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A New Business Model with a Plan for Alternative Revenue Streams for Design Factory Global Network (DFGN)

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science (Technology)

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Objective of the study

The objective of this study was to develop a new business model with a plan for alternative revenue streams for Design Factory Global Network (DFGN). The term "alternative" in this context refers to revenue streams that will complement the current funding that comes from the Finnish government. At the time of writing this thesis, an important question which was under scrutiny was whether annual membership fees should be introduced to all members of the network.

Methodology

The grounded theory was used since there were no previous empirical studies on the research topic and there is a need to create a structured model based on the qualitative data. As such, the instruments of inquiry were interviews, observations and data from secondary sources.

Findings

The key finding of this research was that new members of the network were willing to pay annual membership fees with the expectation that they will get returns on their investments. Old members were not willing to pay annual membership fees but they were ready to provide financial support through other means. Data also revealed that there was a need for improvement in the governance guidelines of the network, especially as they relate to documentation and decision rights of all stakeholders.

Summary and Recommendations

As per the research objective, a new business model was successfully developed for Design Factory Global Network (DFGN). The model was based on Osterwalder's (2004) Business Model Canvas. The following recommendations were also made:

- Official documents should be signed as part of the registration process of new members and the rights and obligations of every member – new and old – should be made explicit.
- Only new members should be charged annual membership fees for a minimum of three years.
- An integrated web-based system should be developed to serve as one-stop-shop for Design Factory Global Network (DFGN).

Regarding the plan for alternative funding sources, the following revenue streams were suggested:

1. Companies pay annual subscription fees to join the "integrated system" platform
2. Companies pay to participate in the global students' projects
3. Companies pay to participate in short ideation challenges aimed at solving companies' mission-centric problems
4. Governments' funds for "special" projects
5. Members pay annual subscription fees to access ''advanced functionalities'' on the integrated system
6. A fraction of the income generated by complementors from users of the proposed integrated system
7. Philanthropic support from companies or wealthy individuals who are passionate about innovations in education
8. Endowment funds for innovation in education
9. Fees from special exclusive events during International Design Factory Week (IDFW)
10. Revenue from the alumni association of Design Factory Global Network (DFGN)
11. Generate revenue from non-intrusive data

Conclusion

The continuing increase in the membership of Design Factory Global Network (DFGN) suggests that academic institutions are beginning to realise the importance of interdisciplinary education that is student-centric and focused on solving real-world challenges.

Keywords: business model, Design Factory, Design Factory Global Network (DFGN), interdisciplinary education, business model innovation, community of practice, strategic alliance.	Publishing language: English

PREFACE

My personal motivation for this master's thesis topic stems from my experiences in Nigeria. Currently, education in Nigeria and most parts of the African continent is flooded with too much theory and few practical components. Consider having a degree in Engineering where students are required to spend five years in the universities. Upon graduation, largely due to insufficient relevant practical experience, most of these graduates find it hard to secure employment and even harder to use their skills for entrepreneurial or innovative purposes.

The lack of a framework that connects students and industries is one of the causes of the above problem. An educational approach that would solve this problem has to be student-centric and aimed at solving real-life challenges. By student-centric, I mean an educational approach that is genuinely interested in empowering students to develop sustainable innovative solutions to real-life challenges as they explore their passions. I am confident that an example of such educational approaches is the Design Factory concept.

Through this study, I wish to gain insights into how the Design Factory concept can be adapted to the context of Africa in order to deliver the kind of teaching and learning that will empower students to make positive contributions in their surroundings. Instead of complaining about the gross unemployment that plagues the continent, students and graduates will be converting problems into opportunities.

ACKNOWLEDGMENT

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1. INTRODUCTION

1.1. BACKGROUND

Every era of human history demands a unique type of education - and the schooling systems are expected to fulfil this need (Ecke, 2008; Mansilla & Lenoir, 2010). Today, the challenges we face as people are so complex that they require a different kind of education than what the majority of our colleges are accustomed to offering (Bokor, 2012).

Gone are the days when teachers are the main source of information for students. Nowadays, students have access to information anywhere, anytime - and perhaps, on anything including search engines, social media, Wikipedia, blogs and other mobile apps. Whilst the students may know how to source for information, the question is: have they learnt how to validate, synthesize, leverage, communicate, collaborate and/or problem-solve effectively with this vast amount of information? (Delafosse, 2017). It is therefore imperative that students must be empowered on how to correctly source, process and manage information in preparation for their future careers.

Research (EF Explore America, 2017) has shown that many of the top careers in 2012, did not exist in 2002 - e.g. telework manager, sustainability manager and social media strategist. It can therefore be reasoned that many of the jobs that today's students will do when they graduate, have not been created as yet. How then can our school system prepare students for the unknown future? In order for our school system to remain relevant, the education it provides must have strong focus on creativity, problem solving, innovation, civic engagement, communication, collaboration, accountability, exploration, initiative, leadership and cultural awareness (Delafosse, 2017; EF Explore America, 2017; Holley, 2009).

In view of the above, the "**Design Factory**" was launched in 2008. It was one of the three "factories" created to facilitate interdisciplinary education in Aalto University, Finland. The other factories are: the **Service Factory** and the **Media Factory** (Aalto Factories, 2017). These factories are strategic and visionary elements of the university and are expected to serve as platforms that bring people together from different organisations (both public and private, academic and non-academic) to solve problems in an informal and relaxed setting(Kemppainen, 2016; Oinonen, 2012; Rautavaara, 2015).

As an institution, the Aalto University started in 2010 as a result of the merger of three top universities in Finland: the Helsinki University of Technology, Helsinki School of Economics and the University of Art and Design. Prior to the official opening, the working title of the university was "Innovation University" – as it was part of the Finnish government's national strategy to infuse innovation into different areas of its economy. Aalto University aims to create "a better world through top-quality research, interdisciplinary collaboration, pioneering education, surpassing traditional boundaries and enabling renewal." (Rautavaara, 2015, p.14).

The Design Factory concept is an interdisciplinary platform where students, teachers, researchers, entrepreneurs and companies collaboratively solve real-world problems - in an informal and relaxed atmosphere. The initiative was a result of 15 years of experimental teaching of a product development course in an inter-disciplinary and student-centric manner (Oinonen, 2012). The primary aims of Design Factory are to promote co-operation between higher institutions and industry, facilitate the "learning by doing" philosophy and ultimately to serve as an agent-of-positive-transformation in the society at large.

Aalto Design Factory (ADF) started as an experimental passion-based co-creation platform for teaching, research and the application of product design (Oinonen, 2012). It functions as an innovation platform and has attracted a lot of attention from all over the world. Aalto Design Factory receives about 10,000 visitors per year (Aalto.fi, 2017) and, as of 2016, it has played a host to 20 Prime Ministers and 14 Presidents among other prominent personalities.

Other higher education institutions and research establishments from other countries are now adopting the "Design Factory" idea – as a potential solution to their problems. The number of Design Factories established outside Finland has continued to increase since 2010. Each of these Design Factories was adapted to the context and interests of the host institution while sharing the same passion for student-centric teaching and the hunger for establishing a passion-based learning atmosphere (Rautavaara, 2015)

In order to connect all the different Design Factories from around the world, Design Factory Global Network (DFGN) was created. Being part of the network makes it easy for members to have access to knowledge and resources which otherwise would have been out of reach. The history of Design Factory Global Network (DFGN) is originates from Aalto University, where the first Design Factory was established (Kemppainen, 2016; Oinonen, 2012; Rautavaara, 2015). Aalto Design Factory (ADF) therefore assumes the mothership of the network and also serves as its headquarters.

1.2.   RESEARCH SETTING

1.2.1. RESEARCH GAP

A lot has been written about the "Design Factory" concept and Aalto Design Factory. To mention a few, Oinonen (2012, p.17) conducted a study to "analyse what the concept of Design Factory really is, and how it can be internationalised as a service". Kemppainen (2016) investigated how the concept of education-as-a-service changes depending on the type of partnership through which it is exported. In her thesis, Rautavaara (2015) compared the professional skills and expertise of product developers with the intended learning outcomes and student experiences of the Product Development Project (PdP) course.

As far as I know, no research has been conducted on the business model of Design Factory Global Network (DFGN) before now. The model that was originally designed for two institutions - Aalto University, Finland and Tongji University, China - has since evolved into an international network that now caters for over twelve institutions from all over the world. Scholars (Bent, 2016; Mäkelä & Lehtonen, 2016; Tapscott, 2001) define a business model as how an organisation creates, delivers and captures value. Given the continuous growth of the network, the need for a deliberate business model has become more urgent that ever. This thesis thus aims to fulfil this need.

In addition to the above, this research also contributes to the on-going discussion on the needs for an interdisciplinary approach in the education offered by schools today.

1.2.2. RESEARCH OBJECTIVE

This study was commissioned by Aalto Design Factory (ADF). The objective was to develop a new business model with a plan for alternative revenue streams for Design Factory Global Network (DFGN). The term "alternative" in this context refers to revenue streams that will complement the current funding that comes from the Finnish government. At the time of writing this thesis, an important question which was under scrutiny was whether annual membership fees should be introduced.

Although the term "new business model" is used, to the best of my knowledge there is currently no official "old" or existing business model of Design Factory Global Network. Therefore, in order for me to achieve the objective of developing a "new" business model, it is crucial that I understand the current processes, activities and what constitute the operations of the network. With this approach, it will be easier to understand the underlying assumptions and justifications of the proposed Business Model.

At the end of the study, I shall make recommendations as to whether annual membership fees should be introduced. Further, I shall suggest alternative revenue streams through which the network can generate steady income. The implementation of the income generating ideas requires changes in the current ways of doing things. These changes will inevitably have an effect on the new business model.

1.3.   STRUCTURE OF THE THESIS

This research work is structured into seven chapters:

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1. Introduction
      ↓
2. Literature Review
      ↓
3. Research Approach
      ↓
4. Data Collection and Data Analysis
      ↓
5. Empirical Findings and Discussions
      ↓
6. Recommendations and New Business Model
      ↓
7. Conclusion
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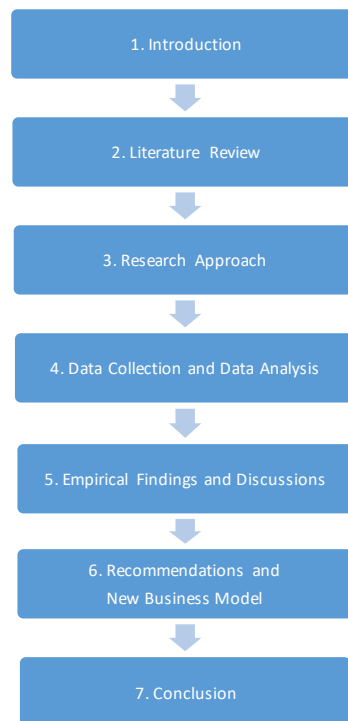
Figure 1: Structure of the study

Chapter 1 provides a context to the study and also makes explicit my research objective.

Chapter 2 is the review of the various literature sources associated with Design Factory Global Network, business model development and concepts such as multi-sided platform, strategic alliance, and community of practice.

Chapter 3 describes my research approach and why this approach was chosen.

Chapter 4 focuses on the specific method of inquiry used (the grounded theory) including the outline of how data is collected and analysed.

Chapter 5 details the empirical findings of the research.

Chapter 5 focuses on the discussion of the research outcomes and how they can be applied to the case of Africa.

Chapter 6 contains my recommendations.

Chapter 7 is the concluding chapter which also gives a summary and the limitations of the study. Ideas are also suggested regarding areas of future research. Finally, a suggested action plan is offered.

2. LITERATURE REVIEW

2.1.   THE GROWING NEED FOR INTERDISCIPLINARY EDUCATION

The boundaries between the different disciplines are disappearing at an increasing speed (Bililign, 2013). The demand to create a new generation of graduates who combine a rigorous disciplinary depth with the ability to reach out to other disciplines and work in interdisciplinary teams has become an urgent matter (Bililign, 2013; Bokor, 2012). Research (Carleton College, 2017) has shown that learning experiences are more authentic and of greater value when they reflect real life. In the real-world, the problems are generally more complex, multi-faceted and almost always require solutions that are multi-dimensional – looking from different perspectives.

Interdisciplinary education provides opportunities to strengthen the interaction between the academic communities and corporate organisations (Bililign, 2013; Bonchek, 2016). There is a consensus, among scholars and professionals, that the current schooling system is not doing enough to facilitate interdisciplinary collaboration – amongst other skills essential to the survival of the present generation of students.

In response, different interdisciplinary programmes are springing up across the globe. The aim is to prepare students for an increasingly interdisciplinary, collaborative, and global job market. One of such initiatives is the "Design Factory".

2.2.   THE "DESIGN FACTORY" AND OTHER SIMILAR INITIATIVES

2.2.1.   DESIGN FACTORY CONCEPT

The "Design Factory" concept may be described as an experimental passion based co-creation approach created to bring together students, staff, researchers, companies and entrepreneurs from all walks of life. The concept grew out of the Product Development Project (PdP) course and the Future "Lab" of Product Design (FLPD) research project.

The concept of "Design Factory" evolved from a series of experimentations of student-centric approaches to teaching and learning and encourages finding new ways of working, breaking down boundaries, and testing the limits of what is possible. The fundamental ideas include: need-finding, benchmarking, iterative prototyping and, support for interdisciplinary activities, how to enable effective brainstorming of ideas, design thinking, partnership with companies, development of "can-do" attitude, market research, electronic engineering, user testing, deep understanding of procurement stages of the product development cycle and the ability to see and treat challenges as opportunities for learning and innovation.

To sum up, the Design Factory concept is all about creativity, exploring one's passion, learning from mistakes and producing proof-of-concept prototypes.

2.2.2.   OTHER SIMILAR PEDAGOGICAL INITIATIVES

In my comparison of Design Factory concept and other initiatives, it should be noted that Design Factory as a concept does not offer any teaching on its own. However, the teachings in courses - such as Product Development Project (PdP) - that fully embody the Design Factory philosophies are what I refer to each time I discuss Design Factory teaching.

2.2.2.1.   NEXUS LEARNING – THE PHILAU "X FACTOR"

The "Nexus Learning" educational initiative has been introduced in the Philadelphia University, United States of America. It is one factor that differentiates the university from others and thus commonly referred to as the PhilaU "X Factor". The fundamental ideas that underpin the methodology revolve around the following four components: active, collaborative, real-world learning and the liberal arts (PhilaU, 2016).

Active: This learning approach emphasises "learning-by-doing" with real responsibilities place on the students to deliver value as the stakes are real – not merely classroom exercises.

Collaborative: This is about interdisciplinary education – bringing students from different levels and different programmes together. For instance, a team may be made up of first year and final year students from any of the academic fields within the university as well as teaching staff and company representative (Nexus Maximus, 2017).

Real world: The learning ensures a right blend of theory and hands-on practical experiences aimed at creating real value in the world for real companies.

Infused with the Liberal Arts: There is a strong connection between the various professional specialties like business management, law and architecture and classic liberal arts disciplines such as sociology and biology.

How is the "Nexus Learning" different from the Design Factory concept?

The Nexus learning is different from "Design Factory" concept in the following areas:

-   Only operational in the Philadelphia University
-   Offered alongside liberal arts
-   There is no pedagogical development training provided to teachers for their professional development
-   Many of the projects based on the Design Factory approach are offered in collaboration with teams from other Design Factories

2.2.2.2.   *IDEO/Stanford design process*

The IDEO/Stanford design process is a practice-based learning methodology (Stanford EXPE, 2017). Every year, interdisciplinary teams of students are brought together from different academic institutions - from around the world - to solve real-world product development problems in collaboration with companies. Participating institutions collaborate via Stanford University's ME-310 course. These teams are taught how to apply the IDEO/Stanford design process in solving the real-life product development challenge submitted by the corporate partners. These partners are usually international companies from different corners of the globe and they provide the funding needed.

By following the IDEO/Stanford design process, students would start by defining the problem in an iterative manner until they have found "needs" or opportunities that they can explore. The team benchmarks similar concepts and also goes into the field to try to understand potential customers. Having collected valuable data, teams engage in brainstorming sessions with a goal of generating as many ideas as possible.

Prototypes are developed to further explore ideas. The proofs-of-concept are taken to potential customers for feedback. Based on the feedback, further ideation and benchmarking may be necessary. The final proof-of-concept prototypes are usually featured at the Stanford Design *EXPErience* event in California (Sugar Network, 2017). Whilst corporate partners are provided with fresh and innovative ideas, the students acquire international exposure and a great learning experience in real-life projects.

How is the "IDEO/Stanford design process" different from the Design Factory concept?

Unlike the "Design Factory" concept, the IDEO/Stanford design process:

- As of 2017, the *"IDEO/Stanford design process" is about sixty (*60) years old whilst the "Design Factory" concept is around seven (7) years
- Only offered through the ME-310 course, on the other hand, the "Design Factory" is offered in about forty (40) courses in Aalto University alone.
- There is no pedagogical development training provided to participating teachers

2.2.2.3. *TIIMIAKATEMIA®* METHODS

Tiimiakatemia educational approach is based on learning by doing and derived from Nonaka and Takeuchi's knowledge creating theory, getting the experiences, sharing the experiences with the others, finding potential new solutions and testing those new concepts in practice (Luukas, 2017).

Tiimiakatemia is a degree program of about three years. The programme is fully face-to-face and does not contain teaching, only coaching. Learning is facilitated in a communal setting where individuals and teams learn from: each other, and older team companies as well as from the customers (Team Academy Amsterdam, 2017).

As self-directed learning, students plan the things they want to learn by preparing an individual learning contract which they would share with their teammates. The learning contract must have the following:

1. Where have I been?

2. Where I am now?

3. Where I am going?

4. How do I know that I have reached my targets?

The desired competences are developed by working in customer projects with the support of other team mates. All the team companies must find their own paying customers. Upon completion of any project, reflection is done at team level and the project team is always given feedback from the customers, team coach and from the team company members.

How is the "Tiimiakatemia approach" different from the Design Factory concept?

Unlike the "Design Factory" concept,

- There is a strong focus on entrepreneurship whilst "Design Factory" is relatively more generic
- Methodology is only operational in the TEAM Academy
- No formal classroom teaching
- Academic degrees (e.g. Bachelors) are awarded, with the "Design Factory" concept, grades are awarded for the specific course
- Learning is facilitated in a communal manner
- There is a stronger focus on commercialization of projects than Design Factory
- Many of the projects based on Design Factory approach are offered in collaboration with teams from other Design Factories. Team academies in different locations do not collaborate on projects

2.2.2.4.   BIO DESIGN

The Bio-design educational methodology is specific to the medical fields. It is aimed at taking health care to a higher level by providing an innovative entrepreneurial programme to selected interdisciplinary teams and by creating new businesses. The idea started at Stanford University and has spread abroad.

The interdisciplinary teams are immersed in clinics for between 4 and 8 weeks to observe their operations and processes. The goal is for the teams to identify as many "needs" as possible, usually between 100 and 200 – these are "needs" that have good business prospects. After immersion, the teams analyse and brainstorm the needs in order to determine the most feasible and profitable ideas. Eventually, one idea will be chosen and a solution developed for clinical use and commercialization (Biodesign Challenge, 2017).

During the development stage, the teams are assisted by mentors, coaches, and other relevant stakeholders depending on the topics or ideas. For example, the stakeholders may be clinicians, patient group representatives, scientists, engineers, IT experts, designers, and entrepreneurs. It is expected that, every year, at least one idea will be taken into production either in startups or existing companies (Biodesign Finland, 2017).

How is the "Bio-design" different from the Design Factory concept?

Unlike the "Design Factory" concept,

- "Bio-design" is specific to the healthcare industry
- There is a strong focus on entrepreneurship whilst "Design Factory" is relatively more generic
- Methodology is only offered in one course
- No formal classroom teaching
- There is a stronger focus on commercialization of projects than Design Factory
- There is no pedagogical development training provided to participating teachers
- Pedagogical experimentations are not encouraged as in the case of "Design Factory" concept
- Many of the projects based on the Design Factory approach are offered in collaboration with teams from other Design Factories. Bio Design centres based in different locations do not collaborate on projects

2.3.   DESIGN FACTORY GLOBAL NETWORK (DFGN)

2.3.1.   THE GLOBAL NETWORK– AT A GLANCE

As of the time of this writing, Design Factory Global Network (DFGN) was made up of thirteen (13) members. Every member was set-up to fulfil the needs of its host institution by serving as an innovation platform for local inter-disciplinary co-creation experiments and problem-solving (DFGN Atlas, 2016). Members of Design Factory Global Network (DFGN) are empowered to address their regional challenges from an international standpoint. Figure 2 shows the footprint of Design Factory Global Network (DFGN) across the globe.

Figure 2: Design Factories around the world (DFGN, 2016)

2.3.2. MEMBERSHIP OF DESIGN FACTORY GLOBAL NETWORK (DFGN)

The membership of Design Factory Global Network (DFGN) is still growing steadily. For the sake of brevity, I shall focus on Design Factories which participated in the study.

2.3.2.1. AALTO DESIGN FACTORY (ADF), FINLAND

Aalto Design Factory (ADF) is commonly referred to as a unique innovation workshop (Aalto.fi, 2017), and a place in which the disciplinary boundaries between technology, business and the arts are broken down in the spirit of creativity. A place in which students transform vague ideas into successful products. In brief, Aalto Design Factory (ADF) is a place where everyone gets their work done (Aalto.fi, 2017).

Opened: January, 2008
Location: Espoo, Finland
Parent institution: Aalto University
Official website: http://designfactory.aalto.fi/
Core-strength:

- o Aalto Design Factory (ADF) has its root in mechanical engineering.
- o It is also at the heart of pedagogical development within the university and has been organizing activities that would help Aalto University professors deliver better learning experiences. These activities include training in the use of certain collaborative tools and facilities as well as professional mentoring (DFGN Atlas, 2016).
- o People who are interested in trying out new teaching methodologies aimed at delivering student-centric problem-based learning, often come to Aalto Design Factory (ADF). It is common to see professors from various departments of the university co-creating and delivering courses to teams made up of students from different disciplines and even other universities within Finland (Rautavaara, 2015).

Programme:

- o Aalto Design Factory (ADF) hosts about 40 courses at its facilities including the Product Development Project (PdP) and ME-310.

2.3.2.2. DESIGN FACTORY MELBOURNE (DFM), AUSTRALIA

Design Factory Melbourne aims to empower students, professors and other stakeholders to create innovative solutions to real-world problems. The combination of Design Factory Melbourne and the Faculty of Health, Arts and Design serves as one of the largest clusters of design researchers and doctorate design research candidates in whole of Australia (Swinburne University of Technology, 2016). Students from different backgrounds - such as business, design, engineering and information technology – are usually brought together to form project teams hosted in collaboration with industry partners.

Opened: November, 2011
Location: Melbourne, Australia
Parent institution: Swinburne University of Technology
Official website: http://www.swinburne.edu.au/fhad/schools/design/design-factory/
Core-strength: The Swinburne University of Technology also serves as a host to the Australian Centre for Design Innovation (CDI) which was established to respond to the increasing demand for strategic and transformative design and development in the market. The goal is to increase the uptake of innovations resulting from design research (Swinburne University of Technology, 2016). By virtue of the close proximity, students therefore have access to the rare pool of talents as well as the sophisticated equipment.

Programme: Design Factory Melbourne currently offers three academic programmes: Mechanical Engineering (ME310), Product Development (PdP) and the Challenge Based Innovation (CBI) project – and they are all project-based courses offered with international collaboration (Swinburne University of Technology, 2016).

2.3.2.3.   DUOC DESIGN FACTORY (DDF), CHILE

The mission of the university is to train people of technical and professional skills to act with success in their work lives and with strong commitment to the development of Chile. The establishment of DUOC Design Factory is consistent with the overall goal of the university as it aims to stimulate creativity among its students through collaboration and inter-disciplinary activities (Rautavaara, 2015). DUOC Design Factory functions as a collaborative platform for students, teachers and businesses around creativity and innovation in Chile.

Opened: November, 2012
Location: Santiago, Chile
Parent institution: Professional Institute Duoc UC
Official website: http://www.duoc.cl/designfactory/
Core-strength: Nation-wide coverage with over 15 campuses in different geographical locations across the country. Its root is in industrial design.
Programme: DUOC Design Factory has a series of interdisciplinary courses that are offered as electives every semester (Duoc Design Factory, 2016). These courses are only available to advanced students from various schools of the institute. As an experimental platform, DUOC Design Factory has explored different course structures in its quest to provide a tailor-made education for categories of students. One of such attempts is an intensive short course taught to students in the evening (DFGN Atlas, 2016).

2.3.2.4.   IDEASQUARE, SWITZERLAND

IdeaSquare is a dedicated test facility at the *Conseil Européen pour la Recherche Nucléaire* (CERN) (Ideasquare, 2017) and it also serves as the section of the CERN that interacts directly with society at large. IdeaSquare aims to apply its advanced research capability for the common good of all people through community-centred projects.

Opened: December, 2014
Location: Geneva, Switzerland
Parent institution: European Organization for Nuclear Research (known as CERN: *Conseil Européen pour la Recherche Nucléaire*)
Official website: http://ideasquare.web.cern.ch/
Core-strength: CERN is the largest Physics research facility in Europe and one of the largest in the world (Allday, 2001). The scientists/researchers at CERN are some of the best in their fields and they regularly engage in collaborations with students, professionals, companies in various manners. (DFGN, 2016; IdeaSquare-CERN, 2016). IdeaSquare also provides students, professors - and other relevant stakeholders - opportunities to access the advanced scientific facilities and experts of CERN.
Programme: IdeaSquare facilitates programmes such as the Challenge Based Innovation (CBI) and Product Development Projects (PdP) for Master's level students. When not in use, IdeaSquare is often used for special events dedicated to innovation and rapid prototyping

2.3.2.5.   IED DESIGN FACTORY BARCELONA

IED Design Factory Barcelona is formed based on the partnership between three schools: ESADE Business School, Universitat Politècnica de Catalunya (UPC) and Istituto Europeo di Design (IED) - an Italian design school based in Barcelona. One of the objectives of IED Design Factory Barcelona is to facilitate strategic interdisciplinary collaboration between the three institutions and industry partners. IED Design Factory Barcelona is located on the campus of the ESADE Business School. The goal of ESADE Business School is to differentiate itself from competitors by offering management education driven by design methodologies with a strong focus on innovation and entrepreneurship.

Opened: As at the time of writing this thesis, IED Design Factory Barcelona is yet to be officially launched.
Location: Barcelona, Spain
Parent institution: ESADE Business School, Universitat Politècnica de Catalunya (UPC) and Istituto Europeo di Design (IED)
Official website: http://designfactorybarcelona.blogspot.fi/
Core-strength: IED Design Factory Barcelona is the first member of Design Factory Global Network (DFGN) that belongs to a Business School.
Programme: Courses offered at IED Design Factory Barcelona include Challenge Based Innovation (CBI), and PACK-AGE among others.

2.3.2.6.   DESIGN FACTORY JAVERIANA

The goal of Design Factory Javeriana is to strengthen innovation and entrepreneurship in the parent university by serving as a platform dedicated to experimentation, co-creation and innovation. Design Factory Javeriana will have spaces in the two campuses of the university at both Bogotá and Cali (Javerianacali, 2017)

Opened: As at the time of writing this thesis, Design Factory Javeriana is yet to be officially launched.

Location: Bogota, Columbia

Parent institution: Pontificia Universidad Javeriana Colombia (Bogotá)

Official website: http://www.javerianacali.edu.co/noticias/lanzamiento-nacional-del-design-factory-javeriana-colombia

Core-strength: Pontificia Universidad Javeriana Colombia is one of the top universities in Columbia. Design Factory Global Network can therefore benefit from the existing relationships that currently exist between the local industry partners and the university.

Programme: Courses are yet to be launched.

2.3.2.7.   DESIGN FACTORY KOREA

One of the fundamental goals of Design Factory Korea is to empower its students. Others goals are: to be able to develop solutions to the real-life problems through collaboration and exchange of ideas among students from diverse backgrounds and companies (Design Factory Korea, 2016).
Opened: April, 2015
Location: Incheon, Korea
Parent institution: Yonsei University
Official website: https://dfk.yonsei.ac.kr/
Core-strength: Design Factory Korea is rooted in the following three areas: technology, design and management. It is located in the midst of some of the biggest electronics multinationals in the world. Its roots lie in the Techno-Arts Division with its model of integrating design, technology and management (DFGN Atlas, 2016).
Programme: The courses offered at Design Factory Korea include the Product Development Project (PdP) and various Capstone Projects. The degree programmes offered at Design Factory Korea are spread over the following three major areas: Information & Interaction Design (IID), Creative Technology Management (CTM) and Culture & Design Management (CDM) (Design Factory Korea, 2016).

