Research project for the macro- and meso level analysis.
Course: Study Tour Preparation (188084; 2.5 EC)

Introduction

This document provides the details of Ohiariha study project regarding the macro and meso level analysis. A complete overview of the study project set-up can be found on www.scintilla.utwente.nl/commissies/src. Every participant puts in 2,5 EC of work which makes the total size of this part of the project 55 EC (21 participants, of which one participant does twice the amount of work as part of a minor course). Both parts, macro and meso, are approximately equal in size. In each study, one participant is the editor. The editor reads all group papers, provides feedback to the groups, writes the overall conclusion (which is the answer to the main research question) and edits the papers of the different groups in order to arrive at a coherent chapter.

The theme of the study tour is Emerging Technologies. The overall research question of the study project is (details at www.scintilla.utwente.nl/commissies/src)

What actors and factors influence the adoption of emerging technologies in Canada?

The desk studies will be carried out by using two models: PEST for the macro study and Porter's Diamond for the meso study, see the two handouts.

Emerging technologies

Once a new technology has been invented it goes through several stages of adoption. Considering a new technology as an innovation, Rogers [1995] has developed a theory for the diffusion of innovations. He defines an innovation as an idea, practice or object that is perceived as new by an individual or other unit of adoption. He distinguishes the following types of adopters of an innovation: innovators, early adopters, early majority, late majority, and laggards.

In its life cycle, initially a technology is brand new and it has not proven itself yet. The innovators start adopting it, followed by a small group of early adopters, who take the risk of adopting the technology for use in their products. When the applications of the technology appear to be successful, more and more companies will implement the new technology into their products (early majority and late majority). In the end every company will use it. At this point, the innovators and early adapters are usually already working on implementing the next emerging technology and in this way they try to stay ahead of their competitors.

The theme of this study project is emerging technologies, implying that we focus on the first stage of the adoption of technology. At the start of this stage the technology is brand new without any available products and at the end of the stage there is a small number of applications of the technology (by innovators and early adopters), but it is not yet widespread. Examples of current emerging technologies that are in the beginning of the first stage of adoption are UltraWideBand, 3D-displays and fuel cell cars. Some examples of emerging technologies that are coming close to the end of the first stage of adoption are Blueray/HD-DVD, UMTS and E-paper.

Macro-level research

The macro level research consists of six tasks. Not every task requires the same amount of research. This distribution was found to be favourable in the previous study tour of Scintilla, named Shouraizou. The distribution of work is as given in the table below:

Group	Total study load [EC]	Number of participants	Number of words
International politics	5	2	5 000
National politics	5	2	5 000
International economics	5	2	5 000
National economics	5	2	5 000
Socio-cultural, technology, history and geography	5	2	5 000
Editor	2.5	1	2 000
Total	**27.5**	**11**	**27 000**

In view of the overall research question the focus in the macro study is on the actors and factors that *could* influence the adoption of emerging technologies, because we do not discuss any specific technologies yet.

Assignment 1: Editor macro-chapter

Research question: What are important actors and factors in society that could support or inhibit the adoption of emerging technologies?

Assignment 2: International Politics

Research question: What are important actors and factors in politics on the international level that could support or inhibit the adoption of emerging technologies?

Assignment 3: National Politics
Research question: What are important actors and factors in politics on the national level that could support or inhibit the adoption of emerging technologies?

Assignment 4: International Economics
Research question: What are important economic actors and factors on the international level that support or inhibit the adoption of emerging technologies?

Assignment 5: National Economics
Research question: What are important national economical actors and factors that could support or inhibit the adoption of emerging technologies?

Assignment 6: Socio-culture, technology, history and geography
Research question: What are important actors and factors in the socio-cultural (technology, history, geography) field that could support or inhibit the adoption of emerging technologies?

At the end of each of the studies a comparison will be made between Canada and the Netherlands. This comparative perspective, in the form of a table with the relevant characteristics, enables an overview of major similarities & differences between 'them' and 'us'. It also helps in identifying the key actors and factors later on.

Meso-level research

The meso level research consists of the 'sectors' in which companies, universities and institutes we visit in Canada are active.

