be hoarded for the short term gains of members in isolation.

It is with establishment of sanctions on hoarding of ideas that network orchestration can bask in virtues of innovation stability. There have also been steps such as maintaining joint asset
ownership and reciprocity to prevent problems like free riding and opportunistic behavior among
the members and maintaining bilateral communication among the members in order to insure
procedural justice. All of these factors are instrumental in making hub firm achieve innovation
appropriability. It is responsibility of the hub firm to maintain check and balance on the part of
knowledge sharing and absorption. It is to be monitored by the hub firm as to who is producing
what in terms of knowledge in order to protect the rights of its producer and prohibit the problem
of free riding. In absence of such monitoring it is likely that the members of the network will be
hesitant to share their knowledge or would hoard on ideas thus affecting the overall process
adversely in the long run.

If the orchestrator fails to establish procedural justice and built trust among its members, the
innovation network becomes vulnerable to chaos and eventually fails to serve its purpose. That
is why joint asset ownership is defined as one of the keys to ensure innovation appropriability
since everybody has some stake in something and resultantly or naturally they guard it against
any wrong. Victoria Institute, as it has been observes and analyzed in previous sections, as an
orchestrator believes in the principle of reciprocity and building of trust among its network
members rather than just mere signing of lengthy binding contractual agreements with its
members. Hub firm, in such a way ensures appropriability. In order to maintain the procedural
justice they have enabled multilateral communication among their members and hold a full
account of final decision on tough situations. They have also introduced agreements to
intellectual property right for the safeguard of their member`s interest in the digital arena where
each member can publish their APIs as an effort to achieve a concept of joint asset ownership
within their network.

In view of Lorenzoni and lipparini (1999), the more unstable the network is the lower networks
value creation becomes. A lot of things can contribute to network instability, such as previously
discussed, poor knowledge flow, free riding problem, hoarding of ideas or mere non
trustworthiness of the network members of the hub firm itself, Some other resultant issues which
can leverage instability can be for example if the members form cliques against the hub firm, or migrate to other competing networks just because they think they are more into creating value, therefore there arise many challenges for the hub firm as it emerges to attain a stable network and as it progresses further to maintain the stability previously achieved. Some of the challenges that are identified earlier under this sub process of the network orchestration are ensuring a dynamic stability, whilst maintaining a good reputation within innovation network, preventing problems like, isolation of members within a network, migration of key members to other competitive networks and maintaining stability achieved, coping under the concept of multiplexity, where multiple partners may enter or leave the network.

As Dhanraaj and parkhee (2009) have discusses in their paper that these problems can be handled by several such as If the hub firm enhances its reputation as trustworthy orchestrator, members of the network would look upon them if something is bothering them, If a hub firm has a strong reputation of a market leader, new emerging members looking for legitimacy in market place would join them, them the hub firm might also have the power to `cast a shadow of the future´ on the present scenarios, where they can motivate people towards the future success and modify the behaviors of the members to everybody’s benefit. Network stability is enhanced the longer the shadow of future is since forward looking expectations of benefit prohibit members to violate the agreements within the network. Some other ways which can help cope up with these challenges can be by introducing the concept of multiplexity where members can have more than one relationship with other members in a network in regards to projects or various tasks, this can help them aid better relationship and trust building among the network members which will eventually leverage the stability of the network.

As facts are lined it has been analyzed that Victoria Institute emerged as a market leader, performing as a central binding body, managing stability of the network during establishment of an innovation cluster system, which helped it gain a good reputation. We see in another effort Victoria undertook as an orchestrator managing the stability of the network was by increasing the possibility of multiplexity, again by arranging collaborative events like travel hack and different
workshops for their members as their operations have been progressing. Being analysed Victoria Institute’s behavior we think that Victoria has tried to attain dynamic stability by depicting a rich picture of the problem situation to all its stake holders through joint thinking process. This helped them build a common vision between all the stakeholders and the network members. This also would have added to their confidence in Victoria Institute as an orchestrator and helped them cast a shadow of future in their members mind. We have also seen that Viktoria Institute in a way tries to monitor its member’s state of satisfaction through general assembly meetings where it can gauge any problems occurring and come up with remedial actions.

6.1 Evaluation of results

6.1.1 Validity

It goes without saying that each and every member of the partnering organizations in the network has significance as far as the gist of this research goes. All the members were contributive to the value of the work as researchers take pride in learning a great deal from the stakeholders in the networking organizations. The rigor and detail orientation of the research question actually puts it altogether for the researchers in order to enable them infuse direction and purposefulness to the study all along. Validity of the results is obvious in relation to the research question as matters have been discussed and analyzed in the very light of it. With help of empirical study, the researchers have been able to fathom into the relevant domains so as to come up with realistic findings and information thus validating the effectiveness of empirical study mechanism in the study so far. With the mapping of empirical and theoretical study in alignment with each other the validity of the study has been self-evident.
6.1.2 Reliability

With reference to the reliability of the used data in research, it has been verified and demonstrated in the work through proper Harvard Referencing system for quotations extracted and discussed from well reputed peer reviewers, scholars and researchers. The empirical study is duly assisted by the interview carried out from a member of hub firm and the interviews is recorded and well scripted simultaneously for the subsequent purposes.

6.2 Conclusion and Further Research

The research methodology was based on qualitative research philosophy and therefore the work has in it reflections of detail and insights that were extracted from thorough perusals of the relevant academic resources and through in depth interview carried out of a stakeholder. The focus of this research has been riveted on the activities and stakeholders’ performance on the part of achieving network orchestration levels desired by the said project i.e. ISET project. As it has been mentioned and discussed in the sections above, the three pillars of Knowledge Mobility, Innovation Appropriability and Network Stability have always been instrumental in materializing network orchestration and this research has amply focused on the mentioned domain and its been established through findings and analyses that hub firm i.e. Victoria Institute has been up to the mark as far as performance parameters and requisites are concerned.

A further research in the network orchestration needs to elaborate their actions and process more clearly in couple of years. The second area we feel to need more attention is: enhancement of functionality of the model presented by Danraj and Parkee (2006) to distribute knowledge among different actor and also study what effect it has on the network orchestration processes during the establishment of innovations factor under responsibility of the hub firm for the years to come.
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8 Appendix

8.1 Interview Question

1. What are the core elements of ISET program?

2. How do you achieve sustainability while communicating with different actors (Government, Supplier, Developer and Consumers)?

3. Hub firm (Viktoria Research Institute) is responsible for network orchestrations who are the parties which are responsible in different domain like (Managing Knowledge Mobility, Managing Innovation Appropriateness and Managing Network Stability)?

4. How you (Viktoria Institute) achieve the eco-goals while using this ISET program and by what percentage (eco-equity, eco-effectiveness and eco efficiency)?

5. The authors working on a small area of ISET program called Network Stability. Can you (Viktoria researchers) tell us that how hub firm interlink different parties while achieving sustainable innovation for every day travelling?

6. What are the key functions of Information Flow in Network Stability while communicating with different actors?

7. If there is a problem occur in Network Stability while communicating digital communication in ISET program so how the hum firm solve it?

8. How this ISET project changes the social norms of citizen to increase energy efficiency?

9. How do you apply this capability and aware people to achieve environmental sustainability?
University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the School of Business and IT (HIT), we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our courses in business administration give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our IT courses, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The research in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department's and university's unit for research-supporting system development.