2.3.2.8.   INSIGHTS FROM THE NETWORK'S MEMBERSHIP

Looking at all the Design Factories, the following characteristics come across quite strongly: student-centred-ness, inter-disciplinary education, industrial collaboration, creativity-driven, hunger for innovation and the passion to make positive impact in the society. There is clearly a shared understanding and common ways of working among the various Design Factories and this is one of factors that enable effective collaboration among the members in spite of the differences in cultures, time zones and organisational boundaries.

It is also interesting to note that the various Design Factories have their roots in diverse fields of study. Take for example, whereas Aalto Design Factory (Finland) has its root in mechanical engineering, the Design Factories in Melbourne (Australia) and DUOC (Chile) stem from Industrial Design. Design Factory Korea is anchored by the Techno-Art Division (TAD), a division whose focus is on: technology, interaction design and management. IdeaSquare belongs to CERN, one of world's largest Physics research institutes.

The passion, strengths and focused-objectives displayed by each of the Design Factories give hope to the future of the current education system.

2.4.   BENCHMARKING: OTHER GLOBAL NETWORKS

2.4.1. SUGAR NETWORK

SUGAR stands for the **Stanford University Global Alliance for Redesign** (SUGAR). It is a global innovation network of educational institutions collaborating with companies to solve real-world product development problems. It is about 50 years old (Trinity College Dublin, 2017).

Target Customers:

- o   Interdisciplinary teams of masters level students are brought together from different academic institutions from around the world to build innovative solutions to design challenges from participating companies
- o   Corporate partners who are seeking fresh innovative ideas

Value Proposition:

- o   Fresh innovative ideas, detailed documentation and prototypes for companies
- o   International exposure and networking opportunities for students

Events:

- o   Every year, interdisciplinary teams of students are brought together from different academic institutions from around the world. These teams converge in Stanford University for a short period and are taught how to apply the IDEO/Stanford design process in solving the real-life product development challenge submitted by the corporate partners (Sugar Network, 2017).

Revenue Streams: Funds are provided by the corporate partners

Official website: http://sugar-network.org/sugar/getinvolved

2.4.2. THE UNIVERSITY INDUSTRY INNOVATION NETWORK (UIIN)

This is a vibrant network of academics, practitioners and business professionals passionate about advancing university-industry interaction, entrepreneurial universities and collaborative innovation (UIIN, 2017).

Target Customers: academics, practitioners and business professionals

Value Proposition:

- o Driving innovation and entrepreneurship in university-industry settings
- o Professional development: Developing the entrepreneurial mindset of university leaders and managers

Events:

- o Conferences
- o Professional development
- o Supported events

Revenue Streams:

- o Corporate membership fees
- o Membership fees Membership for a single academic or business representative

Official website: https://www.uiin.org/

2.4.3. GLOBAL INNOVATION NETWORK FOR ENTREPRENEURSHIP AND TECHNOLOGY

The goal of GINET is to create a Global Network of Entrepreneurial Programs among Academia, Industry, Research & Development Centers, Governments, Investors/Mentors, Multilateral Organizations, and Individuals/Visionaries/Entrepreneurs (serial and first time). The objective is for the identification of innovative ideas, services, applications, prototypes, products, and through strategic alliances with investors, industry and government agencies to bring these innovations to the marketplace (Jordan, et. al.., 2014).

Target Customers: Academia, Industry, Research & Development Centers, Governments, Investors/Mentors, Multilateral Organizations, and Individuals/Visionaries/Entrepreneurs (serial and first time).

Value Proposition:

- o The concept of GINET is to allow and provide a means for companies who operate outside the US market to access the US market and for companies that operate only in US markets to expand into international markets (GINET, 2017).
- o Serve as a portal for companies to access markets that they would normally not be able to access.
- o Help entrepreneurs develop their businesses and facilitate effective information exchange and resources through a broad international network where those involved can contribute to improve quality of life.
- o Bridges Academic Research, Government and Industry Research
- o Build capacity and technology transfer through identification of innovative ideas and through strategic alliances with investors, industry and government agencies, bring these innovations to the marketplace.
- o Foster global interaction among academic institutions to accelerate R&D from the laboratory to the marketplace.
- o Educate, promote, and encourage the generation of new products and services that can drive innovation and entrepreneurship.

- o Promote global entrepreneurship through GINET events such as capacity building, business round-tables, university-industry relations, investment activities, etc.
- o Facilitate international venture funding through GINET to sponsor brilliant minds and projects.

Events:

- o Networking
- o Mentoring of entrepreneurs and facilitation of needed training

Revenue Streams:

- o Individual membership fees
- o University membership fees
- o Corporate membership fees

Official website: https://www.ginetllc.com/

2.4.4. Ge4 NETWORK

The Global Education: Exchanges for Engineers and Entrepreneurs (Ge4) network is an international network of universities established with the aim of connecting academic engineering and management institutions worldwide.

Target Customers: Universities, staff members and students

Value Proposition:

- o For Universities: Provide excellent engineering and management universities as partners and be able to exchange students and staff with them.
- o For Staff members: Network opportunities with colleagues all over the world trying to improve your institutions international portfolio.
- o For Universities and their staff: Provides the perfect network to improve your internationality.
- o For students: research placements, internships, summer school and exchange opportunities

Events:

- o Annual Ge4 meetings
- o Sports competitions – Global Sports Innovation competitions

Revenue Streams: Membership fees

Official website: http://www.ge4.org/index.html

2.4.5. THE GLOBAL UNIVERSITY NETWORK FOR INNOVATION (GUNi)

GUNi is a network currently composed of 210 members from 78 countries, which aims to strengthen the role of higher education in society contributing to the renewal of the visions and policies of higher education across the world under a vision of public service, relevance and social responsibility (Guninetwork, 2017).

Target Customers:

- o higher education institutions, research centers in higher education, networks and other institutions

Value Proposition:

- o to serve as a support structure in helping higher education institutions achieve their visions for their societies

Events:

- GUNi Talks
- Conferences
- Publications – reports and academic articles

Revenue Streams:

- Financed by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations University (UNU) and the Catalan Association of Public Universities (ACUP).

Official website: http://www.guninetwork.org/

2.4.6. SOUTHERN AFRICAN REGIONAL UNIVERSITIES ASSOCIATION (SARUA)

An organisation that aims to assist in the revitalisation and development of the leadership and institutions of higher education in the southern African region. It is open to all the public universities of the 15 countries that make up the Southern African Development Community (SADC).

Target Customers:

- Top management and Higher Education Institutions in the Southern African region

Value Proposition:

- To strengthen the Higher Educational Institutions in the Southern African region, thereby consolidating an agenda for education which results in a significant contribution by Higher Education to national and regional development (SARUA, 2017).
- Offers a top-level university leadership programme for University Registrars and those with overall responsibility for the leadership of key professional and administrative functions (PULSAR Programme, 2017).

Events:

- Vice Chancellor Dialogue Exchange Events
- Executive Focus Events
- Vice Chancellor Leadership Exchange Event series
- Publications

Revenue Streams: Grants from governments

Official website: http://www.sarua.org/

2.4.7. CEMS GLOBAL ALLIANCE IN MANAGEMENT EDUCATION

CEMS is a strategic alliance of leading business schools and multinational companies. It aims to set a global standard of excellence for pre-experience Master's in management (CEMS, 2017).

Target Customers: Business Schools, staff members, students and corporate partners

Value Proposition:

- o Facilitates collaboration between the academic and corporate members to collectively develop knowledge and provide education that is essential in the multilingual, multicultural and interconnected business world.
- o Students joining the one-year CEMS MIM Programme benefit from exposure to: an international course experience in high rank universities and are given access to valuable professional and personal contacts through a close community

Events:

- o International Business Schools tour
- o Regional and local events such as conferences
- o Benchmarking meetings
- o Alumni mentoring

Revenue Streams: Corporate partnership, Alumni membership fees

Official website: http://www.cems.org/

2.4.8. INSIGHTS FROM BENCHMARKING

The following are some insights gleaned from the analysis of the above networks:

- Each of the above international networks has a clearly defined objective, scope and target audience. For instance, Ge4 (the Global Education: Exchanges for Engineers and Entrepreneurs Network) only targets engineers whereas SARUA (the Southern African Regional Universities Association) restricts its mission to the top-managers in Higher Education institutions. Networks such as GINET (the Global Innovation Network for Entrepreneurship and Technology) and GUNi (the Global University Network for Innovation) have more generic mission focusing on the entire educational landscape and audience.
- The events hosted by these networks are relatively similar to those of Design Factory Global Network (DFGN) and include: annual general meetings, conferences, talks, tours, networking sessions and publications. In addition, I found that some networks have alumni mentoring whilst others facilitate exchange programmes between their members.
- In terms of revenue streams, corporate partnerships and memberships fees appear to be common to all the networks – as in the case of Design Factory Global Network (DFGN). Nonetheless, I discovered that certain networks generate funds through other means e.g. alumni associations, grants from governments, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations University (UNU).

2.5.   THEORETICAL UNDERPINNINGS OF THE RESEARCH

2.5.1. COMMUNITY OF PRACTICE

A community of practice is a group of people who share a common concern, a set of problems, or interest in a topic and who come together to fulfil both individual and group goals (Cambridge, Soren, & Suter, 2005). It is often aimed at sharing best practices and creating new knowledge for the advancement of the specific domain.

The Purpose of Communities of Practice

Every Community of Practice must have a clearly defined purpose. This purpose should take into consideration, the benefits to the stakeholders and the specific needs the group intends to meet. According to Cambridge, Soren, & Suter (2005), the purposes of Communities of Practice revolve around the following activities:

- Develop relationships: At the core of any community are the relationships of trust, mutual respect, reciprocity and commitment. Building relationships with like-minded people is enough for many members to belong to a specific community of practice.
- Learn and develop a practice: A community may be formed with the aim of learning and developing a shared practice in a specific domain based on an existing body of knowledge.
- Carry out tasks and projects: A community of practice may be formed with the intention of carrying out a particular task or projects e.g. develop a model, compile cases on a subject.
- Create new knowledge: Creation of new knowledge (or redefining the boundaries) may also serve as the purpose of a given community of practice. In this type of community, members would go beyond the current practice to explore alternative – perhaps, cutting edge – approaches.

The Benefits of Communities of Practice
- Connect people: They serve as a platform that connects people who might not have had the chance to connect.
- Provide a shared context: They make it possible for people to share their stories and personal experiences in a manner that builds understanding and trust.
- Enable dialogue: Communities of practice create opportunities for people to come together, brainstorm, explore new ways of doing things, solve problems and create new and mutually beneficial opportunities.
- Stimulate learning: They may function as a ground where people learn from real life experiences, for example through coaching, mentoring, and self-reflection leading to authentic learning.
- Capture and diffuse existing knowledge: Given that a community of practice is a place where people share knowledge - personal experiences, insights and knowledge - it may therefore be leveraged to diffuse existing knowledge or "best practices" about a topic.
- Collaborative processes: Communities of practice make it easy for collaborative initiatives to be facilitated between members.
- Help people organise: Communities of practice may be used as tools for organizing people into groups or sub-groups around specific goals.
- Generate new knowledge: Communities of practice can go beyond the sharing of existing knowledge to the generation of new knowledge.

Lifecycles of Communities of Practice

Communities are organic in nature – they have lifecycles like most living organisms. The lifecycle phases of a typical community of practice can be described as follows (Cambridge, Soren, & Suter, 2005):
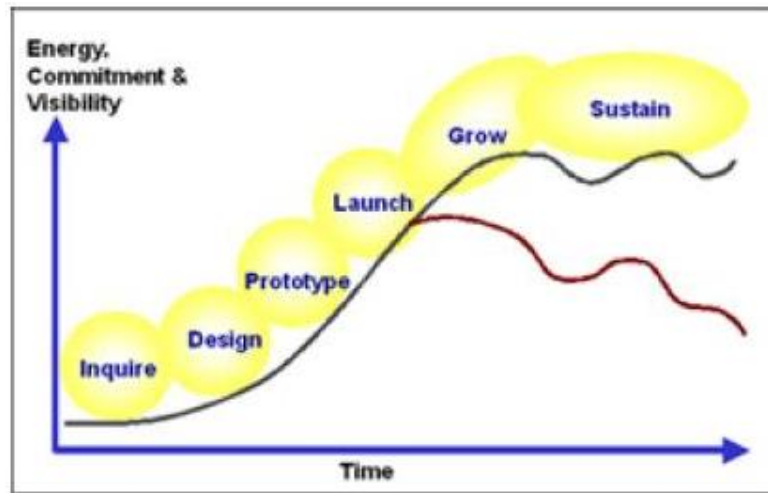
Figure 3: Lifecycle phases of a typical community

- Inquire: At this stage, different ideas are being explored, potential audiences are also being identified and the purpose, goals, as well as a vision for the community are being formed.
- Design: Once the purpose and vision of the community have been established, the activities and processes - among other structures - needed to support the community's goals, will be put in place.
- Prototype: An "experimental" or "pilot" version of the intended community is being implemented with a relatively smaller group or audience.
- Launch: Following the success of the prototype stage, the community is then rolled out to a much wider audience.
- Grow: As the community continues to stabilize and grow, activities will be initiated to facilitate more collaborative learning and knowledge sharing. This may take the form of group projects, and/or networking events that meet individual, group, and the network's goals while creating an increasing opportunity for participation and contribution.
- Sustain: In order to sustain growth and continually meet the expectations of members, at this stage, measures and controls will be put in place to cultivate and assess the knowledge and "products" created by the community to carefully re-invent its strategies, goals, activities, roles for the future.

In order to successfully build a community of practice, a deep understanding of the above lifecycle phases is crucial. Without a conscious attempt to navigate through each of the phases, momentum may be lost during the launch phase and the community may not reach the critical mass needed to be self-sustaining.

Online Communities of Practice

With technology connecting different people across the globe, it is therefore to consider the implementation of Communities of Practice online. Implementing an online Community of Practice is not a static action of simply "switching on" a software platform or technology. Rather the online Community of Practice should function as the *social architecture* of the community that augments the features of the traditional face-to-face meetings. In addition to opening new opportunities for members to communicate and collaborate, it will also enliven the whole community by serving as a platform which provides new possibilities in relationship building, collaborative learning, knowledge sharing and other entertaining activities.

The following figure gives an overview of how the core technical features of an ideal online community of practice may be aligned with the four primary areas of activity of most Communities of Practice:

	Relationships	Learning	Action	Knowledge
Core Technical Features	▪ Distributed account management ▪ Member networking profiles ▪ Member directory with relationship-focused data fields ▪ Subgroups that are defined by administrators or that allow members to self-join ▪ Online meetings/chat ▪ Online discussions ▪ User-controlled delivery modes for notifications and information ▪ Community activity reports	▪ Narrated PowerPoint presentations ▪ E-learning tools ▪ Assessments ▪ Web conferencing and webcasts ▪ Online meetings ▪ Online discussions ▪ Web-site links ▪ Interactive multimedia ▪ Variety of community member roles and responsibilities is supported	▪ Project management ▪ Task management ▪ Document collaboration ▪ File version tracking ▪ File check-in and check-out ▪ Instant messaging ▪ Web conferencing and online meetings ▪ Online discussions ▪ Individual and group calendaring ▪ Subgroup working spaces	▪ Keyword and full-text searches (site-wide and by section) ▪ Structured databases and database tools ▪ Digital stories ▪ Idea banks ▪ Web conferencing ▪ Online meetings ▪ Online discussions ▪ Announcements ▪ Web-site links ▪ Multiple modes for knowledge representation ▪ Resources directly associated with interaction

Figure 4: Core technical features of an ideal online community of practice (Cambridge, Soren, & Suter, 2005)

2.5.2. STRATEGIC ALLIANCE

A strategic alliance may be defined as a purposive relationship between two or more independent organisations that enables each to achieve specific strategic goals that neither would be able to achieve on their own. It often involves the pulling together of resources, exchange, sharing, or co-development of capabilities. Although they continue operating as separate organisations, the control over the partnership and the benefits are shared by both as they continue making contributions to the alliance until it is terminated (Study.com, 2017).

Benefits of Strategic Alliances

The advantages offered by strategic alliances can be broken down as follows (Study.com, 2017):

- **Organizational advantages:** A strategic alliance may be formed with the intention of acquiring certain skills or increasing production capacity through access to a larger distribution system. A strategic alliance partner may also provide complementary products or services that create synergy. In a similar vein, a relatively new player in a market, by having a strategic partner who is well-known and respected may gain legitimacy and creditability more quickly than those companies without a strategic alliance.
- **Economic advantages:** Strategic alliances make it possible for organisations to reduce costs and risks by sharing them across the members of the alliance. It is also possible to obtain greater economies of scale as production volume can increase, causing the cost per unit to decline. Further, strategic partners can take advantage of co-specialization in attempt to create additional value.
- **Strategic advantages:** Strategic alliances may also involve joining forces with rivals in order to access certain opportunities such as development of new technologies or to pursue joint research projects.
- **Political advantages:** To gain entry to some markets or overcome political barriers, it may be necessary to form a strategic alliance with local businesses that are politically-influential.

2.5.3. PLATFORM THINKING

2.5.3.1.   WHAT IS A PLATFORM?

A platform may be defined as a service or product that brings together two or more distinct but interdependent parties (sides or customer groups). The term "platform" is synonymously used to refer to the concept of "multi-sided platforms" which describes the interactions between many different parties. A platform creates value by facilitating interactions among the participating parties such that members of one side are more likely to get on board when more members of another side do so (Hagiu , 2006).

These days, people – including some scholars - seem to have developed the habit of using the term "platform" to refer to some software apps or technology solutions (Climax Media, 2016). Whilst almost all the successful platform-based businesses (e.g. Uber, eBay, Google, YouTube, and Facebook) are technology-oriented, the concept of platform extends far beyond technology (ibid). As a matter of fact, the idea of a multi-sided business is as old as human civilization itself and can be traced all the way back to early marketplaces, bazaars and auction houses (Moazed, 2016). In the ancient Rome, for instance, the bazaar owner would lease booths to their merchants (one side) and at the same time attract customers (another side) to the bazaar through advertisements. This way, the merchants were able to sell their goods to the customers more easily and at reduced costs – as they did not have to own the booths from which they sell. Even in recent times, the concept of multi-sided platforms still exists. Examples include: classic auction houses, shopping malls, stock-exchange houses among others (Moazed, 2016). The only difference in this modern age is that technology now provides the ability for these ventures to scale more easily and profitably.

To fully understand the various dimensions of a platform, I shall now proceed to discuss the core concepts of a platform.

2.5.3.2.   PLATFORM – CORE CONCEPTS

The key concepts that underpin are discussed below:

MULTI-SIDEDNESS

As a concept, "multi-sidedness" refers to the fact that a platform is made up of many sides where each "side" describes a distinct group of users (or customers) that are brought together. For example, the iOS platform brings together app developers (one side) and end users (the other side). All things being equal; without the platform, it will be relatively more expensive or time consuming for the two (or more) sides to find each other and transact. Basically, the platform creates value by serving as a mediator in the bringing together of the different sides and facilitating activities that help them accomplish their individual objectives in a strategic manner (Hagiu , 2006; Tiwana, 2013). Figure 5 depicts this idea:
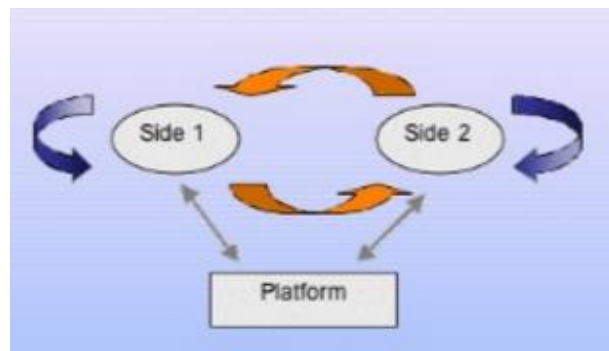
Figure 5: Two-sided platform

NETWORK EFFECTS

Tiwana (2013) defines "network effects" as the degree to which every additional user of a platform makes it more valuable to every other existing user of the platform. Put differently, network effects refer to a phenomenon by which the value within the platform grows to the extent that it attracts more participants (Savander, 2015).

There are two properties of network effects: direction and sidedness (Tiwana, 2013). The direction can either be positive or negative. A platform has **positive network effects** when a user's value from using the platform's service or product increases with the number of other users using the same service or product. Take for instance; the first registered user of LinkedIn or Facebook will derive no value from the platform since he or she is alone and there is no other person to interact with. The second user that joins will automatically increase the value of the platform to the first user and to herself. In the same fashion, the one millionth user will likewise increase the value of the platform to all the existing users and to herself thereby increasing the attractiveness and usefulness of the platform to users that join after him or her.

Negative network effects are the opposite. It is a situation when a user's value from using the platform's service or product decreases with an increase in the number of other users on the network. An example can be a consistent increase in the number of cars on a small road – thus leading to a traffic jam.

In line with Tiwana's (2013) argument, the essence of positive network effects is that; as additional users join a platform, the value of the platform increases exponentially – not linearly – as shown in Figure 6.
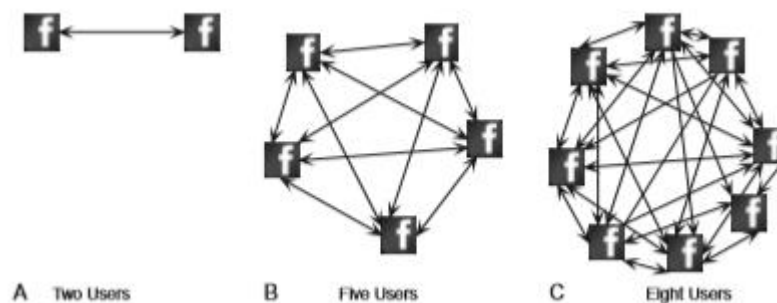
Figure 6: Exponential increase in the value of a platform as additional user joins (Tiwana, 2013, p.34)

The second property of network effects – sidedness – can be further divided into: "same-side" or "cross-side". **Same-side network effects** describe what happens to the value of the platform - to all existing users on one side - when an additional user joins that particular side. An example of positive same-side network effects would be the addition of a new user (friend) to Facebook, this is positive as it increases the value of the platform to all existing friends on that side. However, the addition of an interviewee to an interview process decreases the employment chances and appeal to existing candidates. This is an example of negative same-side network effects.

In the same vein, **cross-side network effects** refer to how the perceived value of the platform to existing users – of one side, say "side 1" – changes as new users are added to the other side ("side 2"). An example of a positive cross-side network effects is the perceived usefulness and attractiveness of LinkedIn to job-seekers ("side 1") as more recruiters or potential employers ("side 2") join the platform. However, the existence and increase in the number of marketers ("side A") on the platform may give negative experience to the job-seekers ("side B") – this may be referred to as a negative cross-side network effect.

To summarise, the properties of network effects can be depicted as follows:

Network effects	Positive	Negative
Same-side effects	Adding a new user **increases** the appeal and usefulness to other users on the **same** side	Adding a new user **decreases** the appeal and usefulness to other users on the **same** side
Cross-side effects	Adding a new user **increases** the appeal and usefulness to other users on the **other** side	Adding a new user **decreases** the appeal and usefulness to other users on the **other** side

Table 1: Network effects

MULTI-HOMING

Multi-homing refers to a situation where a user is a member of multiple (or competing) platforms serving the same purpose (Hagiu, 2006; Tiwana, 2013). A common example is the credit-card market which, for the sake of simplicity, can be said to be a two-sided platform: merchants (on one side) and users (on the other). Let us consider the credit-card platforms as an example. Members belonging to one platform (e.g. VISA) may also belong to other platforms (e.g. MasterCard, American Express) serving the same purpose. Likewise, most merchants accept more than one kind of credit card.

Consider another example in software development; Google's Android as a platform connects two parties – app developers and "end users". Multi-homing occurs when an app developer who creates software applications for the Android platform also creates apps for competing platforms such as Microsoft's Windows and Apple's iOS. On the other side, the "end-user" who uses a mobile device with Android platform may also have a different device using Windows or iOS.

TIPPING POINT OR CRITICAL MASS

A platform's tipping point simply refers to the minimum number of users that a platform must have in order to manifests network effects. In other words, network effects only kick in after a certain number of participants have joined the platform. This number of users is also known as the platform's critical mass. Once a critical mass is reached, network effects becomes noticeable and self-reinforcing (Tiwana, 2013). At this point, the platform can then be leveraged and converted to an income-generator.

2.5.3.3.   PLATFORM GOVERNANCE

Platform governance may be defined as the mechanisms through which the platform owner exerts influence over the participants (or members) of the platform ecosystem (Schilling, 2005). The key to a successful governance is to respect the autonomy of members while also being able to effectively integrate their insights and contributions into a harmonious whole (Tiwana, 2013).

Tiwana (2013) describes the following three dimensions of governance:

- **Control**: refers to various mechanisms, both formal and informal, used to ensure that the activities, contributions and behaviours are aligned with the interests and goals of the platform (Hagiu, 2006; Tiwana, 2013). Examples of such mechanisms are rules and regulations enforced on the platform.
- **Decision rights portioning**: refers to who has the authority and responsibility to make certain kinds of decisions.
- **Pricing policies:** refer to the decisions made of when, how and who to charge, on the platform. The norm is to charge the lowest prices (perhaps, nothing) to the side (side1) from which the platform intends to get cross-side network effects started and charge more to the other side (side2) that benefits more from the presence of side1 (Eisenmann, Parker, & Van Alstyne, 2006; Hagiu, 2006; Tiwana, 2013).

2.5.3.4.   INSIGHTS FROM PLATFORM THINKING

The fundamental basis of platform thinking is the value propositions offered to each side of the platform. So, the success of any network organisation or platform ecosystem largely depends on its understanding of the needs and goals of its members and how to coordinate interactions in a manner that helps them achieve their goals (Sabourin, 2016).

Bonchek (2016) takes this insight a step further and argues that a truly successful platform is one which does not only create value by facilitating interactions among participants but one which enables and empowers the participants to create – and co-create – economic value in new ways and in a ground-breaking fashion.

2.5.3.5.   DESIGN FACTORY AS a PLATFORM

A typical Design Factory brings together the following distinct groups of users: students, researchers, professors, entrepreneurs and companies.
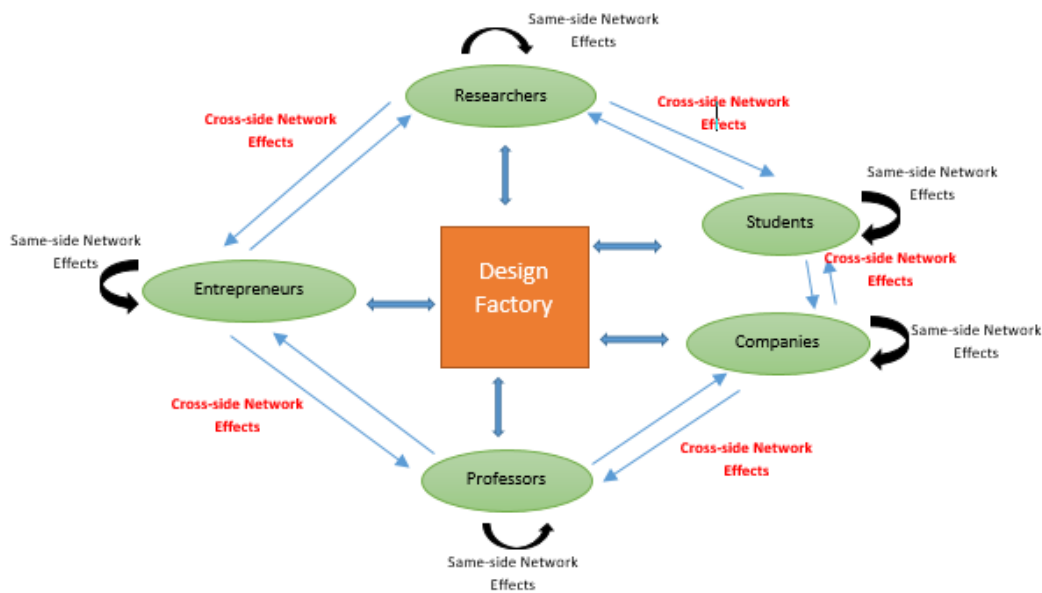
Figure 7: Design Factory as a platform

Looking from the **multi-sidedness** standpoint, it can be said that there are five sides connected via the Design Factory platform as illustrated in Figure 7. The diagram is a simple demonstration of the complex relationships that exist in the platform – especially, for the sake of clarity.