The meso level research also consists of a workload of 27.5 EC. We think that most divisions require the same amount of research, but divisions 31 and 33 are rather small and are therefore assigned half the amount of research. Despite the fact that research institutes and universities are often addressed in the same breath, they play a significant and different role in the process of emerging technologies and therefore deserve two different chapters in the report. Therefore the distribution will be as given in the table:

Group	Total study load [EC]	Number of participants	Number of words
Division 31	2,5	1	2 500
Division 32/64	5	2	5 000
Division 33	2,5	1	2 500
Division 34/35	5	2	5 000
Division 73	5	2	5 000
Division 80	5	2	5 000
Editor	2.5	1	2 000
Total	**27.5**	**11**	**27 000**

The focus in the meso study is on the actors and factors that actually influence the adoption of specific emerging technologies. The meso research question to be answered by the meso editor therefore reads:

Assignment 7: Editor meso-chapter

Research question: What emerging technologies are relevant for the investigated sectors and what actors & factors influence their adoption by the sectors?

To define the sectors of industry, we use the ISIC Ref 3.1 class definitions. This can be found on the internet: http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17&Lg=1. The following divisions and underlying classes are relevant and interesting to our study project:

Assignment 8: Division 31

In the "Manufacture of electrical machinery and apparatus n.e.c." the classes mentioned below have our interest:
3110 – Manufacture of electric motors, generators and transformers
3120 – Manufacture of electricity distribution and control apparatus
(This contains control engineering.)
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Assignment 9: Division 32 and 64

In division 32 "Manufacture of radio, television and communication equipment and apparatus" the classes mentioned below have our interest:
3210 - Manufacture of electronic valves and tubes and other electronic components
3220 - Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy.

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From division 64 "Post and telecommunication" the following class has our interest:
6420 - Telecommunications
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Assignment 10: Division 33

From division 33 "Manufacture of medical, precision and optical instruments, watches and clocks" the classes mentioned below have our interest:
3311 - Manufacture of medical and surgical equipment and orthopaedic appliances
3312 - Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3313 - Manufacture of industrial process control equipment
In these three classes complete measurement systems consisting of sensors, actuators and control system are investigated.
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Assignment 11: Division 34 and 35
From division 34 Manufacturing" the class below has our interest:
3410 - Manufacture of motor vehicles
From division 35 "Manufacture of other transport equipment" the following classes have our interest:
3520 - Manufacture of railway and tramway locomotives and rolling stock
3530 - Manufacture of aircraft and spacecraft
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Assignment 12: Division 78
From division 73 "Research and development", the class mentioned below has our interest:
7310 - Research and experimental development on natural sciences and engineering (NSE)
This contains the activities of research institutes we will visit.
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Assignment 13: Division 80
From division 80 "Education" , the class mentioned below has our interest:
8030 - Higher education
In this class the activities and operation of universities that we will visit are studied.
Research question: What emerging technologies in the field of electrical engineering are relevant for the sector and what actors & factors influence their adoption by the sector?

Deadlines and presentation

Every research group writes a paper in such a way, that all papers together form a coherent chapter. This implies, among other things, that the English used should be adequate and that the text is suitable to be included in the study tour's preliminary report.

The process has been split up in two stages: preparing the draft papers and presenting them, followed by making the final versions. Therefore, two deadlines are necessary. At the first deadline, the draft versions of the reports are submitted. Then an oral presentation (10 minutes) of the research is given. After the presentation, there is time for questions from the other participants and the lecturer. With the feedback thus provided the groups then prepare

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the final version. By the second deadline the comments have been used to adapt the report. We have set the following time-table:

What	*When*	*Where*
Intro lecture	Tuesday January 23rd	5th en 6th hour in T4
Deelnemersreglement handout and signing	Tuesday January 23rd	7th hour in T4
Deadline hand in draft version research questions editor	Monday March 5th	Group Editor
Deadline hand in draft version of research report	Thursday the March 8th 18:00 hour	src@scintilla.utwente.nl
Presentation, feedback and question time	Monday March 19th Wednesday March 21st	6th - 8th hour in B1212 6th - 8th hour in T4
Hand in final research report	Friday March 30th 18:00 hour	src@scintilla.utwente.nl

Guidelines for writing the report will be provided by the committee. These guidelines will contain remarks on using references, the resolution of pictures, the use of plain text or a MSWord template. Then, at the end of June, in July and August the preliminary report will be prepared by the committee based on the contents of the participants' reports.