The **network effects** are relatively deep, given the fact that there are five sides. As mentioned already, the addition of a new member to a platform increases the value and dynamics exponentially – and not linearly. This makes sense, because every group (e.g. students) can connect to all other groups (professors, researchers, entrepreneurs and companies). This was referred to as the **cross-side network effects**. Examples of cross-side network effects in the case of Design Factory platform can be the interactions between: professors and students, professors and companies, professors and researchers, researchers and students, students and companies etc. In the same vein, the **same-side network effects** are when the members of a particular group (side) interact with each other. In the context of Design Factory, examples are the interactions between student teams or a group of researchers brainstorming ideas.

Platform success is often linked to the effectiveness of its **pricing** strategy – which is directly related to the members' willingness to pay (WTP). As cited earlier, members' willingness to pay (WTP) generally increases with the perceived benefits as well as size of the platform.

The impact of **multi-homing** is not an issue in the context of this investigation as members are expected to belong to multiple platforms. Take as an example, a law student, participating in the Product Development Project course at Design Factory, may have to engage on some other platforms – specific to his or her career specialization.

2.5.3.6.   *DESIGN FACTORY GLOBAL NETWORK (DFGN) AS A PLATFORM OF PLATFORMS*

In view of above explanations, Design Factory Global Network (DFGN) may thus be conceived as a platform of platforms - as shown in Figure 8.
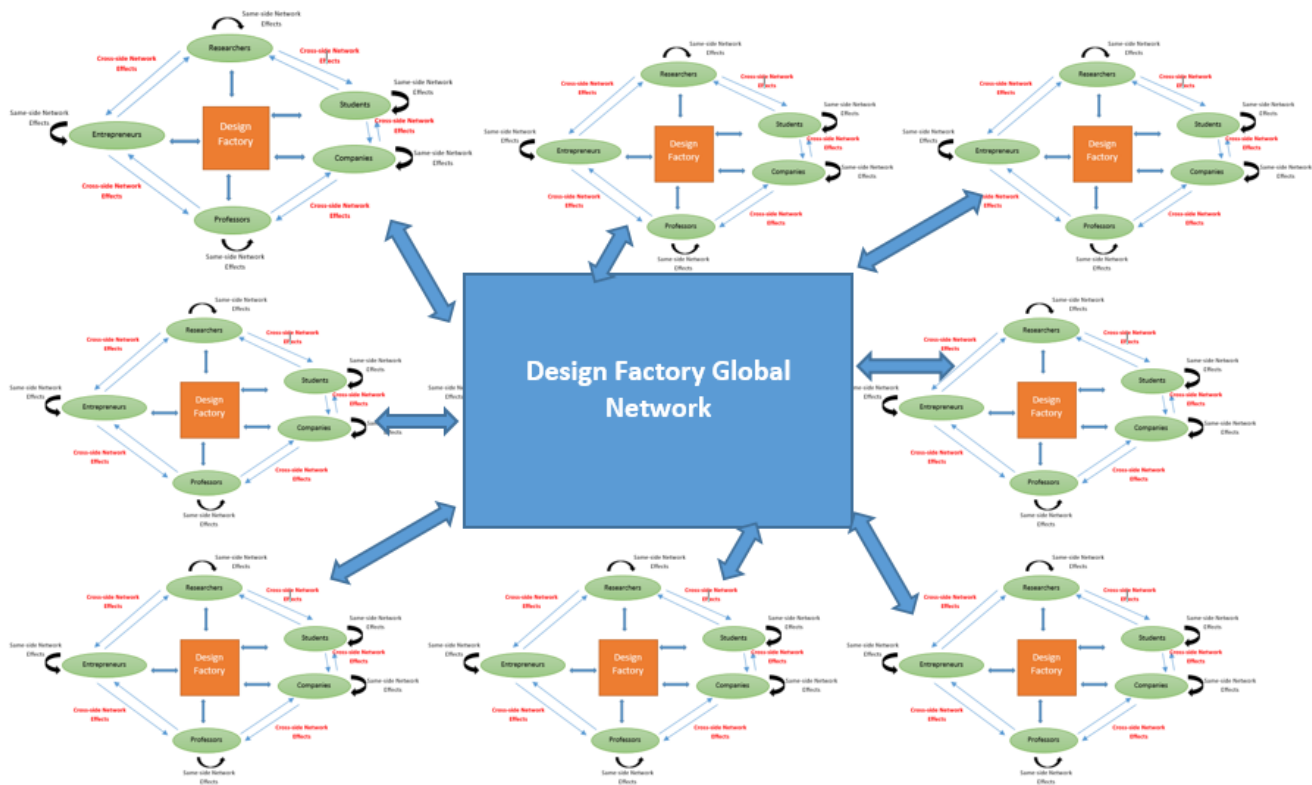
Figure 8: Design Factory Global Network

The success of the network – as a platform - depends on its ability to help individual members in its network to deliver the goals expected of it at the respective host institutions. For this to happen, the Design Factories must be able to generate positive **network effects** both within their borders and across the global network. The International Design Factory Week (IDFW), hosted annually, is one initiative through which interactions between the various Design Factories are promoted. (DFGN Atlas, 2016). During this week, friends and enthusiasts of Design Factories converge in one place with the aim of sharing their experiences, concerns and planning how they can better collaborate on projects.

2.5.4. BUSINESS MODEL DEVELOPMENT

2.5.4.1. WHAT IS BUSINESS MODEL?

The definitions of business model have been a subject of serious debate (Fielt, 2013; Mäkelä & Lehtonen, 2016; Streman & Berglund, 2012). Over the years, scholars have offered various definitions to describe the concept. After an extensive review of the literature, Fielt (2013) compiles a list of some of the prominent definitions provided so far. Table 2 gives an overview.

Authors	Definition
Afuah and Tucci (2001)	A business model is the method by which a firm builds and uses its resources to offer its customers better value than its competitors and make money doing so. It details how a firm makes money now and how it plans to do so in the long-term. The model is what enables a firm to have a sustainable competitive advantage, to perform better than its rivals in the long term.
Amit and Zott (2001)	A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.
Tapscott (2001)	A business model refers to the core architecture of a firm, specifically how it deploys all relevant resources (not just those within its corporate boundaries) to create differentiated value for customers.
Shafer et al. (2005)	We define a business model as a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network.
Chesbrough (2006)	At its heart, a business model performs two important functions: value creation and value capture. First, it defines a series of activities that will yield a new product or service in such a way that there is net value created throughout the various activities. Second, it captures value from a portion of those activities for the firm developing the model.
Johnson, Christensen, and Kagermann (2008)	A business model, from our point of view, consists of four interlocking elements that, taken together, create and deliver value. The most important to get right, by far, is the customer value proposition. The other elements are the profit formula, the key resources and the key processes.
Osterwalder and Pigneur (2010)	A business model describes the rationale of how an organization creates, delivers, and captures value.
Teece (2010)	In short, a business model defines how the enterprise creates and delivers value to customers, and then converts payments received to profits.

Table 2: Different definitions of Business Model (Fielt, 2013)

In view of the above definitions, Fielt (2013) concludes that a business model describes the value logic of an organization or a network in terms of how it creates and captures customer value and that it can be represented by an interrelated set of elements that address the customer, value proposition, organizational architecture and economics dimensions.

2.5.4.2. BUSINESS MODEL DEVELOPMENT – CREATE, DELIVER AND CAPTURE VALUE

In spite of the fact that there is no generally acceptable definition of business model as yet, scholars and practitioners appear to agree on the fact that the development of a worthwhile business model centres on how an organisation (or business network) creates, delivers and captures economic value (Fielt, 2013, Mäkelä & Lehtonen, 2016; Streman & Berglund, 2012).

2.5.4.3. CREATING VALUE TO CUSTOMERS

Every business exists to respond to the needs of certain customer group(s). As outlined in the above definitions, the value proposition is at the core of the concept of business model. Since the objective of any business model is to solve certain problems for certain customers in a profitable way, a deep understanding of the contexts and needs of the target customer groups is critical. Streman & Berglund (2012) and Zott & Amit (2010) argue that the choice of a business model will automatically determines the target customers of the business.

Streman & Berglund (2012) cited an example of Frisco - a technology-based startup. According to them, should Frisco adopt a manufacturer's business model, its customers will be made up of machine suppliers. However, if Frisco implements a technology-licensing business model its target customers will be both the suppliers as well as the machine manufacturers.

2.5.4.4. DELIVERING VALUE TO CUSTOMERS

In order to deliver the economic value created to the relevant customer segment, certain activities must be performed. A business model outlines the necessary activities that need to be performed and how they should be performed. It also details who is responsible at various times and what resources are needed (Streman & Berglund, 2012).

2.5.4.5. CAPTURING VALUE

This describes how an organisation generates revenues whilst it creates economic value to its customers. All aspects of the organization's business model - ranging from its choice of a customer segment, strategic partnerships as well as its key resources – have potential impacts on its profitability (Streman & Berglund, 2012).

2.5.4.6. BUILDING BLOCKS (DIMENSIONS) OF A BUSINESS MODEL

The following discussion regarding the different dimensions will be based on the Business Model Canvas proposed by Osterwalder, Pigneur, & Tucci (2009). So far, this is the most widely used framework in the range of business models (Fielt, 2013) and it is a continuation of the Business Model Ontology presented by Osterwalder (2004).

The canvas is made up of the following nine dimensions or basic building blocks:

2.5.4.6.1.   CUSTOMER SEGMENTS

This building block helps an organisation to answer the following question:

> *For whom are we creating value?*
> *Who are our most important customers?*

In response to the above question, the organisation will be able to carefully identify its target customer segment. In order to better meet the needs of the customers, the segment may be further categorised according to purchasing behaviours, affordability, demography, among other attributes. As the organisation develops its business model, it must be prepared to ignore certain groups of customers whilst focusing on fulfilling the needs of its target customer category (Osterwalder, Pigneur, & Tucci, 2009).

The customer segment can take different forms. Below are some examples:

- **Mass market:** In this case, the value propositions and other elements of the business all focus on one large group of customers with broadly similar needs and problems.
- **Niche market:** Here, the focus is on a specific, specialized section of the market and the value propositions will have to be tailored to the specific requirements of this market.
- **Multi-sided Platform:** Following up on the earlier discussion on multi-sided platform; businesses targeting customers in a platform market will have to refine its offerings to the needs and contexts of all/both sides of the platform.

2.5.4.6.2.   VALUE PROPOSITIONS

The value propositions help a firm to reflect on the following questions:

> *What value do we deliver to the customer?*
> *Which one of our customer's problems are we helping to solve?*

This refers to the services or products that create value to the target customers. A value proposition is the solution or offering or benefits that a firm provides to the customer segment. It may consist of a bundle of products and/or services that caters to the requirements of a specific Customer Segment. The value created may be in the form of price, speed of service, design, customer experience, newness, performance, customization and so on (Fielt, 2013; Osterwalder, Pigneur, & Tucci, 2009).

2.5.4.6.3.   CHANNELS

Thinking about this dimension helps decision makers to provide answers to the following:

> *Through which Channels do our customers want to be reached?*
> *How are we reaching them now?*
> *How are we integrating our channels with customer routines?*

The Channels are customer touch points and they describe how an organisation reaches and deliver the proposed value to its target customers. The organisation has a choice about using its own establish channels or those of its strategic partners (Osterwalder, Pigneur, & Tucci, 2009).

Channels sometimes follow the following five phases:

- **Awareness:** raising awareness about its market offerings
- **Evaluation:** helping customers to evaluate the value propositions
- **Purchase:** making it possible for customers to make purchase
- **Delivery:** This is about how the value propositions can be delivered
- **After Sales:** This includes the various kinds of services or support necessary after the purchase of the products or services

2.5.4.6.4.   CUSTOMER RELATIONSHIPS

In this building block, one of the most important exercises is to come up with an answer to the following question:

What type of relationships do our customers expect us to establish and maintain with them?

It is important for the firm to be clear as to what kind of relationships it want to establish and maintain with each segment of its customer-base. This way, proper investments and metrics can be put in place to ensure success. The following are some of the reasons why a firm might want to maintain its customer relationships: customer acquisition, customer retention and upselling (boosting sales). The author gave an example of the early days of telecommunications, where a mobile network provider - driven by aggressive acquisition strategies – gave away free mobile phones to potential customers. Once the market reached saturation, the firm switched its strategy to focusing on customer retention and growing average revenue per customer (Osterwalder, 2016; Osterwalder, Pigneur, & Tucci, 2009). Customer relationships may take the form of: personal assistance, self-service, automated services, communities of practice, co-creation, and/or dedicated personal assistance.

2.5.4.6.5.   REVENUE STREAMS

The Revenue Streams building block helps the firm to carefully answer the following questions:

For what value are our customers willing to pay and how much?
How much will each Revenue Stream contribute to overall revenues of the firm?

This dimension refers to the income or cash that a firm generates in the process of creating and delivering value to its target customers. In order to be profitable, the revenue generated must be greater than the cost incurred. An important aspect of an organisation's Revenue Stream is its pricing mechanism – as each stream of revenue may implement different pricing mechanisms such as fixed list prices, bargaining, auctioning, Pay What You Want (PWYW), and Name Your Own Price (NYOP).

In the context of this study, the following are some possible streams or sources of revenue:

- **Membership fees and dues:** Membership fees often refer to the once off payments made in order to join an organisation or a network. Membership dues, on the other hand, refer to the different costs associated with being the membership (Dick & Lord, 1998).
- **Freemium:** The term "freemium" is derived from the two words: "free" and "premium". It refers to a stream of revenue that entails the offering of services or products for free while charging a premium for advanced features, or related products and services. It has become a highly popular model, with notable success (Kumar, 2014).
- **Sponsorship:** This often manifests as a payment to the organisation or network, in exchange for which, sponsor(s) would receive a range of benefits (Ahmad, Soon, & Ting, 2015). In order to secure sponsorship, time and efforts are required.
- **Host institution support:** Financial support from respective host institutions may consitute a source of revenue (Kreps, 1989).
- **Licensing:** This refers to the income generated by giving customers (or third parties) permission to use some protected intellectual property in return for some fees (Jensen & Thursby, 2001).
- **Grants:** These are non-repayable financial contributions made by an organisation, government department, foundation or trust, to a recipient (Brody, 1993).
- **Pay-per-use or usage fees:** These are the fees charged for the use or consumption of a particular service or product (Gallaugher, Auger, & BarNir, 2001; MacKie-Mason & Varian, 1995).
- **Subscription fee:** This is an alternative method of revenue generation where an organisation offers services or products in return for a pre-determined fee over an agreed period of time (Gallaugher, Auger, & BarNir, 2001; Wang, Zhang, Ye, & Nguyen, 2005).

- **Donations and, or gifts:** Donations, as well as gifts are sometime made to organisations, especially academic institutions, for various purposes. In the case of Higher Education Institutions (HEIs), these donations may come from alumni, organisations or individuals (Harrison, Mitchell, & Peterson, 1995).

- **Philanthropic funding:** There are wealthy individuals who seek to promote progress by funding projects and researches that they believe would make people's lives better (Freedman, 1989). Sustaining this form of income generation may require building and maintaining relationships with high net worth individuals (Ahmad, Soon, & Ting, 2015) and gaining their confidence and trust.

- **Government funding:** In most countries of the world, certain amounts of money are often dedicated to funding education and this is regarded as a reliable revenue stream for most Higher Education Institutions (HEIs) (Ahmad, Soon, & Ting, 2015; Greenaway & Haynes, 2003).

- **Advertising:** The use of advertising as a source of revenue has increased over the past decades. It requires showing appropriate messages to the right audience (Hofacker & Murphy, 1998) and it is very situable for platform oriented businesses (Gallaugher, Auger, & BarNir, 2001).

- **Endowment funding:** Endowment refers to a certain amount of money, usually large, given to an organisation as a form of financial support. As a stream of revenue, endowments are very relevant in the context of educational institution funding (Barr, 1993).

- **Research and, or consulting services:** Organisations, particulary schools may also offer consulting services to corporates or government agencies as an additional source of income (Ahmad, Soon, & Ting, 2015).

- **Commission or brokerage fees:** this refers to the fees charged when an organisation serves as an intermediary between two or more parties (Lucking-Reiley & Spulber, 2001).

2.5.4.6.6. KEY RESOURCES

In this dimension, managers need to ask themselves the questions below:

What key resources are required for successful implementation of our ideas?

The Key Resources refer to the most important assets required to ensure the success of a business initiative. They make it possible for the firm to create and deliver its value proposition, reach markets, maintain relationships with customer segments, and most importantly earn revenues. More so, these key resources can be owned or leased by the firm or acquired from its strategic partners (Osterwalder, 2016; Osterwalder, Pigneur, & Tucci, 2009).

Key resources may belong to any of the following categories (Osterwalder, 2016):

- Physical Resources: these include physical assets such as manufacturing facilities, buildings, vehicles, machines, systems, point-of-sales systems, and distribution networks.
- Financial Resources: these include: cash, lines of credit, or a stock option pool for hiring key employees or securing key resources.
- Intellectual Resources: examples include: brands, proprietary knowledge, patents and copyrights, partnerships, and customer databases.
- Human Resources: These refer to the key employees needed to implement certain business ideas.

2.5.4.6.7.   KEY ACTIVITIES
An important question to answer in this dimension is:

What key activities are required for successful implementation of our ideas?

In order to implement the business idea, certain activities must be performed. This dimension of the Business Model Canvas is about the most important actions or activities that a firm must perform to operate successfully. For instance, the key activities in a software development firm would include coding, software testing and software business analysis. In the case of a PC manufacturing firm, the key activities may include supply chain management while for a strategy consultancy firms the key activity may be: problem solving (Osterwalder, 2016; Osterwalder, Pigneur, & Tucci, 2009).

2.5.4.6.8.   KEY PARTNERSHIPS
The following questions require answers from the firm's top management:

> *Who are our Key Partners?*
> *What key resources are we acquiring from our key partners?*
> *What key activities do our key partners perform?*

This building block refers to the different partnerships and/or strategic alliances that the firm requires in order to successfully deliver on the value propositions. The partnerships may take any of the following forms: strategic alliances between non-competitors, coopetition also known as the strategic partnerships between competitors, joint ventures to develop new businesses, buyer-supplier relationships to assure reliable supplies (Osterwalder, 2016; Osterwalder, Pigneur, & Tucci, 2009).

2.5.4.6.9.   COST STRUCTURE
The following questions are critical:

What are the most important costs inherent in our idea?

As a building block, the cost structure provides a detailed description of the most important costs incurred while operating under a particular business model.
In terms of costs, business model development may be divided into two categories (Osterwalder, 2016):

- Cost-driven business model development: This approach focuses on minimizing costs wherever possible. It aims at creating and maintaining the leanest possible Cost Structure by offering low price value propositions, extensive automation, and strategic outsourcing.
- Value-driven business model development: This approach is common in cases where the firm places more emphasis on value creation rather than cost-saving. In this scenario, the firm would usually offer for premium value propositions and a highly personalized or customized products or services. Examples include: luxury hotels, with their lavish facilities and exclusive services.

According to the author, Cost Structures are often characterized by the following:

- **Fixed costs:** These are costs which remain unchanged over a relatively long time irrespective of changes in other factors of production e.g. rents.
- **Variable costs:** These refer to costs that change proportionally with other factors of production.
- **Economies of scale:** refer to the cost advantages that a firm enjoys as its output expands. This is often seen in larger firms which benefit from lower bulk purchase rates thereby causing average cost per unit to fall as output rises.

- **Economies of scope:** refer to the cost advantages that a firm enjoys due to a larger scope of operations. Again, this is most common in large organisations that use the same marketing activities or distribution channels to support multiple products.

2.5.4.6.10.   SUMMARY OF BUSINESS MODEL DEVELOPMENT

In summary, Figure 9 shows how each of the nine building blocks fits into the overall Business Model Canvas.
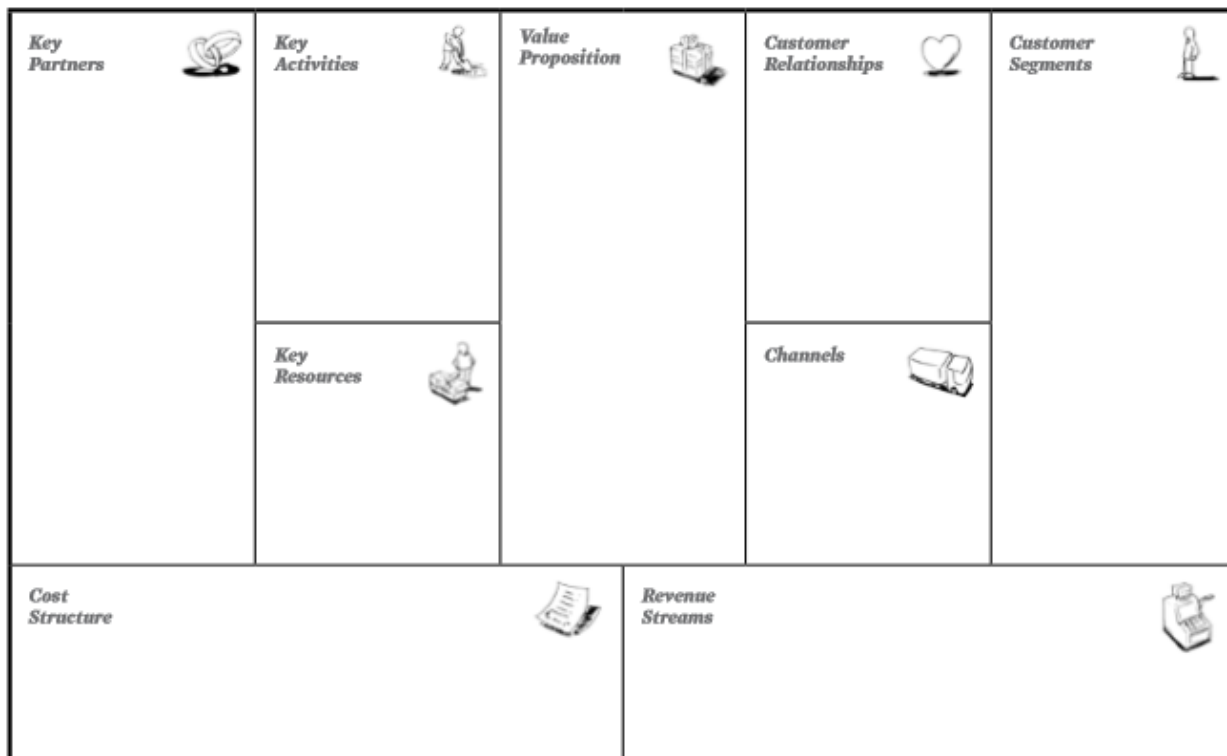
Figure 9: The Business Model Canvas (Osterwalder & Pigneur, 2009, p.44)

2.5.4.7. BUSINESS MODEL INNOVATION

So far, we have seen that a business model provides answers to the following questions: who are your customers? What do you offer to the customers? How do you create their value propositions? And how do you generate revenue?

Business model innovation refers to the continuous changes in how an organisation creates, delivers and captures value from its customers (Hagiu , 2006; Rao, 2016). Put differently, a business model innovation describes how changes to one or more building blocks can completely transform how a business capture add value to its customer groups and in return generate revenue for itself.

The effectiveness of business models lies in the ease with which the different building blocks can be reconfigured in a way that delivers the utmost revenue to the firm as its meets the needs of its customers (Osterwalder, 2004). As a matter of fact, the overall innovations in an enterprise are tightly linked to the model on which the enterprise runs. This is because it is the business models that determine how the firm's innovation processes combine internal and external ideas together into the existing architecture (Iivari, 2015).

By innovating their business models, IKEA has redefined the way furniture is bought, eBay changed the world of trade, YouTube positively disrupted the media world and Apple's iTunes transformed the music industry.

2.5.5. BUSINESS MODEL DEVELOPMENT AND PLATFORM THINKING

Traditional business development focuses on getting users on board and charging them for the value created by the business. In contrast, platform thinking places more importance on network effects and value creation and often subsidises the side that creates the value and charges the side which enjoys the value (Bonchek, 2016; CEB-Global, 2016; Choudary, 2015).

Proponents of platform thinking often refer to the traditional model of business where a service or a product is produced at one end and consumed at the other end as a "pipe" (Choudary, 2015; Choudary, Van Alstyne, & Parker, 2016) whereas the new approach based on platform thinking is referred to as platform business model development.

2.5.5.1. PIPE VERSUS PLATFORM BUSINESS MODELS

Firms running on a pipe model create products or services, and push them out to customers to consume. A pipe business model focuses on getting users in and converting them to transact or perform certain actions (Choudary, 2015). In this setting, value is created upstream and consumed downstream – just as water would flow through a pipe. Manufacturing plants are good examples of pipe business models. Television and radio are other common examples – as contents are often spewed at users (ibid).

In a platform business model, users switch roles as both producers and consumers – as a producer, the user produces value for other users and vice versa (CEB-Global, 2016; Choudary, 2016; Hagiu , 2006). For instance, users act as producers when they upload videos on YouTube. These users would reverse their roles the moment they start consuming (watching) videos posted by others on the platform. Therefore, without producers there is no value for the consumers and without consumers, there is no value for the producers (Choudary, 2016).

2.5.5.2. COMPLEMENTORS AND PLATFORM BUSINESS MODELS

Competitors are the third parties (entrepreneurs or other businesses) who plug into the platform and create value for existing users (Bonchek, 2016; Choudary, 2016). The concept of "complementors" – and as the name suggests - is about taking advantage of the complementary skills and resources that lie outside the platform to further enrich the value of the ecosystem whilst everyone wins.

Take for example, whereas Encyclopedia Britannica worked on pipe model and tried to do everything by itself, Wikipedia offers writers the needed tools to collaborate on an article; in the same vein, while traditional Television Channels expend more resources, capital and time in trying to develop better content for their audience, YouTube flipped the conventional business model and provides hosting and other infrastructures for people to create their own content. Today, the main competitive edge of YouTube is no longer its technology – which can very easily be replicated – but its community of video creators (Choudary, 2016). In a nutshell, the fundamental question that platform owners should ask themselves is: how can we enable others to create value on our platforms?

3. RESEARCH APPROACH

3.1. CHOICE OF RESEARCH APPROACH

To conduct an empirical study, it is vital to connect theory with data. As Creswell (2014) explains, theoretical considerations regarding one's choice of a specific research approach is useful to guide and influence how data will be collected and analysed. In choosing between a deductive and inductive approach, I consider the fact that a deductive approach starts with existing theories and then use data to test and validate the theories. In contrast, an inductive approach starts with data collection and then a theory or model based on the data is developed.

Since this is the first empirical research to investigate the business model of Design Factory Global Network (DFGN), an inductive approach will be used. The inductive strategy of generating theories out of data is also associated with a qualitative research approach, which is most useful for hypothesis building and explanation (Creswell, 2014).

3.2. QUANTITATIVE OR QUALITATIVE APPROACH?

A quantitative research approach is founded on the cause-and-effect thinking logic and it is based on numerical measurements. Data collection is often guided by standardized or pre-tested instruments as a way of ensuring reliability and validity of data. On the contrary, the qualitative research approach typically aims to understand human experiences and behaviours. It is also important to note that quantitative and qualitative approaches are not polar opposites, rather they represent different ends of a continuum.

Whereas quantitative researchers use closed-ended questions and focus on collecting numeric data in order to make sense of the situation and perhaps predict the outcome; a qualitative investigator uses open-ended questions to get into the minds and emotions of the participants. The researcher is considered as an instrument and is placed at the centre of the data-gathering process. This is based on the understanding that the interaction of the researcher with participants may lead to intimacy that may impact the researcher's ability to collect and/or interpret data in an objective, unbiased manner.

According to the research objective of this study, the qualitative approach is more appropriate to explore, develop and describe the business model of Design Factory Global Network. The use of the qualitative research approach also makes it easy to look at matters from broader perspectives and this is necessary as I brainstorm on new ways through which the network can generate revenue.

3.3. CHOICE OF RESEARCH DESIGN

A research design is the logic that connects the research objective and the collected data (Creswell, 2014). There are different specific methods of inquiry suitable for qualitative research – including grounded theory, ethnographic and narrative (Creswell, 2014).

In this study, the grounded theory will be used, since there are no previous empirical studies on the research topic and there is a need to create structured information based on the qualitative data.

3.4. RESEARCH SAMPLE

The primary sources of data are thematic interviews and secondary sources such as the publications, reports, and news letters.

The unit of analysis is Design Factory Global Network (DFGN). As such, the main participants of the study have been selected as follows:

- Key decision makers of Design Factories outside Finland: These interviewees constitute a crucial source of evidence in this research as almost all of them have been involved in their respective Design Factories from the beginning.
- Key decision makers at Aalto Design Factory: These are people that represent the leadership of Aalto Design Factory (ADF).
- Independent third party: This is an individual who teaches as a professor at Aalto Design Factory and has been involved in some of the activities organised at other Design Factories – outside Finland. The opinion of this individual will be used to validate my findings and generate ideas.
- Central administration staff: These are the staff members of Aalto Design Factory (ADF) who provide support to other Design Factories from around the world. These are the people who are reponsible for the central administration of Design Factory Global Network (DFGN).

3.5. STEPS FOLLOWED IN THE RESEARCH PROCESS

The research is carried out in three stages:

In the first stage, I interviewed the key decision makers of Design Factories outside Finland. During the second stage, the key decision makers of Aalto Design Factory (ADF) were interviewed with the aim of finding out their motivations for considering the introduction of annual membership fees, among other topics.

In my quest to come up with a plan for alternative sources of revenue for the central administration of Design Factory Global Network (DFGN), I took some time to analyse the views of the decision makers of the member Design Factories as well as the position of the management of Aalto Design Factory. Then, I interviewed the independent third party to get a neutral perspective on the topic under investigation.

Finally, I collaborated with the members of the central administration of Design Factory Global Network (DFGN) to jointly develop a business model canvas for the network. This represented the current business model of the network.

4. DATA COLLECTION AND DATA ANALYSIS

4.1.   GROUNDED THEORY

The 'grounded theory' strategies will be used for both the data collection and data analysis.

In Table 3, the basic components of the grounded theory are briefly discussed as outlined by Charmaz (1990) and Sbaraini, Carter, Evans, & Blinkhorn (2011):

COMPONENT	STAGE	DESCRIPTION
Openness	Throughout the study	There is emphasis on inductive analysis. In other words, the grounded theory research tends to take a very open approach. The area of focus of the researcher may evolve as it becomes clearer to the analyst(s) what is truly essential to the study participants (Sbaraini et. al., 2011).
Analysing immediately	Analysis and data collection	The data collection and data analysis processes are interrelated. Put differently, the analysis commences as soon as the first set of data is collected – unlike other approaches, where the entire datasets are first collected before data analysis process starts. A researcher using a grounded theory approach often begins inquiry with some questions or areas for observation. Data will be collected on these matters throughout the study, unless the questions prove, during analysis, to be irrelevant. To ensure that no salient information is missed, the data analysis process starts almost immediately the first bit is data is collected - for cues. Relevant issues must be incorporated into the next set of interviews and observations. Repeating this pattern, makes it easy for the researcher to gasp as many critical aspects of the inquiry as possible.
Coding and comparing	Analysis	In grounded theory, data analysis heavily relies on coding. During coding, the data is broken down into smaller components which are carefully labelled, compared and recombined accordingly to form categories. The concepts or categories that emerged are considered to be the basic units of analysis, not the raw data. (Sbaraini et. al., 2011).
Memo-writing	Analysis	The use of memo writing is recommended. This will help researchers to better reflect about events, categories and relationships between concepts – if there are any. In doing so, researchers are able to effectively monitor and keep track of how the concepts and theories evolve.
Theoretical sampling	Sampling and data collection	Theoretical sampling is the next stage after coding comparison and memo-writing of the initial dataset have been completed. This is because the analysis of the first set of data may raise some questions, reveal gaps or even suggest certain relationships that researchers do not yet know or which require further investigation. So, by cautiously choosing participants and by adjusting the previous questions or areas of focus, these gaps may be filled and any uncertainties clarified.

		(Sbaraini et. al., 2011).
Theoretical saturation	Sampling, data collection and analysis	The sampling, data collection and analysis are completed only when a point of "saturation" has been attained. This may be interpreted as a point during the study when no new information/insights are coming from the study participants and all of the categories related to the research objective are well understood and can be validated from the data.
Production of a substantive theory/model	Analysis and interpretation	The outcomes of a grounded theory research project are usually expressed as a substantive theory or model - a set of categories that are related to one another in a cohesive whole (Sbaraini et. al., 2011).

Table 3: The basic components of the Grounded Theory

4.2.   APPLYING THE GROUNDED THEORY APPROACH

4.2.1. AN OPEN BEGINNING AND RESEARCH QUESTIONS

Grounded theory studies require open-mindedness (Eisenhardt, 1989). To this effect, I asked as many open questions as possible. This way, the interviewees have opportunities to speak their minds and this makes it possible for me to ask follow up questions on topics that I find interesting – and perhaps, unanticipated.

4.2.2. INITIAL AND PURPOSIVE SAMPLING

Just like any other qualitative research projects, sampling must begin purposively. This, of course, requires some data to be collected and analysed.

Data Collection

As recommended by the grounded theory approach, I started the analysis of data immediately after the first interview and the insights gleaned were used to tweak the themes and questions I asked in subsequent interviews. I was able to use concepts created from previous interviews as my units of analysis and also group them into different categories – to be further investigated in subsequent interviews.

This initial sample was carefully chosen to ensure that the perspectives of members were given equal weight. As such, I started by interviewing the leadership of the following Design Factories: Melbourne, Geneva, Korea, Javeriana, Santiago, and Barcelona. The background information as well as the responsibilities of these leaders are detailed in Exhibit 2A.

All the interviews were semi-structured and conducted via Skype – because of the physical distance barrier - and they were digitally recorded and carefully transcribed. During and after these interview sessions, I wrote memos.

In addition, secondary sources were used to gather relevant data. These sources include: online publications, paper publications, internal documents such as the annual reports and the Internet including Design Factory Global Network's websites and those of the members.

4.2.3. DATA ANALYSIS

4.2.3.1. CODING AND THE CONSTANT COMPARATIVE METHOD

Coding is an essential characteristic of the grounded theory. It is through coding that researchers are able to define, describe and make sense of the data. Charmaz (1990, p.46) refers to coding as the "pivotal link between collecting data and developing an emergent theory to explain the data". According to Sbaraini et. al., (2011), coding occurs in stages:

- **Initial coding:** At this stage, the researcher generates as many ideas as possible inductively from the initial dataset.
- **Focused coding:** Here, the researcher pursues a selected set of central codes throughout the entire dataset and the study. This requires decisions about which initial codes are most prevalent or important, and which contribute most to the analysis.
- **Theoretical coding:** Then finally, the researcher refines and come up with the final categories in their theory and relates them to one another.

My initial questions revolve around the following areas:

- **Goals of Design Factory as a member of the parent institution**
  Here, I tried to explore and document how the concept of "Design Factory" is understood and how its adoption is expected to create value in the host institutions. A lot of data and codes were generated during the interviews.

  Whilst doing the initial coding, I noticed that certain words were used quite frequently by the interviewees to express the reasons why Design Factories were established in their institutions. After comparing comments made by the interviewees I made a list of some initial codes. By further analysing the codes, I found that the following were common, so I decided to label them as focused codes: empowering students/professors, development of complementary skills, fostering industry collaboration, facilitating innovation and societal impact. Some interviewees also mentioned the idea of using Design Factories to gain competitive advantage. Although this reason is not shared by the majority of the members, I think that it is a useful point to consider.

  After comparing codes against codes and data against data, I was able to distinguish the following theoretical codes: driving change, engagement with society, facilitating multi-disciplinary education, empowerment through practical application of theoretical knowledge as well as better learning experience for the students. In other words, it can be said that some of the main motivations for setting up a Design Factory are to drive certain kind of innovative changes in the host institution and to empower participants including the society as a whole.

- **Being part of Design Factory Global Network (DFGN)**
  It is one thing to have a Design Factory, and a completely different thing to be a member of Design Factory Global Network. Although, almost all Design Factories are members of the network; membership is optional. For this reason, I attempted to get an understanding of each member's motivation(s) and expectations for joining the network.

  Generally, interviewees cited the needs to collaborate with institutions that have similar goals or plans. Some mentioned physical distance, that is, the fact that they are far from others has made it relatively difficult to work on the same projects with other institutions and therefore it would really be helpful to have such a network. Based on the initial coding, I inductively generated the following focused codes which appeared to be prevalent throughout the data set: Remotely located (physical

distance from others), desires global collaboration, seeks community of practice, seeks support structure, desire to be unique among competitors

Through constant comparison, I finally produced a theoretical code: desire to learn from others, intrinsic motivation, validation of ideas, experiments, seeking tangible examples of implementation of innovative ideas.

- **Comparison of "Design Factory" concept with other options**
  The aim of this theme was to understand whether or not the host institution had explored alternatives before adopting Design Factory concept. If their response was affirmative, I asked follow-up questions including why they preferred Design Factory to others. One might wonder how this area of questioning is relevant to the study. I feel that this theme complements the two-previous set of questions about why Design Factory was established in the given institution and why the institution joined the global network.

  The coding process was relatively straight forward. Almost all the Design Factories mentioned that they were aware of alternative options but preferred to adopt the concept of Design Factory - for different reasons. I therefore label this statement as the focused and theoretical code.

- **Community of Practice**
  As discussed in the literature review, a community of practice is the gathering of like-minded people, who are engaged in similar practices, going through similar struggles and interested in relatively similar goals. With this in mind, I asked if interviewees considered Design Factory Global Network (DFGN) as a community of practice. I found it interesting that interviewees often started talking about the idea of community of practice even before I asked. This observation lends credence to the fact that the network is truly perceived as a community.

  The following points were mentioned by almost all the interviewees: disruption is easier when done together, there are barriers impeding engagement with other Design Factories e.g. time, language. We are interested in members with similar objectives. The following point was made by a few interviewees but I felt that it is interesting enough to be included in the focused codes: there is no perfect community of practice, it is what you make of it, and what we bring to the table is what we get back. Based on this, I developed a theoretical code that innovations are easier when done together.

- **Strategic Alliance**
  Typically, two parties engage in a strategic alliance when one has expertise or resources that will help the other achieve its objectives. In the case of Design Factory Global Network (DFGN) there are opportunities for members to leverage each other's capabilities. These capabilities may take different forms and shapes. So, as a researcher, I was interested in exploring the possibilities for strategic alliance among the members and also wanted to know if there has been any in the past or if there are plans for such initiatives.

  During the interviews, many of the interviewees indicated interests in pursuing some kind of international university-industry collaboration together with other Design Factories. Someone mentioned the needs to directly connect their research solutions with partners that understand the problems and have needs for the solutions. So, after the initial coding process, I compiled the following focused codes: cross border Industry partnership opportunities for multinational, differences are also sources of opportunities, competitive advantage, physical distance is still an issue, needs for Design Factories in places such as Africa and India

Theoretical code: there are significant benefits for individual Design Factories to leverage each other's strengths in spite of the differences that exist.

- **Funding**
Here, I tried to understand the cost structure of each Design Factory and how it generates revenue – if it ever does. Having understood their cost structure and revenue model, I then moved on to explore their willingness to contribute to the financial up-keep of the international network. To be more precise, I asked their opinions regarding the potential introduction of annual membership fees.

   The initial coding spans a diverse range of ideas. Since this is a striking aspect of the study, I tried to be as open-minded as possible to accommodate almost all the perspectives presented by the interviewees – including those ideas that are not shared by others. The reason for doing this is to compile a set of codes that are fully representative of the responses of my sample population.

   The focused codes are as follows: disagree with membership fees, membership fee is a sensitive topic, ready to pay fees but Return-On-Investment (ROI) expected, economic situation must be taken into account, willing to provide financial support other than membership fees but wants to have control over how funds are allocated, willing to provide in-kind support, the use of a central "pot", and the allocation of a certain percentage of each member's budget to the networks funding.

   Overall, my theoretical code was that new members are willing to pay while old members that are relatively independent are not. The section on empirical findings will provide a more detailed discussion on the above topics of inquiry.

4.2.3.2.   MEMO-WRITING

Throughout the study, I wrote extensive memos which I maintained as a set of notes to support my thought processes as I proceeded through the study. Before going into subsequent interviews, I would revise my memos to refresh my memory and collate questions and observations that were of relevance to the interviewee(s) and context.

4.2.4. THEORETICAL SAMPLING AND ONGOING DATA ANALYSIS

Up to this point, I had focused on the members of the international network in my quest to understand their contexts, what they perceive as value and their willingness to pay a membership fee – if it were to be implemented. Next, I shifted my focus to the central administration of Design Factory Global Network (DFGN) – in Helsinki, Finland - with the following goals in mind:

1. Explore the motivations for wanting to introduce annual membership fees.

2. Collect data and develop a draft business model that represents the current state of Design Factory Global Network (DFGN) by collaborating with key resources in the central administration.

I shall now discuss these two points:

The plan to introduce annual membership fees by the central administration of Design Factory Global Network (DFGN)

In efforts to develop a plan for alternative sources of funding for the network, I set out to understand the reasons behind the introduction of membership fees - or put differently, the necessity for alternative revenue sources. Since the issues of finance are often dealt with by top management, I decided to theoretically sample the key people responsible for the development and running of the Aalto University Design Factory – the mothership and home of the central administration of Design Factory Global Network. I also sought a neutral perspective from a Professor of Practice – as an independent third party.

The background information to these three interviewees is available in Exhibit 2B.

Following Charmaz's (1990) advice, I modified my interview questions to focus on funding and also to discover how Design Factory has evolved over the years.

Understanding the current business model of Design Factory Global Network
Once the above three interviews were completed, I believed that I had secured almost everything needed to develop a new business model. However, I felt the need to first understand what the current business model would look like if I were to assemble the various building blocks that I had gathered so far. Having a description of the current business model would also make it easy for the top management - of both Aalto University and Design Factory Global Network (DFGN) – to better understand how my recommendations for improvement would lead to a new business model. Moreover, a well detailed business model – such as the one I intended to develop in this study - would help members of the network, especially the newly established Design Factories, to better comprehend how the various building blocks fit together.

At this stage of the research, I further modified my questions - as suggested by Charmaz's (1990) and Sbaraini et. al., (2011). The aim of the interview/session with the team - responsible for the central administration of the network - was to collaboratively brainstorm on the various building blocks of the business model and how they fit into the picture. To facilitate the session, I used the business model canvas framework developed by Osterwalder and Pigneur (2010).

4.2.5. MAPPING CONCEPTS, MEMO WRITING AND REFINING OF CONCEPTS

Once the theoretical sampling was completed, I began to code theoretically. I fleshed out every major focused code by investigating the contexts in which they manifested and considered whether or not there were relationships among them. This process was repeated until I was certain that I had reached theoretical saturation. Based on the insights generated during the brainstorming session with the members of the central administration team, together with data from earlier interviews and secondary sources (e.g. publications), I developed the Business Model Canvases, which are detailed in the following discussion section.

5. EMPIRICAL FINDINGS AND DISCUSSIONS

5.1.   GOALS OF DESIGN FACTORY AS A MEMBER OF THE PARENT INSTITUTION

There is a popular saying that when the purpose of a thing is not known, abuse is inevitable. This is why I started by attempting to understand the goal of every Design Factory established as a part of the parent institution.

To Be an Agent of Positive Change

One thing that strikes me about the goals of each of the Design Factories that I interviewed is that they all seem to assume roles of strategic "change agents" in their host institutions. "Change" was a word that almost all the interviewees mentioned. This observation is consistent with the finding of (Oinonen , 2012, p.56), who quoted Professor Ekman as follows: "The main goals of our operations at Aalto Design Factory is to affect change … primarily on the Aalto University campuses, faculties and schools, and then also in other organisations ".

In a similar vein, the Melbourne Design Factory is currently effecting positive changes in the Australian educational system.

> *"We have now embedded Design Factory concept into the Australian Quality Framework (AQF). So, the concept is now an officially recognized curriculum in Australia. As part of the implementation of this idea, we are also designing what we lovingly called the 'PhD Surf School'. The mission of the PhD Surf School, is that we are developing a model founded on Design Factory concept: inter disciplinary, integrated, problem solving with industry partners where students get professional skills as well as contribute new knowledge to their fields by solving industry problems".*

This now runs as part of the *honours*, master's and doctorate programmes at the Swinburne University of Technology.

To Empower Students and other stakeholders

Even though all the interviewees talked extensively about effecting positive changes, I found that the underlying discourse relates to empowerment - that is, empowerment of their students, professors, entrepreneurs and perhaps, the common people. Multi-disciplinary education emerged as a strong theme during the interviews.

> *"Our goal is to bring multi-disciplinarity into our education in a more formal format to facilitate innovation and entrepreneurship. And also to foster mind-sets through a passion-based innovation programme so that innovation can happen"*

By empowering people to be passionate about what they want to do, they are enabled to grow the industry/university collaboration to make it possible to disrupt it.

An interviewee who represented an institution that has close to twenty campuses - scattered all over the country – mentioned the following as one of the main goals of setting up a Design Factory:

> *"We are aiming to spread the values of innovation, design and creativity to other schools within the institution. In addition, we are also trying to use Design Factory concept to change the way our professors teach.*

All the interviewees stated the importance of empowering their students to come up with solutions to problems – no matter what form the problem takes. According to a particular interviewee:

"We empower our students so that they can look at a problem that they have never seen before and not be scared to tackle it. Recently, we had a group of students from Ohio State University and the task that we gave them was what society-driven problem the CERN of today can solve in 2040? They came up with some very nice concepts that we do not even know how to build today. We understand the Physics behind them but we do not have the materials to build them. We asked another group of students to design a jumbo jet in one hour. These were people that have no prior knowledge of Aerodynamics but they were able to design in one hour a plane that could still fly and we can demonstrate it. So, we want to show the students that they should not be afraid, they should think 'big and do good'"

Another aspect of empowerment, especially as it relates to students, is the development of complementary skill sets and exposure that will help them to be more successful and give them better chances in the future. The fact that students are assigned mentors who are mostly experienced professionals means a lot. The responsibilities of these mentors are to guide, inspire and expose the students to the industry-contacts (experts) or experiences (events or materials) that can help the student to achieve their goals.

During my Product Development Project (PdP) course, my project team was assigned a mentor – this mentor was a Mechanical Engineer with over twenty years' experience. The mentor played a very important role in my learning experience and in the overall success of the PdP project. At different times, he (the mentor) gave us real-life perspectives of the problem we were trying to solve and connected us to other experts in the field.

Still on the topic of student empowerment, I also found that the technical institutions that participated in the study consider the establishment of Design Factories as an opportunity for their students to develop soft skills - among others - which are not taught as part of the traditional curriculum.

"Our institution is technically oriented in both the way teachings are delivered and content. We aim to empower our students with social skills and soft expertise (e.g. design thinking, prototyping, and communication skills) to help them advance in their careers … We have been spending a lot of time and resources in equipping our professors from different disciplines and schools (faculties of the university). Our aim is to create an impact that will permeate every corner of our campuses."

Looking from an entrepreneurial perspective, students and other participants who are interested in starting their own ventures but lack necessary technical expertise or know-how can be empowered through their participation in Design Factory projects. An interviewee from a Business School mentioned that:

"The way this is strategic to our university is through innovation and entrepreneurship. These are the two strategic areas for us. Many of our students are interested in projects or fields that are related to high tech heavy industry … but since they do not have the technical expertise or network or initial understanding of the hi-tech technology … so, let's say a student might to kick off a startup that require these skills or hi-tech expertise they might be afraid to get into such a venture because they do not have that kind of network now. On more practical terms, what we want to achieve is to broaden the variety of projects that our students of entrepreneurship can consider and can enter to build their entrepreneurial passion. So, these are the goals we are aiming to achieve".

It is becoming common to see Business degree students/graduates wanting to – or, actually – learning programming languages. This kind of knowledge can easily be acquired by engaging in inter-disciplinary projects where software developers, designers and business students are teamed-up.

Engagement with society

The positive change or impact that these Design Factories are aiming to achieve transcends the academic world. Consider the case of IdeaSquare, which belongs to and is situated in CERN (*Conseil Européen pour la Recherche Nucléaire*) – that is, the European Organization for Nuclear Research.

> *"The goal of IdeaSquare is to see how we can connect basic scientific research of CERN with society. Meaning that we are constantly finding new ways of linking our science with societal needs. We wish to participate in educating next generation scientists, engineers and innovators. We try to facilitate the process where this interaction between purely scientifically driven technology R&D meets society-drive, design things that are driven by user needs and requirements".*

To Facilitate Inter-disciplinarity in our Education Offering

Many institutions – both academic and non-academic – have recognized the need for inter-discipline education and are now seeking means by which they can partake of it. Considering the fact that inter-disciplinary education is one of the core fundamentals of the "Design Factory" philosophy, then belonging to Design Factory Global Network (DFGN) constitutes a strategic choice for any institution interested in facilitating inter-disciplinary education. As an interviewee mentioned:

> *"What for us is really important is bringing multi-disciplinarity in our education in a more formal format. What we have been doing in the past three years, is that we have been setting up different courses where we have been collaborating with these two other schools. So, it's been like a pilot stage leading to Design Factory collaboration. For us, the important part is inter-disciplinarity."*

Some interviewees used the term "unending possibilities" to describe what they are trying to achieve as a Design Factory. The idea is that when people of different skill sets and backgrounds are brought under one roof to solve a particular challenge, there is no limit to the possibilities that can be achieved. This is where innovation comes from.

> *"As you know, the students' teams are usually cross disciplined e.g. from business management, designers, engineering, science etc. We equip them to think differently e.g. by doing design thinking, black hole exercises. We send out to do a lot of market research e.g. water distribution problem, they talk to experts in the fields … they do their homework. Then at the end, when they think that they have interesting concepts, we would start thinking about the technology. The idea is to generate new thinkers, innovators and entrepreneurs. Our aim is breakthrough innovation not incremental innovation … We are interested in impact. Companies are very good in versioning. In the aircraft industry, a major breakthrough technology is if a plane is able to consume 10% less fuel, it is considered a major breakthrough. In our side, 10% is nothing, we are looking for 100% or 1000% - it is a mind-set!"*

This kind of education is completely different from what is taught in traditional settings where students are trained to sustain the status quo. Instead of teaching students to fit into existing structures, almost all the interviewees talked about new possibilities or positive disruption.

During one interview, the passion with which a respondent discussed the need for multi-disciplinary education was so strong that I had to enquire about what motivated this passion. The response was:

> *"I come from digital media design background and digital inflation exhibition in the museum world. You need many people to put together an exhibition for a museum. You need many collaborators to make anything possible and it is the team and the collective vision that move towards shared meaning that makes it possible. Experts alone are useless. I have a lot of experience in delivering high quality, large projects for the public through a team-based approach. Where different disciplines have to come together to deliver an outcome … I am passionate about Design Factory concept. It is the only way to do real education. I cannot go back to the old way". I think the old traditional model of university is only a small*

piece in the future of education because you will disrupt it and bring education to whole other level that I can't imagine and if we empower you, you will make it better for the next generation!"

To Differentiate Ourselves from Competitors

Even though the point in this section answers the question of why an institution would consider joining Design Factory Global Network, I feel that it is also an appropriate response to why an institution would want to establish a Design Factory in the first place. Some interviewees were confident that Design Factory would bring a positive twist to the kind of education they offer and they consider this as an opportunity to differentiate themselves from their competitors.

> *"We are the first Business School joining the network and joining the network can help us to differentiate or profile ourselves as a unique Business School. We are getting away slightly from traditional management education (e.g. finance-driven MBA programme). We are driving towards inter-disciplinarity and innovative methodology. The MBA programme is a 'keyness' to challenge but I think it does help us in the differentiation in the market if we consider other top schools".*

The point about using the Design Factory concept for the purpose of branding or differentiation was cited by only one interviewee but I do find it relevant and insightful. The use of engineering (or other technical) approaches in business contexts has increased over the years. For example, the use of Design Thinking approaches and rapid prototyping in a market-entry strategy will significantly speed up time-to-market and reduce the wasting of resources.

To Help Speed-Up Our Own Innovative Teaching and Learning Techniques

The adoption of Design Factory concept was also considered as a way of speeding up existing schemes of innovative teaching and learning techniques in some institutions. One group of interviewees mentioned that that they already have their own initiative geared at facilitating multi-disciplinary and industry-linked education projects.

> *"For over a decade now, we have been running our own innovative approach to education and this involves inter-disciplinarity and collaboration with industry partners. This initiative occurs on two levels. The first is consultancy services offered by our design department but these are not related to students. The other one we develop design briefs with companies and these briefs are delivered to professors and students as projects. This second scheme does not charge companies for participation but we have to say that it is not free because industry has to give us insights, information and guide our students in order to achieve their goals".*

By adopting the "Design Factory" concept, it is believed that the existing efforts will be well complemented and perhaps – its growth rate will be catalyzed.

To Create Our Own Innovation Hub

Quite a number of interviewees also mentioned having their own innovation ecosystem as one of their reasons for establishing Design Factory.

> *"Our Design Factory was founded on the three focus areas: Technology, Design and Management. Every team is made up of students from at least those three areas. The goal is to create a new innovation platform for our students and faculty to engage in fostering product and service innovation with focus mainly on ICT. Our country has been recognized as an Information and Communication Technology (ICT) stronghold in the world. So, as a Design Factory, we aim to find ways to be more creative whilst leveraging those resources … We are now busy developing our own innovation ecosystem where we work with companies through the capstone projects and also establish corporate programme that emphasize design thinking in the next generation of industries. We are currently working hard at building our own internal ecosystem where companies from our own locales e.g. LG, Samsung, Cisco ".*

The idea of having their own platforms of innovation came mostly from old and independent members.

To round off, it can be said that two of the main motivations for setting up a Design Factory are to drive certain kinds of innovative changes in the host institution and to empower participants, including society.

I found that the agenda and support of the incumbent leadership of the parent institution is vital to the success of each of the Design Factories. For example, some universities have their leadership changed every five years. If the newly sworn-in leader does not share the enthusiasm of Design Factory, it might be difficult for such a hub to flourish.

5.2.   BEING PART OF DESIGN FACTORY GLOBAL NETWORK (DFGN)

The following are the reasons cited by interviewees for joining Design Factory Global Network.

One of the main reasons mentioned regarding decisions to join the international network is the desire to connect with like-minded people - or institutions aiming for and passionate about similar goals - from other parts of the world.

Remoteness – difficult to drive change alone

One important point is the fact that it is difficult to drive change alone and being remotely located (physical distance from others) is tantamount to solitary.

> *"The fact is that we are on the other side of the world. We wanted to share and connect with others who are going through the same struggles. Because it is not easy to do inter-disciplinary industry disruption alone".*

A similar reason was cited differently by another interviewee:

> *"As a country, we are very far from the rest of the world. So, it is always very interesting and beneficial whenever we have this kind of connection with colleagues from other parts of the world. "*

Existing or previous relationships

I also noticed that existing or previous relationships are important factors that influences the decision to join the network. For example, a director of one of the longest established Design Factories – overseas – studied at the Helsinki University of Technology (HUT) now known as Aalto University. Similarly, the head of a newly established hub is an Aalto University alumnus who also worked as a researcher within Aalto Design Factory facilities.

> *"I see the network more as a community of friends. We are interested in finding new ways, effective ways to demonstrate the usefulness of CERN. Having a network where we can share information is really good".*

Some interviewees mentioned that there were existing relationships between their institutions and the Helsinki University of Art and Design before merging with the Helsinki University of Technology and Helsinki School of Economics which resulted in the establishment of Aalto University in 2010. Given the success of prior relationships, the interviewees said that their institutions were glad to join the international partnership which has evolved into Design Factory Global Network.

> *"When our institution joined the network, there were only three members: Aalto, Tongji and Melbourne … meaning that the community was relatively smaller then and we were the fourth. We joined due to the strong relationships we already had with the Helsinki University of Art and Design".*

Invitation to join the international network

Some mentioned that they were invited to join the network:

"We were asked to be part of it".

The fact that new members are invited to join the network, suggests that many of them were not aware of the international network when they first initiated the process of establishing their own Design Factories.

Desire for global collaboration on academic projects

A majority of the interviewees indicated their desire for global collaboration as their primary reasons for joining the international network.

We aim to link our programmes and activities with other Design Factories. For example, the Product Development Programme in Aalto University.

Aalto Design Factory is seen as the role model both in terms of industry collaboration and diverse course offerings. Currently, most of the Design Factories from across the world participate in the Product Development Course offered at Aalto Design Factory by linking their own courses with it. The courses offered at the other Design Factories do not have to bear the same name.

In doing so, students from different backgrounds are able to meet and collaborate on a company project. At the same time, managements of other institutions gain insights into different ways of facilitating company-based projects or how to better interact with external stakeholders. The following comment is consistent with this line of thinking:

We consider the global network as an opportunity to work and collaborate with other institutions across the globe. That way, we can explore various perspectives of how a particular thing may be done in different ways.

Support structure

Interestingly, I noticed that whilst many of the long-standing members were talking about creating their own platforms of innovation, almost all the new members were talking about getting support from the network.

Desire for industry collaboration across the globe

Many interviewees cited the desire for international collaboration as one of their reasons for joining the network. According to the data collected, almost all the members are seeking partnerships so that they can work together with industry partners across the globe. At a time like this, when the world is considered a global economy, there is a consensus that international collaboration among the members that provides significant opportunities to their students and researchers beyond their own domains, is important. According to an interviewee:

"Last year, students from our Design Factory and another Design Factory [from another part of the world] completed a project for a multinational company. This is the kind of things that we would like to continue trying out with industry partners especially across national borders.

I observed that in order for an institution to be able to join the network, the status or ranking of the institution does not matter. Using the exact words of one of the interviewees, I found that:

> *"The partnerships [on Design Factory Global Network] are born out of a passion for collaborations and … driven by providing opportunities to collaborative partners irrespective of their status in the world as universities or their rankings".*

The above sentiment was shared by many interviewees. They appear to be more interested in people who share their passions and are ready to work hard at them. Instead of using the rankings of institutions as a criterion for eligibility, the following comment paints a better picture:

> *"We seek partnership with Design Factories that have an objective of bringing industry and university collaboration together, to facilitate and empower students to be part of inter-disciplinary industry engaged problem solving as well as to empower and foster a mind-set through a passion-based innovation programme so that innovation can happen".*

Professor Kalevi Ekman also mentioned that:

> *"We do not have a strict list of requirements that must be met but an ideal candidate must show interest in inter-disciplinary activities".*

All the above reasons align with the four basic purposes of any community of practice platform as detailed in the literature review, that is: to develop and nurture relationships, to learn and further develop the domain of practice, to carry out project tasks and create new knowledge.

Looking from a strategic alliance point of view, motivations cited may also be linked to the following benefits: organisational advantages, economic advantages, strategic advantages and political advantages. As members of Design Factory Global Network, the Design Factories are vehicles through which their constituent institutions intend to achieve certain goals (e.g. inter-disciplinary education at a lower cost and at a faster speed). This is both an organisational and an economic advantage. Similarly, the use of the network to help the parent institution differentiate itself from competitors, is a strategic advantage. Finally, political advantages may be gained through societal engagements.

5.3.   COMPARISON OF "DESIGN FACTORY" CONCEPT WITH OTHER OPTIONS

In the literature review, I discussed other innovative pedagogies that are similar to the "Design Factory" concept. In this part of the interviews, I attempted to find out if the interviewees ever consider adopting other pedagogies instead of Design Factory.

The response of interviewees is summarised as follows:

Design Factory concept solves our challenges in a unique way
A majority of the interviewees said that they were aware of similar initiatives but did not consciously compare nor benchmark them with Design Factory. Many of these interviewees felt that Design Factory concept was the most suitable one for them – as it solves their problems in a unique way.

> *"Yes, there are other types of this industry engagement projects but there is nothing in my mind that is a larger collaborative effort of a group of people working towards shared meaning. So, basically Design Factory Global Network (DFGN) is the only thing that speaks exactly to our interests and exact needs".*

No need to compare with other initiatives due to existing or previous relationships

Many interviewees indicated that even though they may be aware of alternatives, they did not bother to explore them due to existing or previous relationships with Aalto University. This is similar to the earlier observations regarding the motivation to join the network.

It was also observed that almost all the members also belong to other networks – e.g. *FabLab* network - but the members consider the usefulness of each of these networks to be unique and different from others. From the perspective of platform thinking, this has been described as multi-homing.

5.4.　　COMMUNITY OF PRACTICE

As illustrated in Figure 8, Design Factory Global Network (DFGN) may be described as a multi-sided platform that brings together different independent parties to collaborate and attain goals that they are unable to achieve on their own.

As members of the multi-sided platform, the benefits can be analysed from many different perspectives – including from the community of practice and strategic alliance perspectives. The unit of my data analysis is Design Factory Global Network (DFGN) – which, in essence, is a platform connecting various Design Factories. Referring to my explanation of Figure 7, every Design Factory is itself a platform that connects the following stakeholders: students, professors, researchers, entrepreneurs, corporate organisations and other agencies, including governments.

The concept of community of practice can therefore be aligned to platform thinking since each of the stakeholder categories can create a community tailored to their particular interests. Take for instance, corporate organisations interested in partnering with universities to drive innovation: they can team up to brainstorm on how to best achieve this objective. In the same way, students of the various Design Factories may also form a community that can help them to make the most of their opportunities. The interactions between the members of one side of the platform is referred to as the "same-side network-effects" as shown in Figure 6.

Building on platform thinking, the community of practice serves as a platform for people or parties that have similar goals, challenges and interests. Above all, these parties are often willing to share their perspectives and support each other. For example, gone are the days when academic institutions operate in silos. Every university or college now belongs to one community or another. Design Factory Global Network (DFGN) as a community aims – amongst other goals - to partner with institutions that are interested in positively disrupting the education system. In platform thinking, the goal is to achieve "cross-side network effects".

As Professor Kalevi Ekman put it:

> *"At some point when the Design Factories started increasing from two, three, four and five, we started thinking that … what does that mean? Then came the idea that maybe we should arrange a meeting where all of these Design Factories could meet and see each other, know each other and talk about their experiences and so forth. And one of those meetings was held here [in Helsinki], the second one in China, next one in Australia, then in Chile and the next one in Geneva …. The most important action is the Global Network Week. It is a very remarkable investment of time and money, if you travel to one place from some distant location and you spent the whole week of your time there. A lot of efforts have been put into planning and arranging the programme, so that every member can have the feeling that when they go back home, they would have something to bring with them … a lot of ideas, maybe some help from other network members for some burning problems they have at home".*

The International Design Factory Week continues to serve as the meeting point where all members of the various Design Factories from around the world meet once a year. A sample of the scheduled activities for an International Design Factory Week is available in Exhibit 3.

Sharing is essential - what you bring to the table is what you get

Sharing is an important aspect of the Community of Practice, and it goes a long way to influence the growth of the network. As mentioned by an interviewee:

"I believe that this is how disruption can happen. What we bring to the table … what we contribute and how we can help each other to foster Design Factory concept is a critical success factor. So, it is not what we get, it is what we bring".

Sharing is an essential component of any successful community. Every Design Factory has its own strengths and weaknesses. By coming together as a community, the unique capabilities of individual Design Factory can be harnessed and explored to strengthen the others.

"I think it is a good thing that different factories have the opportunity to hear about each other, what they are doing and how they are different. It helps you to specialise your own niche because we should not all do the same thing we should do something that makes us unique".

Leverage each other's unique capabilities

Look at some examples: the Korean Design Factory is located in a "hi-tech" vicinity, IdeaSquare belongs to one of the largest Science research institutes in the entire world. Design Factories in Chile and Columbia provides access to the Latin American world whilst Melbourne Design Factory has a strong presence in Oceania. The idea is that, there are representatives from almost every corner of the world in the network and this presents substantial benefits. The following comment was made by an interviewee:

"We are certain that by working with other members of Design Factory Global Network, our professors will gain insights into new, perhaps, better ways of doing things. This may include methodologies, pedagogies or opportunities to participate in foreign funded projects".

I observed that the members of the network are genuinely interested in using their capabilities to assist others. For example, the PhD Surf School introduced by the Melbourne Design Factory is an initiative that other members can easily leverage as a form of international collaboration.

"We want to extend our knowledge and share our discoveries with all the universities involved in the Design Factories and share supervision knowledge with supervisors so that they can become better at their jobs and not just have the candidates rely only on the supervisor-candidate relationships".

Our strengths lie in our differences

Just like any normal community, there are differences: differences of opinions of members, differences in economical situations, time and cultures. According to an interviewee:

"We have a lot of differences … for instance, differences in cultures, time-zones, economies, academic styles and calendars. These differences make our collaborations and the tension through community of practices".

Despite the many benefits that can be derived, the community has its challenges. An interviewee said:

"I think it is actually a community of practice that is organically growing and regenerating itself according to needs. It is not all communities of practice that are perfect. Not everyone agrees and there is a consistent tension but the rigour and tensions are important for healthy communities and exerting new models of knowledge".

The above comment reminds me of what the literature say concerning the lifecycle of a typical community of practice. According to the authors (Cambridge, Soren, & Suter, 2005), every community is like a living organism - dying and growing. Given the rate at which Design Factory Global Network (DFGN) has been growing, I would place it in the "growth phase" of the lifecycle described in Figure 3. In order to progress to the next level of development - the sustain phase – the expectations of both the members and central administration must be properly managed. In addition, tensions in the community and any other challenges have to be tackled with caution.

One challenge mentioned by the members of the central administration team, which was also repeated by Professor Kalevi Ekman is the fact that:

> *"One thing that is not nice is that there are times, when we say to some members, send us pictures, send us information about your Design Factory … and they say, we are too busy … and end up not sending the needed information. Then we think, so why are you here?"*

Sometimes, certain materials are required from members for publication purposes as well as reporting to the management of the Aalto University – in charge of funding the mothership of the network.

5.5.   STRATEGIC ALLIANCE

As a purposive relationship between two or more independent parties aimed at achieving specific goals which neither party would not be able to achieve on its own, strategic alliance has become an important tool used by organisations to grow and access opportunities. Many researchers (Kemppainen, 2016; Study.com, 2017) have discussed the many opportunities that have become available to institutions when they come together as a collective.

I have already discussed the benefits of the network from the point of view of a community of practice. Whilst a community of practice helps the members to support and create value for each other, the concept of strategic alliance makes it possible for the members to create value not only for themselves but for outsiders as well.

Accenture (2016) reports that corporate organisations are increasingly capturing new growth opportunities and driving ground-breaking innovations through the value-creating power of their platform ecosystems by tapping into the capabilities and knowledge of strategic alliance partners such as academic institutions.

During the interviews, I asked questions that were focused on exploring Design Factory Global Network (DFGN) from a strategic alliance point of view. Many interviewees mentioned value-creating opportunities - both for themselves and for their strategic partners (mostly corporate organisations) - as one of the many benefits:

Opportunities for partners
As one interviewee noted:

> *"We can take advantage of our differences in our cultures, time-zones, economies, and academic expertise. By leveraging these differences, we can provide unique opportunities for our stakeholders and partners. For example, we can say to an industry partner. Hey! Do you want to try some user testing in Finland and Australia? We can do that for you. So, we have strengths in our diversity and our capability".*

The collaboration between Design Factories in Korea and Melbourne with Cisco Corporation is an example of how different members can jointly and strategically achieve their goals.

Even a new member that recently joined the network – a few months ago - has already begun an international collaboration with another member for a multinational corporation that has branches in the two countries:

> *"Although we are one of the newest members on the network, we have already started benefiting from quite a range of prospects. One strategic alliance initiative that has recently emerged is an opportunity for us to collaborate with another Design Factory in our neighbouring country on a project for a corporate*

organisation that has operations in both markets. The idea is for each of these Design Factories to tackle the same challenge from different perspectives for the company".

The above illustration is consistent with the experience of Professor Kalevi Ekman, who said:

"I can see clear advantage and benefits for our business partners, when there has been a Design Factory in China. Many of our business partners were interested in that ... they would sometimes say ... hey we have a factory there, or we have an R&D unit there or we have never been in China ... can we visit Design Factory and see how they can help us?'"

Design Factory brings variety to available projects and improves the chances of success of entrepreneurial ventures

This alliance also brings variety to the available project range. One respondent indicated that:

"We consider the alliance as an opportunity for us to broaden the variety of projects that our students of entrepreneurship can work on and possibly take forward as an entrepreneurial venture".

On a personal level, I took an Innovation Internship Project (i2P) course at the Design Factory. This course was jointly hosted by my school (Aalto University, Finland) and the ESADE Business School, Spain with industry sponsors coming from the two countries. As students, we spent some time on each other's campuses and conducted market research in both cities: Barcelona and Helsinki. At the end, the idea and prototype that we developed was considered novel and positively disruptive. Our sponsor – which was Nokia Technologies - was very pleased with the outcome. Upon completion of the project, we are now exploring the possibilities of taking the project forward as an entrepreneurial venture.

Every Design Factory hub has a chance to make a difference

Leveraging the uniqueness of every member is the essence of any network. For instance, there is only one Business School on the network at the moment whilst others are technically-oriented. The following comment of the interviewee is noteworthy:

"As the only Business School in Design Factory Global Network, we are confident that we will be able to balance the business-technical initiatives of the network. Last year, we were ranked in the top ten in the world in entrepreneurship. Also, we are able to explore how the project-based courses can be linked to entrepreneurial pathway".

In spite of all the seemingly countless possibilities and opportunities to be harnessed, my attention was drawn to some challenges that make these opportunities difficult to realise.

Physical distance was cited as a serious hindrance by many of the interviewees, especially those outside Europe.

"It is still difficult for us to collaborate with other Design Factories in the network mainly because of the physical distance. Whilst it is relatively easy for those in Europe e.g. Aalto DF (Helsinki), IdeaSquare (Geneva), Barcelona, Porto, Riga etc. For us the distance and the cost of travelling can be quite overwhelming".

Another interviewee talked about the same issue from the following angle:

"If you give students an assignment and they are not in the same physical space, it generates challenge. We know this and we have studied it. We know already what kind of thing that students can do when they are together and what they cannot. Even so, we still believe that we can do work together better. There have been experiments, smaller ones, such as the "rat relay" competition. It is a first step in the right direction but it is still centred around Aalto University. We are very open to this idea and we would like to see it happen".

It is interesting to know that attempts have been made to solve the challenge associated with physical distance.

The rat relay was mentioned by many of the interviewees as a novel idea. Here is a short description. The rat relay is a problem-solving game – like a hackathon except that the participants are not in the same place. The participants are members of Design Factory Global Network (DFGN) scattered all over the world and they work together for a given period at a stretch (non-stop). Each of the problems-to-be-solved originates from a different source. If the first comes from Aalto Design Factory, then after the problem has been worked on for about 8 hours, it is then passed to another Design Factory (e.g. Porto Design Factory), after another 8 hours, it is then passed to another (e.g. Design Factory Javeriana) ... this passing around of a part-solution continues until every participant around the world has contributed and eventually it goes back to the starting point (Aalto Design Factory). Meanwhile, once a team submits their solution to the next team they are immediately given a new challenge to solve – and this continues for 48 hours. More information on the 2016 rat relay can be found in Exhibit 4.

The challenge submitted to the hackathon by Aalto Design Factory came from a corporate organisation that was seeking innovative solutions regarding the European Refugees problem that was very topical at that time. To paint a background context, the issue concerned the time when the refugees first arrived and were super excited about finding something to do in the new country e.g. find a job, but found that, for over six months, they were not eligible to do anything because of documentation. The challenge was: what could be done in order to give these young and able people a faster start?

In the words of Professor Kalevi Ekman:

> *"One of the things to learn from this competition is that, how can you transfer the result of your work to the next people, so that they will understand what you have been doing? ... We learned a lot about the difficulties that have to be overcome in order to facilitate such collaborative problem-solving".*

Apart from physical distance, interviewees especially those from Latin America indicated language as a barrier.

> *"So far, our involvement in the activities of the global network has been negatively affected by language barrier among others. Until recently, we were the only Design Factory that speaks Spanish (almost all our students don't speak English). This has made collaborations relatively difficult for us as a part of the network".*

Differences in academic calendars and time zones were also mentioned to be sources of challenges. In some parts of the world, the academic calendar runs from January to December, whilst in others it is from September to June.

> *"As a result of different time zones – many times when we are in winter most others are in summer. We start our semester in March while many others start in September which makes it relatively difficult for our students to collaborate on projects".*

Needs for Design Factories in more developing countries

This point came from only one interviewee. It can be considered as an outlier, however, I thought it warrants discussion.

> *"My guess is that if there is a Design Factory in Ghana, Tanzania, Lagos or even in India, we will be super eager to collaborate. For example, most of the exercises we give our students are very theoretical. They are done in a vacuum! The students here, they are born with Wi-Fi. So, if they want to help and want to help a seven-year old kid in Ghana to learn English, what do they do? They come with Samsung 7 with some nice apps and everybody here claps saying fantastic, fantastic!!! ... but you can ask five simple questions which will illustrate, even for me, that this is insane. Why? Because there is no connection whatsoever with the kid or his/her parents or the elderly in the village. We don't know if they have electricity, we don't know if there is network available not to mention wireless service in the field. And when the kids are in the fields, do you think they will have time to use Samsung 7? Here, it works well but*

it may not work in some other places. So, the key point am making is that if we have a Design Factory in Africa am pretty sure that these guys will be super busy if they are able to connect in a meaningful way. I think this guys will be very popular. Everybody would like to work with them because there will be, for once, a challenge which is connected to the real environment with people who really understand or at least are closer to it than here".

As already mentioned, most Design Factories aim to act as agents of positive change in their societies. And this is one of the interesting aspects of the global network, the fact that it makes it possible for different hubs to collaborate on projects that matter to them. Consider the above comment. In spite the fact that this particular Design Factory has everything it takes to make a positive difference, the interviewee felt that that there is a missing link. Even though the students have the right skill sets to make an impact, they can only work on abstract ideas mainly because there is a limited connection between their projects and real-life occurrences.

This interviewee is very optimistic partnering with other Design Factories especially in developing countries. In this way, it will be easier for them to work on challenges that have a direct impact on real people. Although, Africa was mentioned, the comment applies to other developing countries in the world.

5.6.   FUNDING THE NETWORK

At the moment, the sustenance of the central administration of Design Factory Global Network (DFGN) hinges on the annual budget of Aalto University. Professor Kalevi Ekman explains what is meant by the central administration as follows:

"There are people who have been spending a part of their time and brains for keeping the network alive. This includes providing support for members in need of assistance, being in touch, asking questions, arranging the next International Design Factory Week, sending emails etc. That is the network. Otherwise, the network is not anything that you can switch off or on".

As reported by Kemppainen (2016), Aalto Design Factory is currently satisfied with having its expenses covered when offering support and other related services to other members in the network. Professor Kalevi Ekman further mentioned that:

"We (Aalto Design Factory) are not making any profit and I guess that we will never make any profit. Design Factory Global Network (DFGN) is not a money-making machine. Aalto University does not intend to make money through this kind of education export".

It is important to ensure that requests for assistance made by the network members do not overwhelm the personnel of the central administration at Aalto Design Factory, nor cause too much expenses for Aalto University. Professor Kalevi Ekman asked the following question:

"What happens when Aalto Design Factory staff are spending significant portion of their time supporting the network?".

The above question is relevant given the rate at which the network has been growing in the past five years. In light of the unexpected, sudden and very large decline of Finnish government funding in 2016, about 350 jobs (17% of workforce) were cut in Aalto University (Aalto News, 2017). This occurrence makes it clear that there is a need for alternative sources of revenue.

"We (Aalto Design Factory) felt that maybe in the long term, it could be healthy for the family members to pay annual fees that cover the salaries of these two personnel".

Further, I asked participants to share insights into how they can contribute to the financial up-keep of the network. Given that they are all aware of the intention of the central administration to introduce annual membership fees,

I also used the opportunity to solicit their opinion regarding how the network can generate revenue from alternative sources. This part of the interview sessions turned out to be the most emotional and yet very insightful!

Long-standing members are unwilling to pay membership fees but proposed other options
One of the things that stood out very clearly was the fact that the long-standing members who are also less dependent members, do not agree with the idea of annual membership fees. No explicit reasons were offered. However, the following two reasons were made clear.

> ***Reason #1:*** *It is too early to charge annual membership fees*
> *"We are currently building our own capability right now. I think that if you start charging subscription fee to pay Design Factory Global Network (DFGN) … I don't know if we have enough funding to pay these things. So, I will just say that it is too early to do these things … I don't think that it is a good idea to come up with a subscription fee now. I strongly object to the payment of subscription fees".*

> ***Reason #2:*** *Sending cash is difficult to explain to authority*
> *"Sending cash is always difficult. Just sending cash. I think universities are more readily willing to pay for conference fees … sending an individual to participate, the fees can cover some little overhead for the network. But to ship or transfer money to Helsinki will be difficult to explain to the finance department and top management".*

Even though independent existing members generally disagree with the notion of annual membership fees, they came up with quite a range of alternative options. For instance, one interviewee proposed the use of a central bank account referred to as a "central pot".

> ***Option #1***: *The use of a "central pot"*
> *"I have discussed a couple of ideas over the past two years and one is that every member pays a subscription amount into a central "pot". And there will be some strict criteria built around that pot for how it will best to use the funds to support the global Design Factory network that is one. It is very separate from the central administration and the running of Design Factory network".*

To be sure I understood, I asked for clarity and the response was that:

> *"By a central pot, I mean putting money in the pot and then collectively decide what we (members) are going to do with that money … whether it is to hire an additional staff, to support the central administration or whether it is support a Design Factory which does not have enough money".*

Whilst the idea of a "central pot" seems logical, it will be very easy for things to become complicated especially given the intrinsic differences discussed earlier.

> ***Option #2***: *"in-kind contribution" from every member of the network*
> *"We prefer to contribute either people or in-kind, knowledge … We would have a visiting staff member from our Design Factory come to assist or part of their job could be that they would allocate 50% of their time to helping with Design Factory Global Network (DFGN) strategy or administration or web design or communication or stakeholder management with industry partners … whatever".*

As a way of supporting the central administration of Design Factory Global Network, some interviewees suggested the possibility of devoting time in assisting with tasks specific to the network. This support could take the form of web design, report or article writing or travelling to other Design Factories to provide the needed support.

Option #3: *Allocation of a certain percentage of every member's budget for the network's financing*
"Maybe we can agree that 20% of each DF's funding should be allocated to the global network's activities but not sent physically to Aalto Design Factory".

This arrangement proposes that every member of the network would set aside a certain percentage of their annual budget to be used in financing the network-related expenditure. The idea is that no matter how big or small every member's annual budget might be, an agreement should be reached regarding what percentage every member must reserve for network related activities. Some interviewees consider this option as a possible work-around the challenges associated with the sending of money to the central administration of the network. I think this option would be difficult to manage and might introduce unnecessary complications or friction in the administration of the network.

Option #4: *Charge for participation at special seminars organised at annual events*
"What I would do is to charge for participation in certain seminars or dedicated events. Or promoting student's projects where the hosting costs will be covered".

New members are willing to pay
All the new members that participated in the interviews indicated their willingness to pay annual membership fees. I also found that they all have expectations about what the network would give them in return but there was no clarity or certainty on what these expectations are. As one respondent mentioned:

"We are happy to pay annual membership fees to belong to the network, but we need some clarity on what we are receiving in return. Also in the process of joining the network, we were expecting that there will be signing of some documents (formal agreement) but it turned out that there isn't – especially when it involves significant investments from the partners. You want to do it knowing that you have a protected position in the network".

In subsequent interviews, I asked participants who had joined recently whether they signed any documents as part of the joining process, but they all replied in the negative. There were also common strong feelings regarding Return On Investments (ROI). Some already have timelines in mind regarding when their goals of joining the network should be realised. According to most of them, they should already start seeing positive results and within five years of joining, all their goals should have been fulfilled. I asked what these goals were. They mentioned:

"the number of projects in collaboration with other DFs, number of contacts for research and number of students interested and effectively taking courses in universities within the network".

Although it was not part of the question, one of the new members raised the topic of what a fair amount to be charged as annual membership fee should be.

"From our point of view, we can pay a fee to be a part of Design Factory Global Network (DFGN) but probably it is less than what you expect … 5000 euro … is a lot of money for us … and we cannot pay that, probably it will be rejected by the authority. As a reference … the amount we pay to be part of other international networks … Cumulus network (1000 eur), Icsid (1300 usd), Nasad (1300 usd), Ico-D (1000 usd approx.) … Maybe we can pay according to our economic realities".

The **Cumulus Network** is also known as the International Association of Universities Colleges of Art, Design and Media. **ICSID** refers to the International Council of Societies of Industrial Design. **NASAD** refers to the National Association of Schools of Art and Design and finally, **ico-D** refers to the International Council of Design. These associations are specific to the "design" field of study and they aim to promote excellence therein.

The above comment is in line with the concept of "multi-homing" discussed in the literature review: belonging to multiple platforms serving a related purpose. As the central administration of Design Factory Global Network

(DFGN) deliberate on whether or not annual memberships fees should be introduced, the existence of multi-homing should be kept in mind.

I found that almost all the members of the network have a similar funding model that depends mostly on the budget of the parent institution. However, in the case of one interviewee, the funding that their Design Factory receives from the parent institution is only for the first three years of its existence, after which they are expected to start generation of revenues on their own. When asked how they plan to achieve that, the response was:

> *"We are exploring various possibilities of raising our own money through sponsorship. And this is exactly the kind of product that we are currently designing. The question to the corporate relations working with us is that: which kind of products can we create to interact in a meaning way with the corporate world. Meaningful to our students and meaningful to the companies. Evidently, we will offer sponsorship package for a fixed period e.g. three years of a fixed annual fees. With these fees, what are the things that the sponsors would get in return? Students' projects, giving them access to the space, workshops facilitated by Design Factory faculties and giving them visibility to the space. This is the kind of interaction and products that we are thinking of".*

So, what it means is that this Design Factory must be in a position to generate its own funds after three years, otherwise it may seize to exist.

Another point raised during the interview sessions was the fact that there are no clearly stated rights and obligations of the different stakeholders of the network. Using the words of an interviewee:

> *"The central administration of the network should clearly establish what are the rights and responsibilities that we have as members. I think the consequences of it is that everybody will have to understand the roles in the network in a much clearer term … I think it will make the network to be more professional and formalised".*

The rights and responsibilities (or obligations) mentioned by the interviewee refers to what the central administration expects from members (e.g. the do's and don'ts) and what members should expect – in return - from the central administration (e.g. expected benefits).

5.7. THE CURRENT BUSINESS MODEL OF DESIGN FACTORY GLOBAL NETWORK

In an effort to develop a new Business Model for the network, I felt that it would be useful for me to first describe the operations of Design Factory Global Network (DFGN) by using the nine building blocks that will be used in constructing the new model. With this approach, it will be easier to understand the underlying assumptions and justifications of the proposed Business Model.

At the heart of every business are the customers, as such I will commence with the Customer Segment.

5.7.1. CUSTOMER SEGMENT

At present, the **Customer Segment** of Design Factory Global Network (DFGN) focuses on:

- Customers: Staff members of the various Design Factories
- End users: Students in each of the Design Factories

As already explained, customers refer to the section of the Customer Segment that pay for the products/services. In the context of Design Factory Global Network, the staff members of the individual Design Factories are considered to be the customers. This is because, in addition to running the hubs, they are also responsible for sourcing the necessary operational funding of the habitats.

So far, the Business Model Canvas looks as follows:
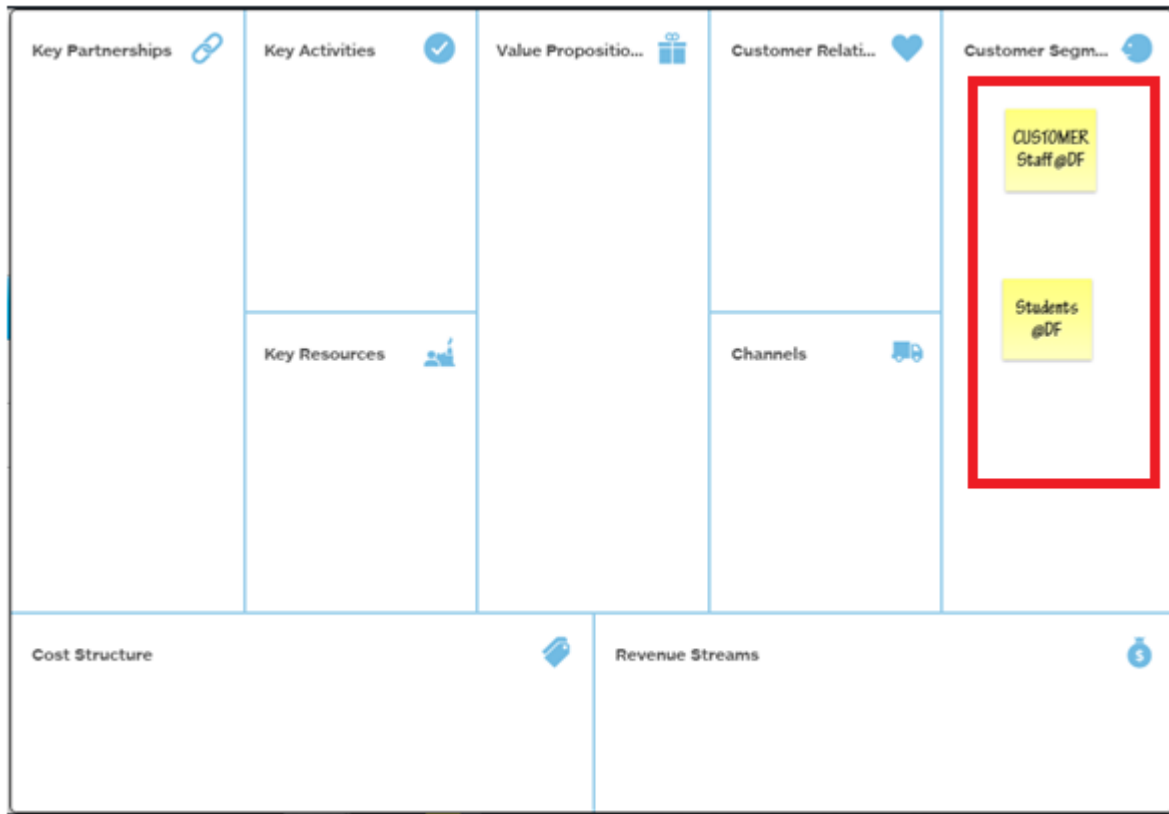
Figure 10: A typical Business Model Canvas

5.7.2. VALUE PROPOSITIONS

The Value Proposition Canvas (VPC) will be used to make sense of the **Value Propositions** for the above customer categories:

Value Proposition Canvas (VPC) for Staff members of the Design Factories

The responsibilities of these staff members are typically split between their roles as a member of the host institutions and the Design Factory.

As part of the host institutions, they are obliged to teach and conduct research. By extension, being part of the Design Factory, these staff members often strive to get the "**jobs**" done:

- **Multi-disciplinary approach to learning:** Facilitate multi-disciplinary education by engaging professors, researchers and students across different fields.
- **Engage with the society:** Solve real life challenges in their surrounding communities.
- **Practice and theory:** Provide practical application of theoretical knowledge.
- **Provide better learning experiences:** Offer student-centric pedagogical approaches in an effective and innovative manner.
- **Experimentation:** Provides an opportunity for staff members of the various Design Factories to explore their passions in teaching and learning through an experimentation approach. One of the pain that most members currently experience is that of being a lone champion. Design Factory Global Network, as a community will help solve that problem by serving as a support structure and community of practice.
- **Tangible examples of innovative teaching and learning techniques:** In their quests to innovate, these staff members generally seek to learn from tangible implementation of teaching methods.
- **Validate disruptive pedagogical ideas:** Professors, who have "ideas" that may be considered "crazy" or disruptive often seek outside validation of by looking around for support and top-management buy-in.

The Value Proposition Canvas (VPC), as described already, makes it easy to design, test, build and manage Value Propositions that match Customer's needs and jobs-to-be-done. Figure 11 shows a fit between the offerings of Design Factory Global Network (DFGN) and the needs of the customers (staff members) in a more systematic way.
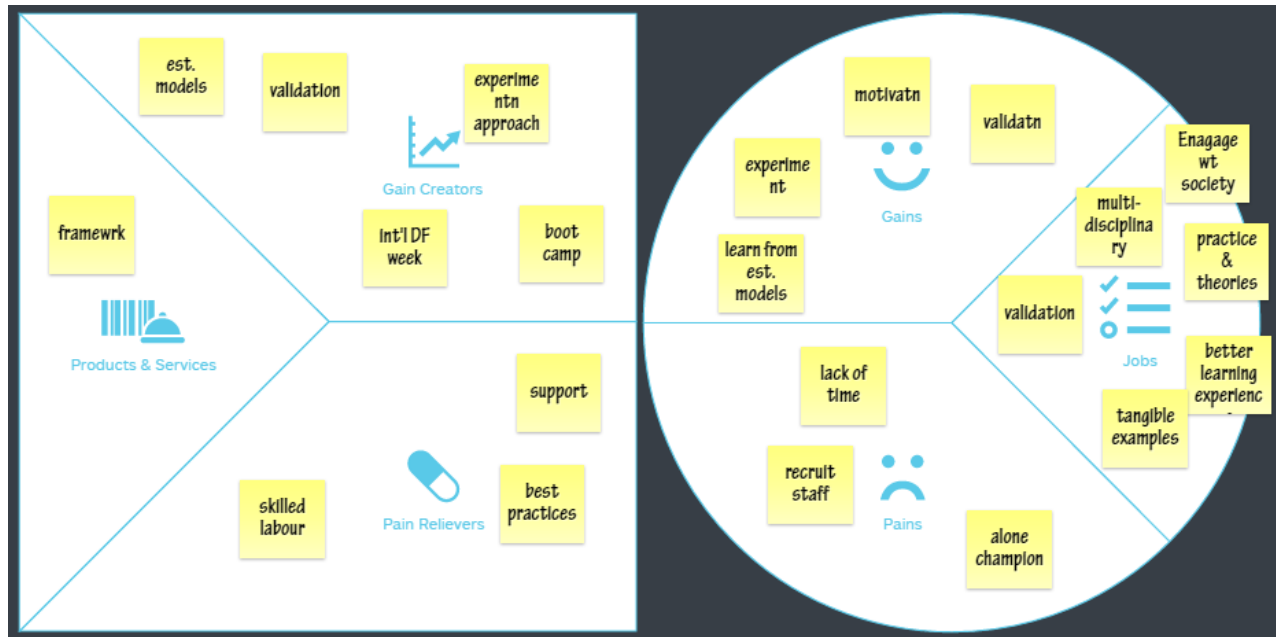
Figure 11: Value Proposition Canvas (VPC) for Staff members of the Design Factories

The network creates value to its customers (staff members) by addressing their pains as discussed below:

Driving change alone: Often times, most people who are interested in the ideas of Design Factory are those who want to facilitate positive changes in the way to educate or teach. As an individual, it is more difficult to drive and facilitate positive changes in any setting – be it in a society, an organisation or educational institution. As a pain reliever, the network offers a **support** structure in a variety of ways to anyone who is passionate about facilitating the kind of education that the "Design Factory" concept represents. In the process, the concerned staff members will be able to **gain** from the experiences of **Subject Matter Experts** from around the world on various relevant topics at events such as the **boot camp** and the **International Design Factory Week**. The staff will also be given the opportunities to **learn** from a model that has been tested and successfully implemented across the world. All these opportunities/experiences will provide some form of **validation** and also significantly strengthen the intrinsic motivation of the staff member to forge ahead with the implementation of the desired changes.

Lack of time: There are times when a staff member may want to explore some new approaches of teaching but may not have the time to experiment with the underlying concepts or ideas. The pool of methods and best practices of Design Factory Global Network (DFGN) can easily be leveraged and adapted.

Recruitment: It may sometimes be difficult or time consuming to find someone with the right credentials, experience or qualities to facilitate passion-based student-centric learning – amongst others. In such a case, the diverse talent pool and skill set available on the network can be very useful.

Value Proposition Canvas (VPC) for the students

The students are the end users but there are no direct interactions between them and Design Factory Global Network. The assumption is that, by empowering the individual Design Factories to achieve their goals they will invariably help the students to meet their needs as well. The following are some of the needs and desires which students are aiming to achieve:

Employability: Education that improves the chances of being able to earn a living either by running their own businesses or securing employment with reputable firms.

Memorable experience: Learning experience that is unique, relevant and memorable.

Fun: Most traditional teaching methods are boring. Students often enjoy learning methods that are interactive, engaging and explorative.

Freedom to express ideas: It is one thing to understand concepts but a completely different thing to be able to explain them. Students find it useful when given the freedom to express ideas.

Networking: Meeting and making new friends are necessary to both personal and professional development. Students desire education that gives them opportunities to achieve these personal goals.

Figure 12: Value Proposition Canvas (VPC) for the students

The network creates value to its end users (students) by addressing their pains as discussed below:

Silo: Silo in this context refers to situations where students only study with people from their own fields, for example, Mechanical Engineering students working on projects together. As already explained, Design Factory courses are all multi-disciplinary and a majority of them are linked to projects from real companies. As gains, students who participate in such projects get more than practical application of their theoretical knowledge but are also given opportunities to work with smart students from other disciplines. Most of these projects may also have international partnerships where students work in close collaborations with students from universities abroad. At times, companies provide mentor(s) who often provide guidance to the students and also provide the needed industry knowledge. This experience offers students international exposure and help them to be more culturally mature as they develop their soft skills. Whilst student develop both professionally and personally, they also become better aware of their strengths and problem-solving approaches and abilities.

Too much theory: Education that is based on too much theory is fast becoming irrelevant. To be competitive, students must be given opportunities to apply theoretical concepts in solving problems – in the process, they will **learn by doing**. As pain relievers, Design Factory concept offer courses that are based on real life challenges. The fact that there are no right or wrong answers encourages students to be creative and explore different ways of tackling the problems. Thus, using the **learning by demand** method – finding out and learning and exploring any concepts and/or acquiring whatever skills that will enable them to develop a working prototype that solves a problem.

Boredom: Most traditional approaches to teaching are one directional, with the professors doing almost all the talking whilst the students listen passively. This can be boring to students. In comparison, the courses offered in Design Factory are considered more fun and engaging because of the pedagogical approaches used.

Having developed the Value Propositions, our Business Model Canvas looks as follows:

Figure 13: Value Propositions of Design Factory Global Network
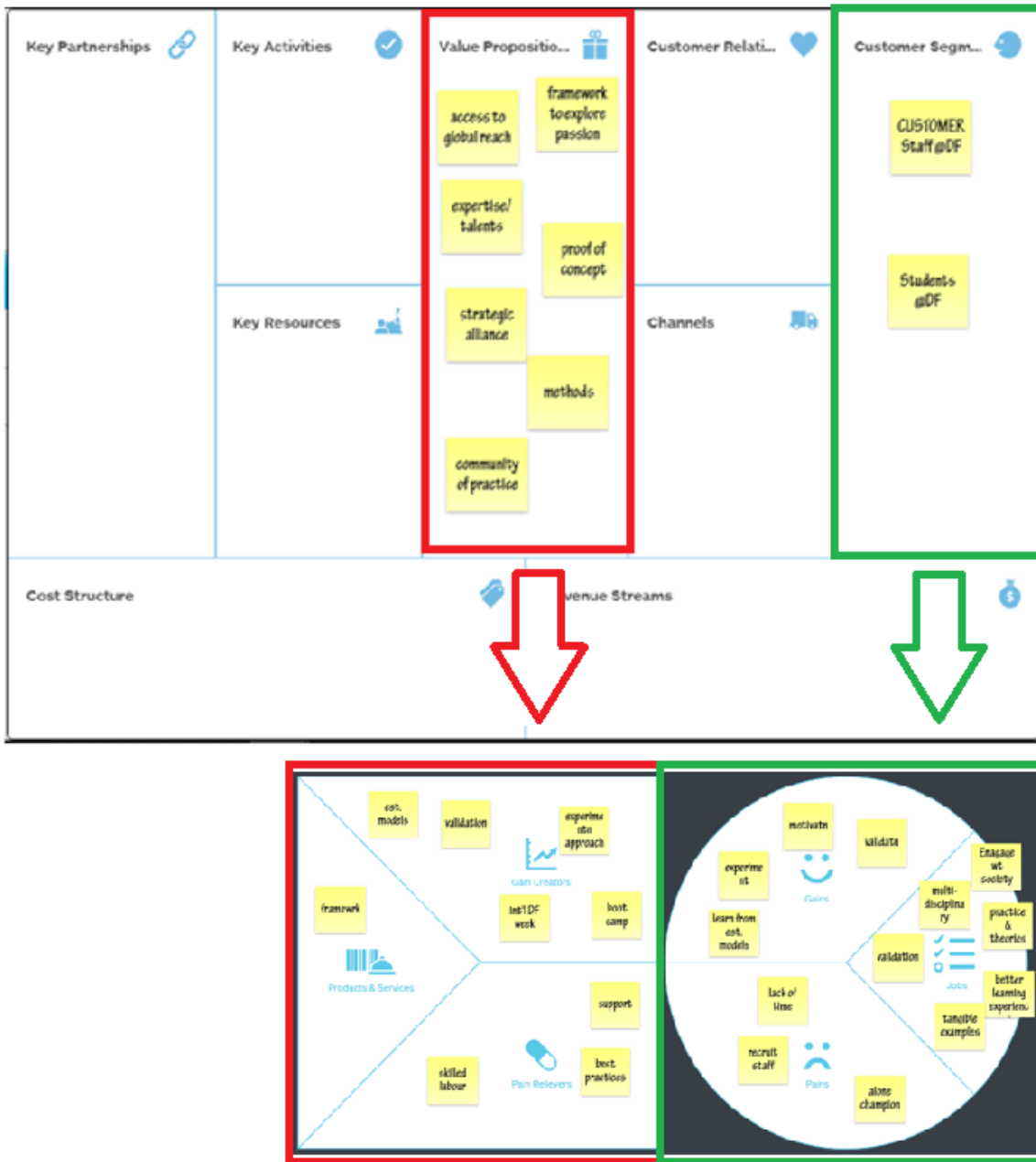
Figure 14: Mapping Value Propositions Canvas and Business Model Canvas

5.7.3.   KEY ACTIVITIES

Figure 15: The Key Activities of Design Factory Global Network

The following are examples are key activities of the network:

Documentation: This refers to the various documents that encapsulate and/or describe the "Design Factory" concept. For example, the website, atlas, publications, thesis works, among others. The documentation as a key activity may serve as a proof-of-concepts for members looking to validate or try out some ideas.

Tailored training: As part of the support structure to other Design Factories, the mothership sometimes organises trainings that are tailored to the context of the particular member.

International Design Factory Week (IDFW): This is a gathering of all the Design Factories in the world under one roof. This is an annual event and it usually takes place over a period of one week and the hosting is rotated. For instance, the 2014 version was hosted in Melbourne (Australia) and the 2015 edition was held in Santiago (Chile). A sample schedule of activities of the International Design Factory Week is available in Exhibit 3.

The "*DF Boot camp*": The boot camp is targeted at parties that are interested in knowing more about the "Design Factory" idea. The boot camp focuses on teaching participants about the concept. These people, typically, would visit Aalto Design Factory (ADF) and be taken around the factory on a tour with workshops on some of the methodological approaches.

Visitation: As part of the process of getting to know what the "Design Factory" concept is all about; interested candidates often pay a visit to Aalto Design Factory (ADF) facilities. In addition to those who are planning to set up their own Design Factories, Aalto Design Factory (ADF) is frequently visited by prominent personalities such as the Presidents of Russia, King of Sweden.

One-on-one support: Inasmuch as it is useful to brainstorm in groups, some challenges are specific to certain hubs rather than the others, as such the nature of activities needed to tackle these problems are done on a one-on-one basis.

Match making: The network also assists members who are looking for potential talents to source qualified professionals. If the administrators of the network get information regarding the qualities of a potential employee that are most important to the employing member, then other members within the network, meeting those criteria, are contacted regarding whether or not they would be interested in these opportunities.

5.7.4. KEY RESOURCES

Figure 16: The Key Resources of Design Factory Global Network

The key resources include the following:

Design Factory Topic Experts: These are the individuals that have deep understanding, expertise and experience of how the Design Factory concept works. The members of the central administration fit into this category as they have spent some time overseas as part of different Design Factories. Their experience includes helping other Design Factories with general factory-setup, curriculum development, providing insights and advice on the various methodologies and styles of working of the concept. Members of other Design Factories who have gained relevant experience may also function in this role.

Pool of methods: These are the different approaches used in ensuring that the goals of the "Design Factory" concept are achieved.

Knowledge across Design Factory Global Network: The experiences and knowledge gained by members over the years are important intangible resources that can never be over-emphasised.

5.7.5. CUSTOMER RELATIONS
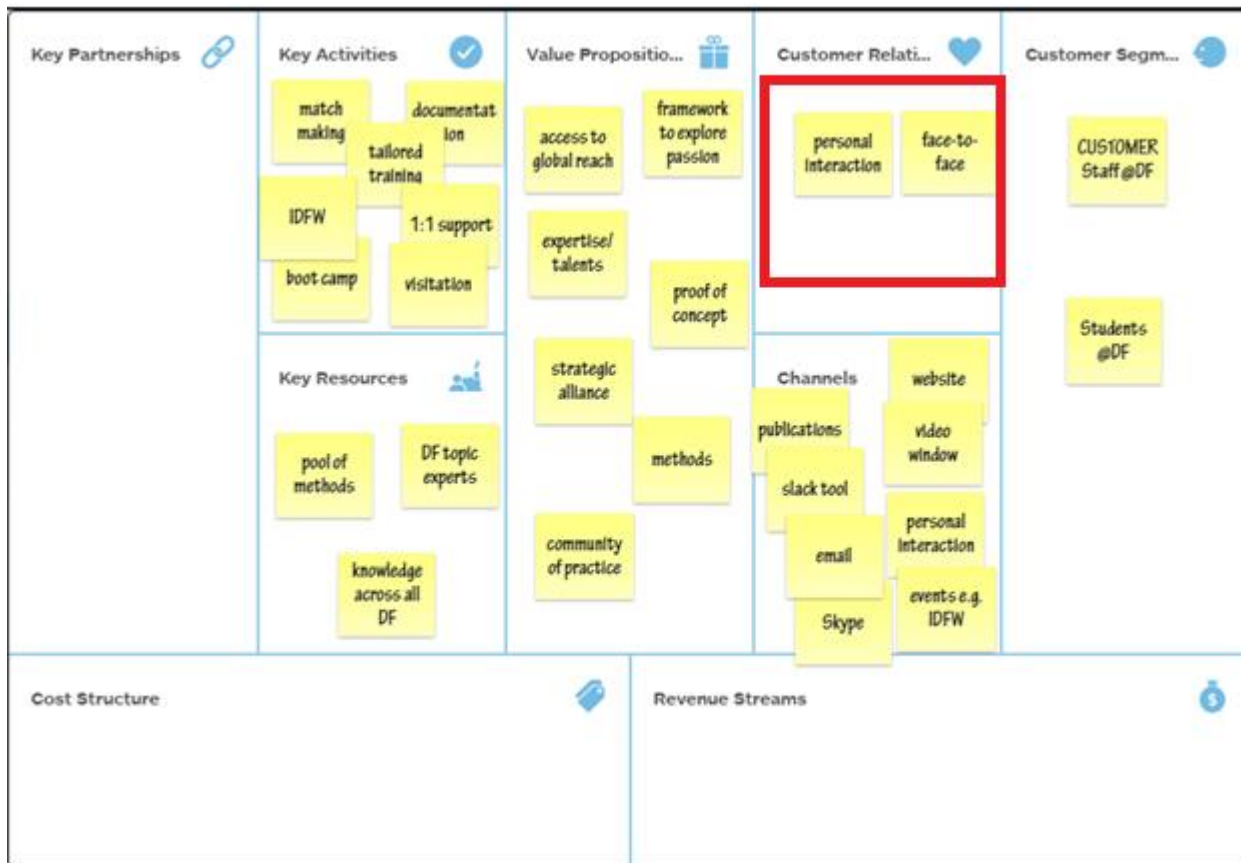
Figure 17: The Customer Relations of Design Factory Global Network

Customers often prefer to be interacted with through the following:

- **Personal interactions:** Staff members of the Design Factories usually prefer personal interactions whilst communicating. This mostly happens through Skype, video windows and during events such as the International Design Factory Week (IDFW) and the "DF Boot camp".
- **Face-to-face:** In the context of the network, face-to-face interactions are used to explain the fact that some customers require the physical presence of the other party as part of the engagements. To achieve this, the party with the desired expertise may be temporarily hired and brought on-site with complete commitment to the task at hand. An example was when Design Factory Melbourne needed someone who understands the concept of Design Factory and is also familiar with the people. This process was completed by hiring Paivi Oinonen and bringing her to Australia for a full assignment for six months.

5.7.6. CHANNELS

Figure 18: The Delivery Channels of Design Factory Global Network

The following channels of communication are currently being used:

- **Publications:** There are various publications from the network. One such publication is Design Factory Global Network (DFGN) Atlas. It is a periodical report that aims to convey what has been happening in the various member Design Factories and within the network since the last issue.

- **Slack:** This is a cloud-based team collaboration tool. Materials can easily be shared and communication can be grouped into different Channels. The tool is easily integrated with other software and the content is searchable (Duffy, 2016).

- **Email:** More formal communications are mostly done via emails. Further, emails are also used for file sharing and solving relatively simple cases.

- **Skype:** Remote engagements that require voice and visual communications (e.g. meetings and brainstorming sessions) are often held on Skype.

- **Personal interactions:** The majority of the various methods of communications go beyond simply exchanging information. The physical presence, emotion, facial expressions and tone of the speaker's voice play an important role in the effectiveness of the communication process.

- **Events:** The main events are the International Design Factory Week and the Boot camps.

- **Video window:** This refers to a big screen – similar to Skype's video chat feature - that displays the activities taking place in a particular central venue at each of the hubs. At Aalto Design Factory, the video window is located in the kitchen (a central spot where people often converge to dine, hold meetings and socialise). People at both ends can see and signal to each other but voice is not activated. During the launching of Design Factory Melbourne – in 2011 – people at Aalto Design Factory were able to join in the celebration via the video window.

- **Website:** The website of Design Factory Global Network (DFGN) (www.dfgn.org) provides an overview of what the network aims to achieve as well as brief descriptions of - and links to – all Design Factories in the network.

5.7.7. COST STRUCTURE
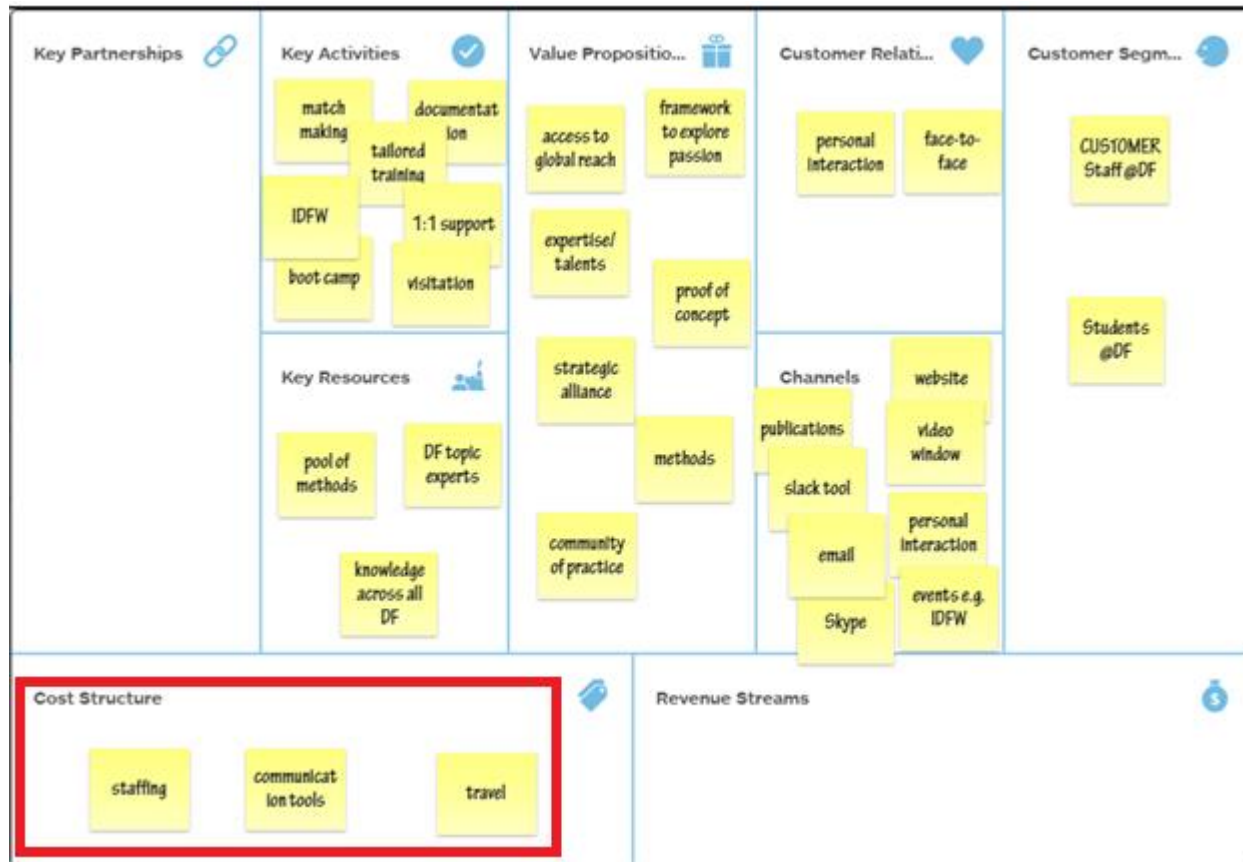
Figure 19: The Cost Structure of Design Factory Global Network

The costs incurred in maintaining and sustaining Design Factory Global Network (DFGN) currently fall into three categories:

- **Staffing:** Members of the network, especially the newly established hubs often require support from the mothership of the global network. This support differs in complexity and may take different shapes and forms depending on the needs and contexts of the member. The support provided by the mothership is essential not only to the growth of Design Factory Global Network (DFGN) but also in making sure that each member accomplishes its set goals. To provide this kind of support structure, it is necessary to have dedicated human resources at Aalto Design Factory.
- **Communication tools:** In order to fulfil the value propositions mentioned earlier, there are needs for effective communication in the global network. The design and development of the communication tools require funding. For instance, Slack as a tool is relatively expensive compared with other team messaging apps (Duffy, 2016).
- **Travel:** Travelling expenses related to Design Factory Global Network (DFGN) events (e.g. International Design Factory Week) are catered for by Aalto Design Factory funding.

5.7.8. KEY PARTNERSHIPS

Figure 20: The Key Partnerships of Design Factory Global Network

At the moment, the following are the key partnerships that Design Factory Global Network (DFGN) enjoys:

- **Aalto University Management:** The management of Aalto University has spent millions of euros on developing and promoting the "Design Factory" concept from the beginning up until the present date. This support structure is very critical to the internationalisation of the concept. For instance, the first Design Factory outside Finland – located in the Sino-Finnish centre at Tongji University was co-financed by the managements of both Tongji University and Aalto University.

- **All Design Factories around the globe:** Design Factory Global Network (DFGN) is nothing without the various members from all over the world. It is the community, support and atmosphere created by the collection of the various Design Factories that create the ultimate value and constitute the uniqueness of the alliance.

- **Design Factory Experts:** These are the Subject Matter Experts distributed across the network. The fact that each hub has a set of unique advantages makes partnerships amongst members very desirable. Take as an example, Design Factory Korea is built on technological innovations and located in close proximity to some of the most advanced technological companies in the world e.g. Samsung. The Melbourne Design Factory is located in the midst of some of the best design institutes in the world. IdeaSquare is a section of the largest physics research institute in the world.

- **Director of Aalto Design Factory:** The role of Professor Kalevi Ekman - the director of Aalto Design Factory - is unique and instrumental to the success of the network. In addition to being the founder of the "Design Factory" concept, the director has also been able to gain the trust and support of multinational companies and government institutions world-wide.

5.7.9. REVENUE STREAMS
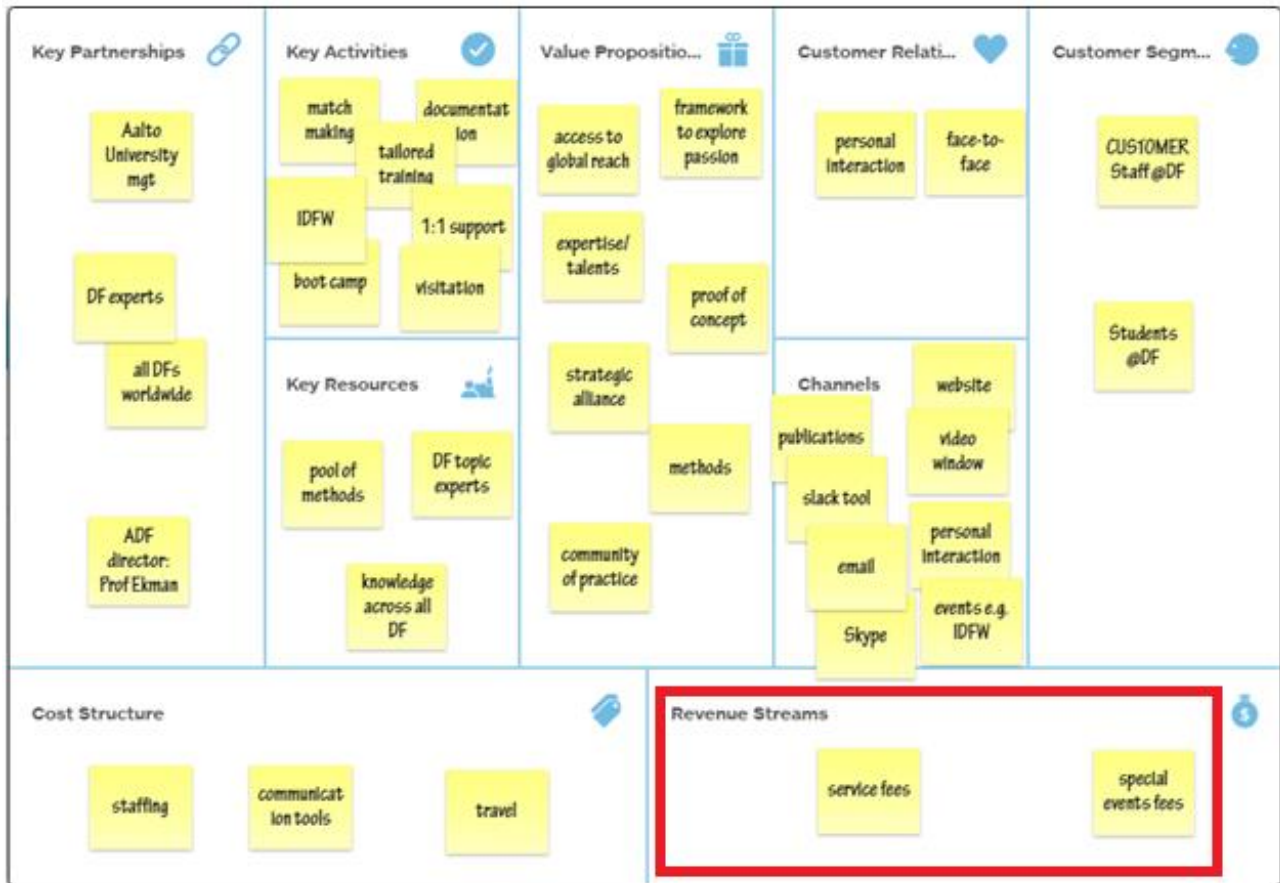
Figure 21: The Revenue Streams of Design Factory Global Network

The revenue streams of the current business model are the following:

- **Service fees:** These are the payments made to Aalto Design Factory for a particular service rendered. The service fees may take various forms at different times.
- **Special events fees:** Sometimes, requests are made for some special events and payment must be made in order for these events to be hosted.

In view of the above, the current business model of Design Factory Global Network (DFGN) may be represented as follows:

Key Partnerships	Key Activities	Value Propositio...	Customer Relati...	Customer Segm...
Aalto University mgt	match making / documentation / tailored training / IDFW / 1:1 support / boot camp / visitation	access to global reach / framework to explore passion / expertise/talents / proof of concept / strategic alliance / methods / community of practice	personal interaction / face-to-face	CUSTOMER Staff @DF
DF experts				
all DFs worldwide	**Key Resources**		**Channels**	Students @DF
ADF director: Prof Ekman	pool of methods / DF topic experts / knowledge across all DF		publications / website / video window / slack tool / email / personal interaction / Skype / events e.g. IDFW	

Cost Structure	Revenue Streams
staffing / communication tools / travel	service fees / special events fees

Figure 22: The current business model of Design Factory Global Network

To round off my discussion on the current model of operation of Design Factory Global Network, Table 4 maps the value propositions to the corresponding key activities, resources, channels and customer relations needed to fulfil them.

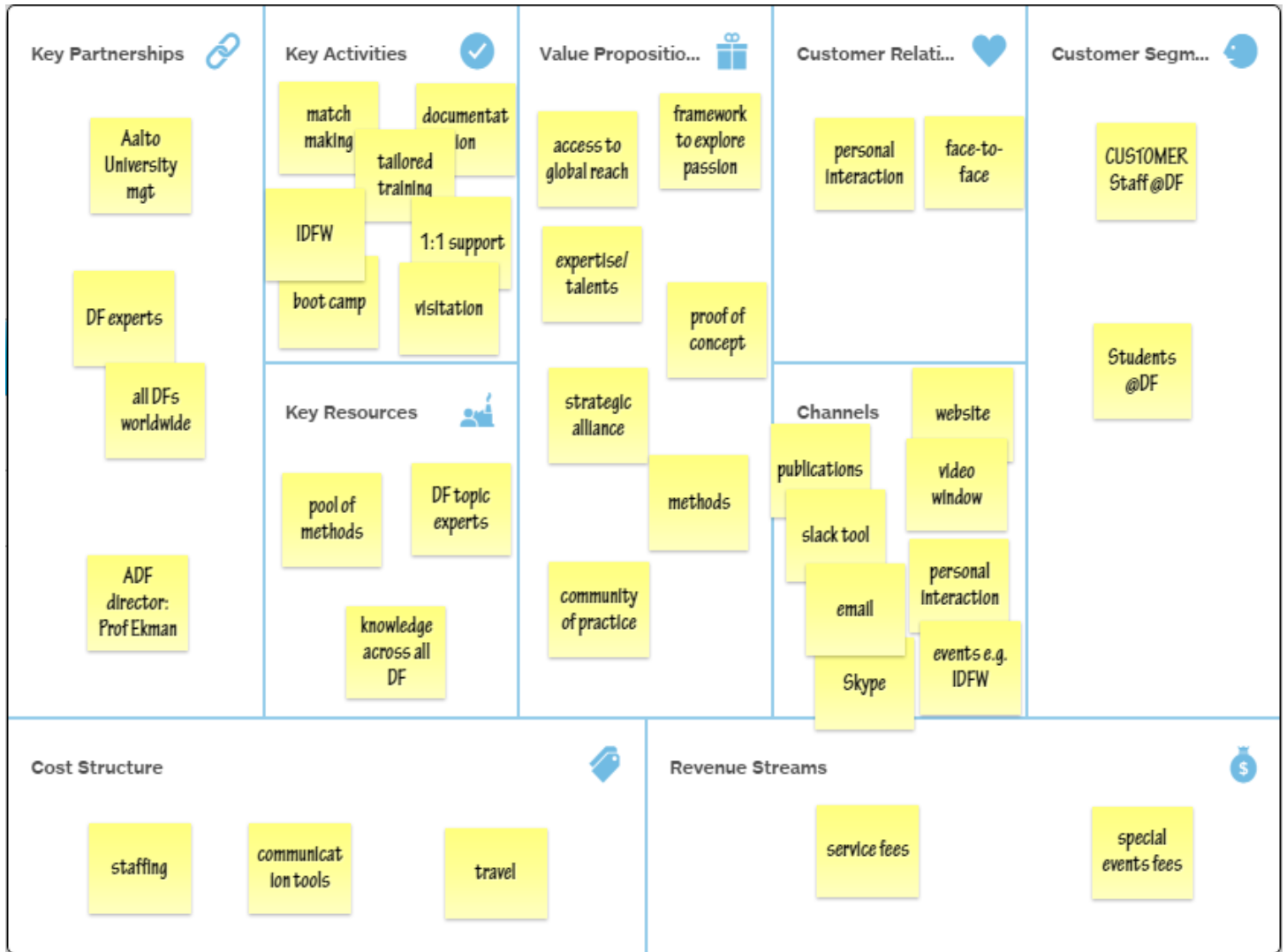| Customer Segment	Value Propositions	Key Activities	Key Resources	Channels	Customer Relations
Design Factory Staff	Framework to explore passion	Boot camp	Pool of methods DF topics experts	Events Personal interaction	Personal Face-to-face
		Visitation	DF topics experts	Personal interaction	Face-to-face
		International Design Factory Week	Pool of methods Knowledge across all hubs DF topics experts	Events Email Slack tool Personal interaction	Personal Face-to-face
	Proof of concept	Documentation	Pool of methods Knowledge across all hubs DF topics experts	Website Publications	Face-to-face
		Visitation	DF topics experts	Personal interaction	Face-to-face
		Boot camp	Pool of methods DF topics experts	Events Personal interaction	Personal Face-to-face
	Methods	Tailored training	Pool of methods DF topics experts	Personal interaction Events	Personal Face-to-face
		1:1 support	Pool of methods DF topics experts	Personal interaction Skype Slack tool Email	Personal Face-to-face
	Strategic alliance	International Design Factory Week	Pool of methods Knowledge across all hubs DF topics experts	Events Email Slack tool Personal interaction	Personal Face-to-face
	Community of practice	International Design Factory Week	Pool of methods Knowledge across all hubs DF topics experts	Events Email Slack tool Personal interaction	Personal Face-to-face
		Boot camp	Pool of methods DF topics experts	Events Personal interaction	Personal Face-to-face
	Access to global reach	International Design Factory Week	Pool of methods Knowledge across all hubs DF topics experts	Events Email Slack tool Personal interaction	Personal Face-to-face
		Match-making	Knowledge across all hubs DF topics experts	Personal interaction Email Slack tool Skype	Personal Face-to-face
	Expertise/talents	Match-making	Knowledge across all hubs DF topics experts	Personal interaction Email Slack tool Skype	Personal Face-to-face

Table 4: Map of value propositions and other building blocks of Design Factory Global Network

6. RECOMMENDATION AND NEW BUSINESS MODEL

6.1 RECOMMENDATIONS
6.2 ALTERNATIVE REVENUE GENERATION
6.3 A NEW BUSINESS MODEL
6.3 RISKS AND MITIGATIONS

6.1.   RECOMMENDATIONS

6.1.1. RECOMMENDATION #1: GOVERNANCE GUIDELINES

Official documents should be signed as part of the registration process of new members and the rights and obligations of every member – new and old – should be made explicit.

Currently, the result of the data analysis shows that there are no signings of formal documents when new members join the network.

In the review of existing literature, the following three dimensions of governance were discussed:

- **Control:** The signing of official documents by members – both new and existing – of a network is an important ritual which has the tendency of promoting integrity, accountability, relevance and impact among stakeholders. Documentation is one of the key activities necessary to ensure the successful governance of any platform (Hagiu, 2006: Tiwana, 2013). For instance, many of the international networks benchmarked (e.g. CEMS -the Global Alliance in Management Education) in this study have governance charters which clearly defines the key organisational elements of their establishments. The contents of the documents may evolve over time to cater for the changing needs of the organisation.
- **Decision rights portioning:** It is important that every member of an organisation fully understands their basic rights and obligations.
- **Pricing policies:** Detailed discussion as to whether or not the central administration of Design Factory Global Network (DFGN) needs to have pricing policies will be made in the section that follows.

My recommendation regarding the governance of the network, based on the data collected, is that new members should be made to sign official documents that reflect the amount of money they have paid, and the rights/obligations of all stakeholders should be made explicitly clear and properly documented. It is advisable that this is done collaboratively during an event where most members are physically present e.g. the International Design Factory Week.

6.1.2. RECOMMENDATION #2: MEMBERSHIP FEES
To charge or not to charge?

> *Only new members should be charged annual membership fees for a minimum of three years. Independent existing members should be exempted.*

This recommendation is based on the fact that new members joining the network have relatively little to offer and more to gain from the network. Being allowed to leverage the network for their growth is a financally beneficial alternative for these members. They often consume resources and time of existing members and the central administration. Conversely speaking, the independent existing members have a lot to contribute to the development of the network and therefore should be reasonably shieded from distractions and motivated to achieve more. It should also be kept in mind that it is not the intention of Design Factory Global Network (DFGN) to be a *for-profit* organisation.

Why three years? The idea of the three-year period came from the data analysis. Over 60% of the new members that participated in the interviews explicitly mentioned three years at some point in the interview sessions. One stated that the funding they have received for the establishment of Design Factor is only for three years, after which they are expected to fend for themselves. Another group of interviewees indicated that they expect to have realised their return on their investment by the end of three years. After the three years, once agreed conditions have been fulfilled, a new member may be considered independent and subsequently exempted from membership fees.

This idea may be likened to the approach of international organisations such as the Global University Network for Innovation (GUNi), in which newly approved members start as "associated institutions" and after fulfilling certain requirements, gain "full membership".

6.1.3. RECOMMENDATION #3: AN INTEGRATED SYSTEM

An integrated web-based system should be developed to serve as a one-stop-shop for Design Factory Global Network.

When starting out, most organisations or networks have the tendency to solve problems in the fastest ways possible by using different information systems for varying functions in an ad hoc manner. The outcome is multiple, disparate systems that operate as standalone. Integrating data from all these software applications can be difficult, expensive, and may even cause efficiency issues down the line (NetSuite, 2017). As the membership of the network and its complexity grow, these disparate systems may no longer be able to support its operations effectively.

At the moment, Design Factory Global Network (DFGN) is using multiple, disparate systems to carry out its functions. For instance,

- **Official website**: is hosted on www.dfgn.org
- **Administration:** The staff members of the various Design Factories are all using their own institution administrative or Learning Management Systems.
- **Communication:** Slack is the main communication tool used at the moment by most partners.
- **Publications**: Currently, Design Factory Global network's publications are hosted on www.issuu.com – a free electronic publishing platform for magazines, catalogs, and newspapers. As was mentioned in the data analysis, there are times when members delay or find it difficult to share materials (about their Design Factories) needed for publications such as the *DFGN Atlas* (https://issuu.com/aaltodesignfactory/docs/dfgn_atlas). I was surprised to find this high-quality material on the Internet, if I had not been specifically given the web link, I might not have been able to access the document.
- **Videos:** The videos of the final presentations of students' projects are often streamed on disparate platforms. For example, I found that one Design Factory posted the videos of their presentations on Facebook (DFBootCamp17, 2017).
- **Pictures of students' prototypes:** and presentations are often deployed to www.flickr.com

In this information age, data integrity is critical to the success of any organisation or network. Given the current use of multiple standalone systems, it is relatively difficult to access real time information and business insights. Operational efficiency is also impacted with duplicated data entry and management (NetSuite, 2017).

6.1.3.1.   AN INTEGRATED INFORMATION SYSTEM

A potential solution that would position Design Factory Global Network (DFGN) at a strategic position of success is to opt for a "holistic" central system. Therefore, I recommend the development of an **integrated system** that will cater for the needs of the network. The system should be implemented in such a way that every member Design Factory will have an account on the system as well as the students, researchers, entrepreneurs and professors from each of these Design Factories. Stakeholders should be automatically mapped to the Design Factory to which they belong. It is important to keep in mind that the goal of the system is not to replace the current operations or activities of the international network, rather it is aimed at helping both the members and central administration to take advantage of technological advancements. I discuss some of the benefits that Design Factory Global Network (DFGN) stands to gain from such a system. In addition, Accenture (2010) observes that 82% of its interviewees (managers of international companies) are confident that a digital platform would be the 'glue' that further brings their respective organizations together in this digital economy. In a similar fashion, I am assured that the use of the proposed integrated system would further increase the inter-connectedness and interactions between the members of Design Factory Global Network.

There is currently no online platform that connects students, researchers, professors, entrepreneurs from various corners of the world to drive positive change or co-develop innovative solutions. Facebook is known to connect people – on a general level, mostly related to personal relationships. LinkedIn connects skilled professionals and companies. Twitter brings up-to-date news to everyone on the fly. There is clearly a gap and a need for a digital platform dedicated to collaborative innovation.

The "Design Factory" concept is about driving positive change in education, so it can be said that Design Factory Global Network (DFGN) is in a league of game changers. A window of great opportunity, to make a "positively disruptive" impact is now opened for Design Factory Global Network (DFGN), and it is my wish that the network can react now.

The Development of the integrated system

The development of any new software system often costs a significant amount of money, time and resources. As a way of circumventing huge costs and expensive resources, I suggest the use of open source code. Studies (Gold, 2012) have shown that the use of open source code lowers cost, improves quality, speeds-up delivery time and ultimately enables organisations to advance innovation. According to Accenture (2010) reports, nearly 80% of international companies make use of open source projects.

I am aware that Aalto Design Factory has dedicated software developers and I am convinced that they are capable. Even though I suggest the use of code from open source standalone projects for specific features of the integrated system, I expect that the architecture of the system will be implemented in modules. These inter-dependent modules may then be integrated using web services and XML technologies via the *Apache Servicemix,* an open source integration framework (http://servicemix.apache.org/). In so doing, troubleshooting will be simplified and risks associated with any part of the system will be better managed.

The following additional functionalities should be included in the system:

- **Administration:** This feature should be targeted at helping the staff – as well as students - of the various Design Factories to carry out their responsibilities. This system should seamlessly integrate with the different administrative or Learning Management Systems being used by the members. The Gibbon's open source project (https://gibbonedu.org/download/) may be adapted for this purpose. Further, since almost all institutions have their own systems, this functionality should be implemented such that it seamlessly integrates into the members' systems.
- **Communication:** This feature brings team communication into one place, making it searchable and accessible anywhere. To implement this functionality, the following open source projects can be utilised: MatterMost(https://github.com/mattermost), and Rocket chat (https://github.com/RocketChat).

- **Video conferencing:** To achieve video conferencing functionalities, *jitsi* (https://jitsi.org/) open source code can be used.
- **Publications**: Electronic publishing capabilities can be achieved with the use of open source code from the *yumpu* (https://github.com/Yumpu) project.
- **Project management:** The fact that Design Factory idea revolves around project work makes it important for there to be some kind of project management tools provided to help during collaboration. Open source projects such as Taiga (https://taiga.io/) can do this.
- **Brainstorming:** Sometimes teams need to brainstorm on ideas or see their thoughts laid out before them so they can come up with an excellent solution. A feature that makes it possible for project teams to generate ideas and sort out inner chaos may be included. This may take the form of a mind-mapping functionality – that would allow students to map out their thoughts in a visual manner, so as to be able to get a grasp on alternative routes to a resolution. An open source project that can be used to deliver this feature is known as *FreeMind*: (http://freemind.sourceforge.net/wiki/index.php/Download).
- **Social interactions:** Students, staff, researchers, professors and entrepreneurs – including other stakeholders – of participating Design Factories should be able – and be encouraged – to connect and collaborate via this system. One way of implementing this idea, may be that each Design Factory hub creates an account on the systems. Stakeholders from each of the various Design Factories should be able to interact via this portal. In order to increase usability and better user experience, this feature may be implemented such that users are able to log on with their existing social media accounts e.g. Facebook, WeChat etc. An example of a project that can be used is: *Cytoscape Consortium* (https://github.com/cytoscape)
- **Project visibility:** Students final reports are mostly submitted via email. There is no visible access to the projects by students of other Design Factories. Imagine the students from Aalto Design Factory having access to the kinds of projects that the students in Melbourne Design Factory, or Korea Design or IdeaSquare are working on. I am confident that this can ignite more ideas and they can build on each other's ideas. The system should also make it possible for effective collaboration across the various Design Factories. At the moment, students and other stakeholders collaborate through media such as Facebook, WhatsApp, LinkedIn and Telegram.
- **Design Factory Research Projects:** Researchers associated with the various Design Factories or working on projects relevant or central to Design Factory concepts often post their project description or work on various web portals e.g. www.researchgate.com. Currently, there is no one online portal where such researchers can discuss their work and gain insights into related work.
- **Online forum:** This will serve as an online community of practice for the members as well as other stakeholders who might be interested in the topic of discussion. It should also be possible for members to share knowledge, post questions and get help from others – similar to the *stackoverflow* platform (http://stackoverflow.com/). *PhpBB* project source code can be used - (https://www.phpbb.com/downloads/).
- **Webinars:** The hosting and viewing of webinars from various Design Factories should be possible via the system. Design Factories are known to be constantly busy with different kinds of academic activities, those presentations that involve presentations may be broadcast as live events through the platform. This functionality can be easily implemented by adapting the open source code from projects such as the *OpenMeetings* (**http://openmeetings.apache.org/**) which allows users to set up conferences on the Web using microphones or webcam, share documents on a white board, share your screen or record meetings. It should also be possible to display and notify interested parties about up-coming or on-going live webinars at various Design Factories. This way, anyone interested can easily read through the description of a webinar and decide which one they would like to join.
- **Membership and other relevant information:** Information should be provided on the portal regarding how a new member can join and the minimum requirements that must be met as well as other details

including the potential benefits, rights and obligations, Frequently Asked Questions (FAQs), current members and testimonials (if available) from existing members. Other relevant information (e.g. call for ideas on how the network can make positive impacts in societies, corporates etc.) should also be included.

6.1.3.2.   BENEFITS OF THE INTEGRATED SYSTEM

- **Multi-disciplinary approach to teaching and learning:** The system makes it easy for people of different backgrounds and even different nationalities to collaborate on projects and ideation process es via the Internet.
- **Engagement with the society:** The fact that the system or platform is not limited to only students makes it possible for members of the public who are interested in innovative ideas to participate. This way, issues related to the societies may be brainstormed and solved through the platform.
- **Opportunities to apply theoretical knowledge:** The system also makes it possible for students, professors or whoever has any theoretical knowledge that can solve certain problem(s) to put that knowledge into practical use.
- **360-degree visibility:** This system would provide a 360-degree (holistic) visibility on member Design Factories across the world as well as the various exciting activities happening there. Real time vision of the network's activity is improved and it also makes it easier to uncover useful business insights as quickly as possible. Further, stakeholders would have a better understanding of what is happening at the other Design Factories.
- **Serve as proof of disruptive pedagogies:** The profile and qualities of the various Design Factories participating on the platform can serve as proof to anybody or organisations looking to validate disruptive pedagogical concepts.
- **Fun and better learning experience:** The use of technology to solve problems and the networking involved, among other interesting aspects of the system, offer a fun experience to users, including students and professors.
- **Publications made easier:** The challenges associated with the current delay of materials needed for publications will be solved by the launching of this system. There are many options to choose from. The use of contents generated by the various users' interactions may be one solution. Another can be the gathering of relevant information through the online forum.
- **Provides support structure for people interested in driving change:** Anybody interested in driving change in any part of the world can look at the platform and derive inspiration and perhaps support from users of the system.
- **Serves as an online community of practice:** The beautiful experiences of the annual International Design Factory can be repeated on an almost daily basis through interactions via the platform. People experiencing issues no longer have to wait for twelve months (a year) to draw insights from other members, they can communicate via the online forum.
- **Provides instant support structure to members:** The feelings one gets, when one knows that there is a website one can go to find help, is refreshing. The fact that users are able to post questions regarding their problems and get quick responses from other users from around the world is an important benefit. Reusability of the same solution is also possible as new users experiencing similar problem no longer have to bother anyone to get assistance. With the rate the network is growing, this initiative will significantly reduce the workload of the central administration staff.
- **Potential recruitment platform:** I have never seen a platform that is dedicated to people who are passionate about innovative education. With the introduction of this system, it is clear that whoever is a member shares the passion for problem-solving and inter-disciplinary education. Therefore, corporate organisations or entities looking for talents with the afore-mentioned qualities will quickly know where to turn to locate them.

- **Experimentation:** One of the value propositions of Design Factory Global Network (DFGN) is that it provides an opportunity for members to explore their passions in teaching and learning through an experimentation approach. As a game changer, the integrated system may be used as a ground for technological experiments by stakeholders – students, professors, entrepreneurs, researchers and interested companies - from all over the world.
- **Breeding ground of entrepreneurs:** Academic projects that effectively solve some of the afore-mentioned problems may be turned into entrepreneurial ventures.
- **Scalability:** Given the rate at which Design Factory Global Network (DFGN) is growing and attracting worldwide interest, the use of an integrated system has definitely come of age. This system will make it easier to expand, to be accessible and ultimately scale the various offerings that the network provides. For instance, the whole process and activities can be brought together in a more efficient manner and makes the network more accessible to more potential sponsors who might not have had the chance otherwise. This is similar to the LinkedIn platform except that instead of giving companies access to potential employees, this platform would be giving them access to a pool of intelligent brains that are passionate about problem-solving and positive disruption.
- **One-stop-shop:** Above all, the integrated system will serve as a one-stop-shop for anyone, companies, and governments looking for digital innovation ecosystem. It will also make it possible to manage end to end processes and simplify data extraction from activities across the entire Design Factory Global Network. The use of this integrated system would also provide managers of the various Design Factories with increased efficiency, as well as the ability to monitor growth – amongst other important factors.

6.1.3.3.   THE INTEGRATED SYSTEM AS AN ONLINE COMMUNITY OF PRACTICE

The integrated system will also function as an online community of practice. Cambridge, Soren, & Suter's (2005) discuss four important areas of activity that every online community of practice must cover – as shown in Figure 4. The afore-mentioned technical functionalities can therefore be categorised into the four areas of activity as follows:

The first activity is to manage existing and new **relationships** the following features will come handy: members networking profiles, social interactions, sub-group formation.

The second activity area relates to **learning**. In order to facilitate learning, online forum, webinars, social interactions and the other e-learning tools can be used.

The third area is about **project management**. The various features supporting this area are: administration, documentation, collaboration, management of project tasks, the sharing and visibility of projects among members are important.

As the last area of activity, **knowledge** generation and management can be facilitated by the technical features responsible for publications, searching (text and documents), online forum, and webinars, among others.

As an online community of practice, the system will help interested problem-solvers to tackle challenges such as the "rat race" more effectively, irrespective of their locations. One of the problems uncovered in the data analysis is the difficulty of driving positive changes alone – especially in remote locations. As an online community of practice, members of Design Factory Global Network (DFGN) will have access to continual support via the Internet and may also be able to engage others in their ideas.

6.1.3.4.   INCOME GENERATION FROM THE INTEGRATED SYSTEM

The ability of the integrated system to generate income relies heavily on how much value it is able to create for the various sides (customers) brought together by the system – and the level of their interactions. As explained

by Savander (2015), the network effect is defined as how valuable that system (platform) becomes to existing users when an additional user joins. One way of increasing the attractiveness of the platform is the implementation of enticing incentive systems, pricing models as well as maintaining an excellent reputation (Bonchek, 2016; Choudhary, 2016).

In order for the integrated system to produce positive network effects to manifest and start generating positive externalities, the tipping point (or a critical mass) must be exceeded. Once the tipping point has been successfully passed and positive network effects set-in, the platform may then be considered as a source of alternative revenue streams.

6.2. ALTERNATIVE REVENUE GENERATION

Alternative revenue generation, in the context of this study, refers to means other than membership fees – and dependence on Aalto University Management - through which the central administration of the network can generate income.

I shall start by talking about how the network can generate funds from the integrated system as well as other generic options.

6.2.1. REVENUE STREAM #1: CORPORATE PARTNERSHIP

Corporate partnership: Companies pay annual subscription fees to join the "integrated system" platform

Corporate Partnership is an exclusive arrangement through which companies contribute financially to Design Factory Global Network (DFGN) and in return benefit from privileged access to a global pool of innovative young minds from recognised institutions from around the globe. Tapping into this talent pool enables companies to remain competitive both in terms of superior products, advanced technology breakthroughs or knowledge in the fast-changing market (Giffi & Rodriguez, 2017).

The companies are therefore prepared to pay to gain access to online platforms such as the proposed integrated system for many reasons including the following:

- recruitment of internationally-minded talents through the integrated system. Tools should be developed to make it easy for corporate partners to post and manage opportunities such as internship and job openings for students. It should also be possible for companies to perform advanced-searches for candidates of a particular background or proven experience.
- a wide collection of branding services and tools should be designed and developed to help corporate partners achieve their goals such as altering an existing brand.
- an opportunity to building a strong network of leaders and professionals across different countries and cultures
- by using the integrated system, an opportunity to gain access to markets that they would normally not be able to access. According to the data analysis, I observe that multinationals can more easily access new markets or markets that have been previously difficult to penetrate through partnerships with educational networks such as Design Factory Global Network.

6.2.2. REVENUE STREAM #2: GLOBAL STUDENTS' PROJECTS
Companies pay to participate in the global students' projects

For the sake of clarity, it is important to note that the corporate partnership discussed above does not include participation in projects.

According to the data collected, multinational companies are looking for opportunities to participate in students' projects that span multiple national borders, as such almost all the interviewees recommended global students' projects as a potential source of alternative revenue for the network.
The Product Development Project (PdP) course coordinated from Aalto University already enjoys the global participation of students from other Design Factories. Unfortunately, the main sponsors are Finnish companies that have existing relationships with the university. As the "Design Factory" continues to get attention from other parts of the world, it is necessary to extend the financial support base to companies outside Finland.

The global project which is most comparable to the Aalto University's Product Development Project (PdP) is the ME-310 projects (of the SUGAR Networks). Considering the ease with which SUGAR Networks is able to generate revenues by engaging multinationals in its projects, I am convinced that Design Factory Global Network (DFGN) is equally capable to access such funds by cultivating a revenue-generating strategy that looks outside Finland.

One approach is the use of the proposed integrated system as a "one stop-shop" for companies that are serious about tapping into the resources of member institutions with students' teams specially selected from the various Design Factories. Currently, sponsors (mostly Finnish) approach Professor Kalevi Ekman. With the integrated system in place, companies from all over the world – as long as they can access the system via the Internet – would submit requests/enquiries for projects online. These requests would then be processed by the central administration which will be responsible for liaising with members regarding the implementation of the global projects. This way, the central administration would be able to take a fraction of the funds whilst the rest is shared between the participating Design Factories.

6.2.3. REVENUE STREAM #3: SHORT IDEATION CHALLENGE
Companies pay to participate in short ideation challenges

An ideation challenge is a collaboration of diverse groups of people aimed at generating breakthrough ideas. It usually takes between a half-day and three days. Cross-disciplinary teams are often brought together to design thinking or another idea generation framework. Ideation challenge is fast gaining ground as an important tool used in solving mission-centric problems —whether technical, scientific, or creative (Trebon, 2017). This initiative has been used extensively across the world's leading industries, such as semi-conductor, and drug-synthesis, among others (Sciencewatch, 2017).

In their quest to remain innovative, the rate at which international companies are now partnering with educational institutions for ideation purposes has grown significantly over the years. This is an opportunity for an international network such as Design Factory Global Network (DFGN) to be relevant. The use of the integrated system would make it particularly simple for companies to discover and explore the network, its members and previous projects. Interested companies could then contact the central administration by a "button-click". In turn, the central administration would review companies' requests and subsequently invite members who have the capabilities and resources and are willing to take forward the projects.

6.2.4. REVENUE STREAM #4: GOVERMENTS' SPECIAL PROJECTS
Governments' funds for "special" projects

Governments all over the world are spending huge amounts of money on various "special" projects that are unique to their regions. The Internet was once a "special" project by the United States' Defense Advanced Research Projects Agency (DARPA) (Cantrell, 2017). Today, these so-called "special" projects take different forms and shapes, examples include: Smart City, High Speed Rail station, and Space Planes.

The interesting thing to note is that, these projects are knowledge intensive and there is a lot of money available for teams with convincing proposals. Initiatives such as the smart city projects are becoming more common and this wave of innovations has the potential to fundamentally alter our daily lives for good. The European Union, for example, allocated about 100 million euros for research and related projects on smart city and proposals are invited from everyone including the higher education institutions. Similarly, open data are being made available - along with financial support - by governments to interested parties to leverage for the economic and social development purposes (International Development Research Centre (IDRC), 2017).

I noticed that the Global University Network for Innovation (GUNi) is financed mainly by the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the United Nations University (UNU), the fact that Design Factory Global Network (DFGN) have similar value propositions such as passion for positive societal impacts gives me confidence that funding from UNESCO and UNU are possibilities. To strengthen its position for this funding, I would recommend that the central administration of Design Factory Global Network (DFGN) carefully explores and coordinate global projects that align with the visions of the governments (or public service agencies) of members' countries.

I know that the application process can be very demanding, but it can constitute a stable source of revenue when secured. The associated risk and possible mitigations are discussed in section 6.3.

6.2.5. REVENUE STREAM #5: FEES FROM ADVANCE FEATURES
Members pay annual subscription fees to access ''advance functionalities'' on the integrated system

In addition to the basic functionalities on the system, there should be some advance features that are only available to premium users. Premium users in this context refer to Design Factories that would pay annual subscription fees to use these advance features - some of which will be developed by complementors. The advanced technical functionalities will cover the four primary areas of activities of any typical community – and these include learning, relationship and project management as well as knowledge generation and knowledge management.

6.2.6. REVENUE STREAM #6: REVENUE FROM COMPLEMENTORS
Income from complementors

Complementors can add value on the network by developing technological functionalities that will:
- make learning fun and easier
- foster and encourage relationships among platform participants
- help members to collaborate and problem-solve cases from remote locations around the world – similar to the "rat race challenge"
- make project management across the network easier
- facilitate effective and efficient knowledge management on the platform

These solutions would be deployed as advanced features on the system. A fraction (say 10%) of the revenue generated by these advance or premium features would go to the central administration of network whilst the rest goes to the complementors.

6.2.7. REVENUE STREAM #7: PHILANTROPIC SUPPORT

Philanthropic support from companies or wealthy individuals who are passionate about innovations in education

There are successful companies and wealthy individuals who are either interested in supporting innovations in teachings and learnings or looking for ways of positively contributing to the development of humanity. USA's Andrew Carnegie and Canada's Richard G. Ivey are good exemplars (Pitts, 2017).

Educational institutions may solicit philanthropic support by engaging in a collaborative partnership with the corporate responsibility divisions of successful companies – at national or regional levels. I discovered that many of the biggest international networks in the world – the likes of Apache Software Group, Institute of Electrical and Electronics Engineers (IEEE) – rely on philanthropic support as one of their revenue sources (IEEE, 2017).

As Design Factory Global Network (DFGN) seeks alternative revenue sources, I am confident that the use of philanthropic support will be possible. As a "one stop-shop", the integrated system will automatically provide detailed information to potential philanthropists who come across or are introduced to the website.

6.2.8. REVENUE STREAM #8: ENDOWMENT FUNDS

Endowment funds for innovation in Education

When funds are donated to an (educational) institution with instructions to use the annual income generated from those funds for its ongoing support, this is called an endowment fund (RPI, 2017). Endowment funds are usually aimed at encouraging and promoting innovation.

The following illustration paints a clear picture:

> "A donor gives a charity $5,000 for its endowment without stipulating how the income is to be used. The charity invests in a stock paying an annual dividend of $250. The charity may use the $250 dividend money in any manner they wish within the charity. A second donor gives a charity $5,000 for its endowment and specifies that the annual income is to be used for staff training. The charity invests in a stock paying an annual dividend of $250. The charity may use the $250 dividend money each year only for paying the expenses of staff training. Any unspent money must be carried forward and saved for future staff training expenditures" (Monti, 2017).

Many top-rated educational institutions or international networks rely on endowment funds as sources of revenue. For instance, Harvard University's largest financial asset are their endowment funds (Harvard University, 2017) and Stockholm School of Entrepreneurship's (SSES) major source of revenue is the endowment fund received from the Erling-Persson Family Foundation (SSES, 2017). Aalto University is also a beneficiary of endowment funds as about EUR 700 million was raised between 2008 and 2011 (Aalto University News & Events, 2017).

Finland is internationally recognized for quality education and innovation and considering the success story of the Aalto University Design Factory since inception, I am confident that Design Factory Global Network (DFGN) has everything it takes to raise endowment funds from international companies and wealthy individual who are interested in novelties.

6.2.9. REVENUE STREAM #9: FEES FROM EXCLUSIVE EVENTS
Fees from special exclusive events during International Design Factory Week (IDFW)

Special exclusive events with some international guest speakers may be organised during the International Design Factory Week or any other time when all the Design Factories convene in one location. This idea was suggested by one of the interviewees, who had earlier mentioned that it is difficult to justify – or explain to their organisation's finance committee - why a certain amount of money has to be transferred to the central administration of Design Factory Global Network (DFGN) in Helsinki, Finland. The interviewee believes that since academic institutions are used to sending staff members to international conferences and seminars, paying for participation in the exclusive events will be easy to explain.

By bringing internationally respected guest speakers on board, the image of the network will be further enhanced and participating members will have the opportunity to get expert opinion on some of their pressing issues at a significantly reduced fee – compared to a situation where the member hires the expert alone.

Members will be charged fees to participate in these "special" events and there may be sales of valuable merchandise. A percentage of the profit generated from the event should go to the central administration of Design Factory Global Network and rest will go to the host(s).

6.2.10. REVENUE STREAM #10: REVENUE FROM AN ALUMNI ASSOCIATION
Generate revenue from an alumni association membership fees

The world is getting smaller by the day and considering the collaboration between the various Design Factories, some of the students who have participated in any of the global projects may want to remain connected to the network for different reasons such as professional support, mentoring, career guidance, access to state of the art facilities and so on. Many of the interviewees cited student empowerment as one of their most important reasons for joining Design Factory Global Network, hence I recommend the establishment of an alumni association as I am confident that this association would serve as a source of empowerment for the students even after graduation.

It is a common knowledge that many of the students of today, are going to be the leaders of tomorrow. As a potential source of disruptive innovations, tools and services should be created to support these alumni to become better leaders and excel in both their professional and personal lives.

Financial support from the alumni association may take different forms. One way may be through membership fees which may be annual or lifetime.

6.2.11. REVENUE STREAM #11: REVENUE FROM NON-INTRUSIVE DATA
Generate revenue from non-intrusive data

It is often said that: "data is the new 'oil'".

I find the following quote interesting:

> *"Data, much like oil, in its raw form is essentially worthless without proper processing. Extract it, refine it, package it, and put it on sale at the right marketplace – and suddenly the value can go through the roof. Oil is piped to refineries, whilst data is sent to the digital equivalent, data centres and super computers … if data is the new oil, analytics is the new refinery"*
>
> (Hamilton, 2017)

Advancements in artificial intelligence including big data analytics and machine learning are on the increase. Technology giants such as Google, Facebook, Amazon and Microsoft are continually developing sophisticated techniques for artificial intelligence. It is therefore not surprising that data is now one of the most sought after resources in the world.

The use of the integrated system presents a unique opportunity for Design Factory Global Network (DFGN) to collect non-intrusive data that can be used to help the members and corporate organisations to find patterns and trends in efforts to improve their processes, take advantage of opportunities, personalized experiences and access new possibilities (Laskowski, 2017). To be more effective in matchmaking and foster the exchange and co-creation of value among these various parties on the platform, the use of data has become vital. As such, the different information (data) are collected about each side (customer segment) and are leveraged to facilitate interactions among stakeholders (Choudary, 2016).

One of the many possible ways of generating revenue from data is by extracting useful market information that can help corporate organisations in specific regions of the world, and that they are willing to pay for.

6.3.   A NEW BUSINESS MODEL

As in earlier discussion on business model innovation, anytime one of the nine building blocks is modified, the others are usually affected. Based on the recommended revenue streams, the current business model will evolve as follows:

REVENUE STREAMS	CUSTROMER SEGMENT	VALUE PROPOSITIONS	KEY ACTIVITIES	KEY RESOURCES	CHANNEL	CUSTOMER RELATIONS	COST STRUCTURE	KEY PARTNERSHIP
CORPORATE PARTNERSHIP	**Companies seeking fresh innovative ideas**	Recruitment Branding Market access	Matching-making Tools for branding	DF topics experts Proofs of concepts Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Sytem development Events organising	Corporate organisations
GLOBAL STUDENTS' PROJECTS		Working-prototypes	Needs finding Brainstorming Prototyping Documentation	Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Sytem development Events organising Human resource	Corporate organisations All Design Factories
SHORT IDEATION CHALLENGE		Fresh innovative ideas	Ideation Documentation	Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Sytem development Events organising	Corporate organisations

							Human resource	
GOVERMENTS' SPECIAL PROJECTS	**Governments**	Fresh innovative ideas Working-prototypes Strategic alliance Access to talents	Facilitate collaboration beween members	DF topics experts Proofs of concepts Knowledge across hubs	Integrated system Personal Interaction Events	Face-to-face Automated	Sytem development Staffing Documentation	Governments DF topics experts All Design Factories
FEES FROM ADVANCE FEATURES	**Design Factory Staff**	Solutions to operational challenges	Develop advance features on integrated system	Software developers	Integrated system	Automated	Sytem development	Complementors
REVENUE FROM COMPLEMENTORS	**Complementors**	Income generation	Manage complementors Workshops organising	Software developers	Integrated system Events Personal Interaction	Technical workshops	Sytem development Organising Technical workshops Development of software dev. toolkits	Complementors
PHILANTROPIC SUPPORT	**Wealthy individuals**	Social responsibility	Facilitate projects for societal improvement	DF topics experts Proofs of concepts Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Sytem development Event organising	Wealthy individuals
ENDOWMENT FUNDS	**Wealthy individuals Companies**	Social responsibility	Facilitate projects for societal improvement	DF topics experts Proofs of concepts Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Events organising Sytem development	Wealthy individuals Companies
FEES FROM EXCLUSIVE EVENTS	**Design Factory Staff**	Professional empowerment	Facilitate workshops Seminars/Webinars	DF topics experts Guest speaker Knowledge across hubs Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Events organising Sytem development	All Design Factories Experts Guest speaker
REVENUE FROM ALUMNI ASSOCIATION	**Design Factory Alumni**	Mentoring Profes. Networking	Seminars/Webinars Event organising Match-making	Software developers	Integrated system Events Personal Interaction	Face-to-face Automated	Events organising Sytem development	Design Factory Alumni
REVENUE FROM NON-INTRUSIVE DATA	**Corporate organisations**	Insights from platform's usage data	Data-mining	Software developers	Integrated system	Automated	Sytem development	Corporate organisations

Table 5: Mapping recommended revenue streams to other building blocks

Revenue Streams 1 - 3: (**Target customer:** Corporate organisations)

Corporate partnerhip, Global students' projects and short ideation challenge

This requires that Design Factory Global Network (DFGN) will also have to focus on corporate organisations as possible source of revenue. In other words, the current **Customer Segment** will grow from two (the current Staff of Design Factories and Students) in order to now include exchanges with corporate organisations. The **Value Propositions** for this new customer segment are: recruitment, branding and market access, development of well documented working prototypes and the generation of fresh innovative ideas. The **Key Activities** required to deliver on the propositions include match-making and the development of software tools for branding, documentation, needs finding, brainstorming, and recruitment services on the integrated system. The **Key Resources** needed are the Subject Matter Experts at Design Factory topics, proofs of concepts, software developers and knowledge across all Design Factory hubs – this includes the students, staff, researchers and other stakeholders of every Design Factory. The **Channels** of communication include personal interactions, organised events and also via the integrated system. The **Customer Relations** may be classified as both face-to-face and automated. The **Key Partnerships** needed are the corporate organisations and regarding the **Cost Structure**, the bulk of the costs will be in the development of the software tools and organising of relevant events.
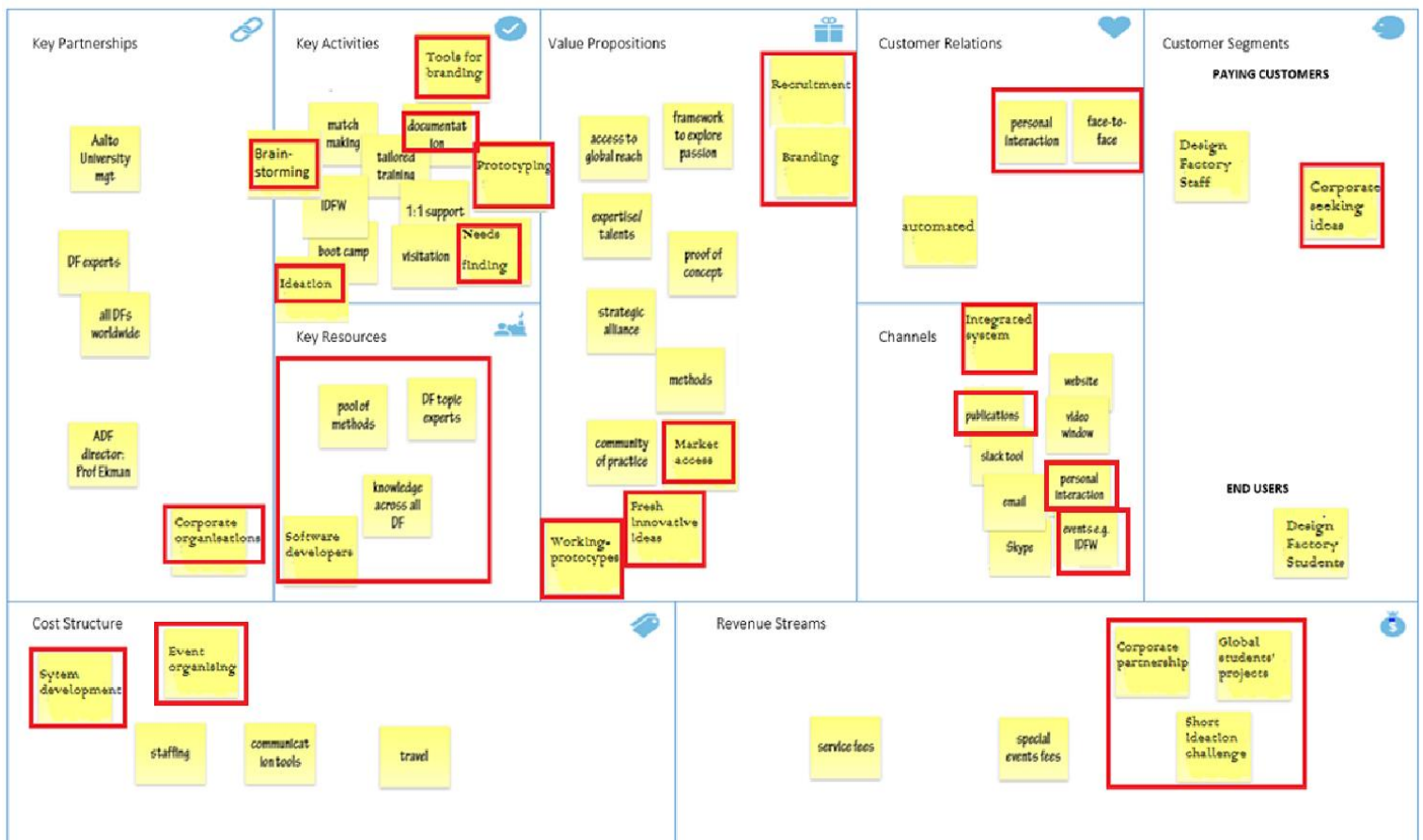

Figure 23: Business Model Canvas for generating revenue from corporate organisations

Revenue Stream 4: (**Target customer:** Governments)

Governments' special projects

In order to generate revenue through special governments projects, governments will have to be treated as a target **customer** group of Design Factory Global Nework (DFGN); in terms of **value propositions**, the network will serve as a source of talents and strategic alliance. It will also help in the generation of well documented fresh innovative ideas and working prototypes. The **key activity** here is that the planning and faciltation of how other Design Factories will collaborate in the implementation of the projects. Facilitation of brainstorming and ideation sessions, documentation and match-making are also important activities needed. As **key partners**, the various Design Factories will be responsible for recruitment of local talents for the projects. The **key resources** needed to ensure success are all the Design Factories' staff, the Subject Matter Experts on Design Factories topics and proofs of concepts that can be demostrated, the pool of innovative methodologies and software developers. Communication **channels** and **customer relations** will be both through the integrated system (automated) and personal interactions (face-to-face). The associated cost will mostly be in the development of the integrated system, collection of required documentation and the salaries and travelling expenses of staff members working on the project.
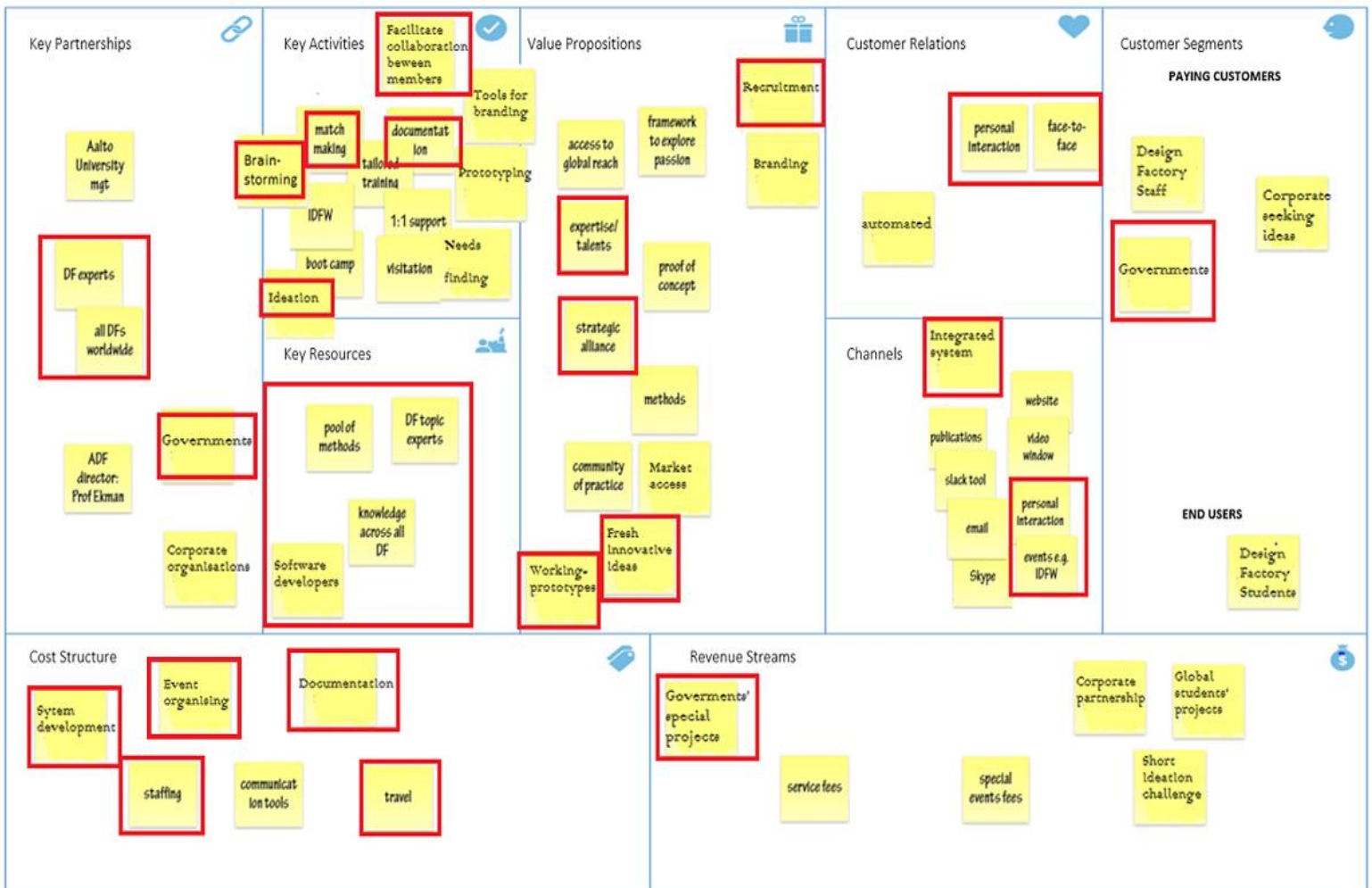

Figure 24: Business Model Canvas for Governments' special projects revenue stream

Revenue Stream 5: (**Target customer:** Design Factory Staff)

Advanced features on integrated system

The staff members of the various Design Factories are the original customer segment. The development of software features aimed at helping staff of Design Factories solve some of their pressing problems is a feasible value proposition. The key resources needed will be the software developers, most likely complementors. Customer interactions will mostly be automated since the main channel is the integrated system.
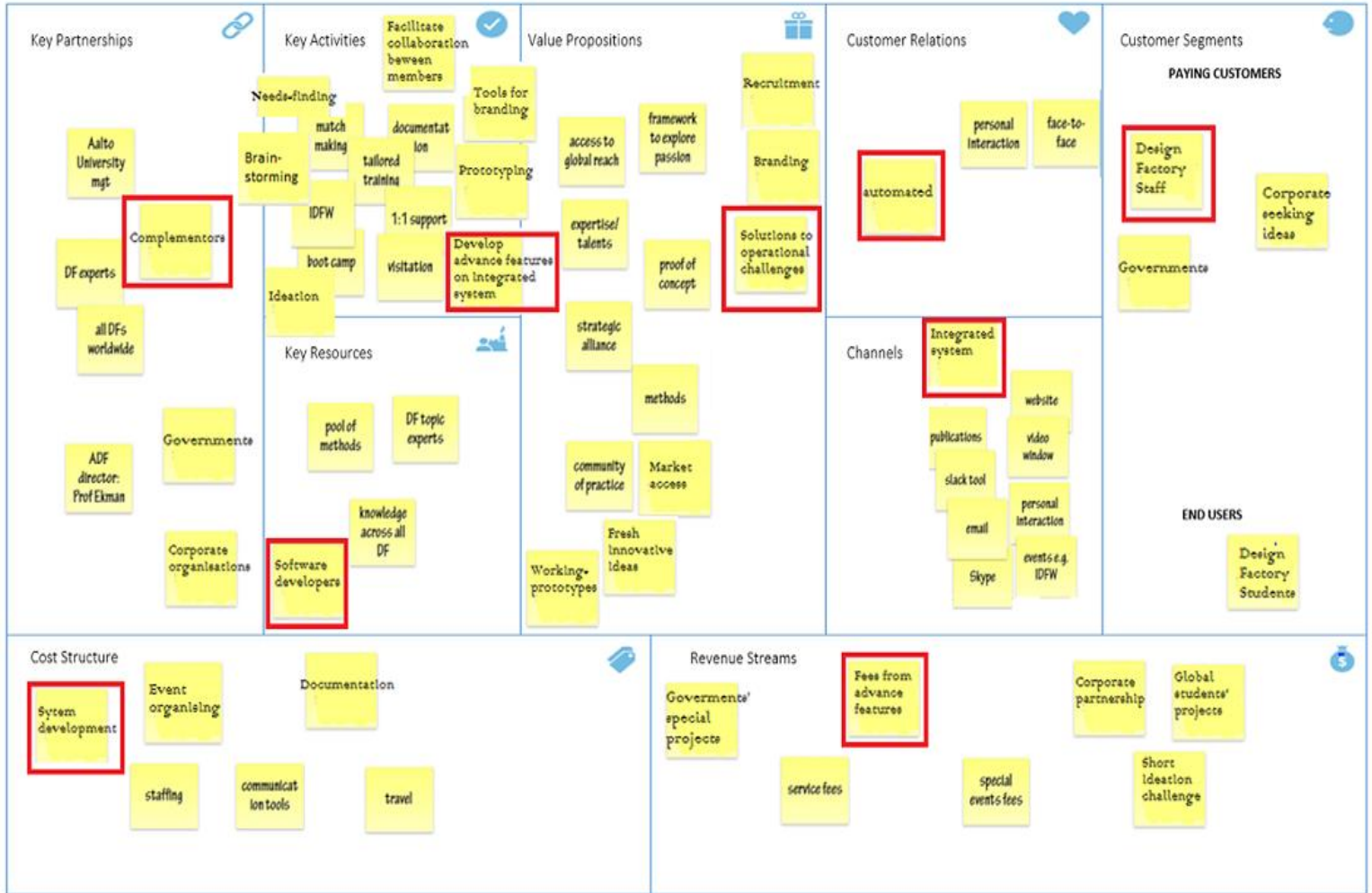

Figure 25: Business Model Canvas for Advanced features on integrated system revenue stream

Revenue Stream 6: (**Target customer:** Complementors)

Revenue from Complementors

The complementors consitute yet another customer group to be added to the customer segment of the current business model. The main value proposition to the complementors is the fact that they can generate income from the platform by developing software solutions that help the users solve their problems. The key activities required on the part of the central administration is to give and co-ordinate the access as well as organising technical workshops. These workshops may be used to train the complementors on how to connect their solutions to the platform and they may also be used to solicit feedback. As such, the channel of communication will be both personal interactions and via the system. In the same vein, customer relations are both automated and face-to-face.
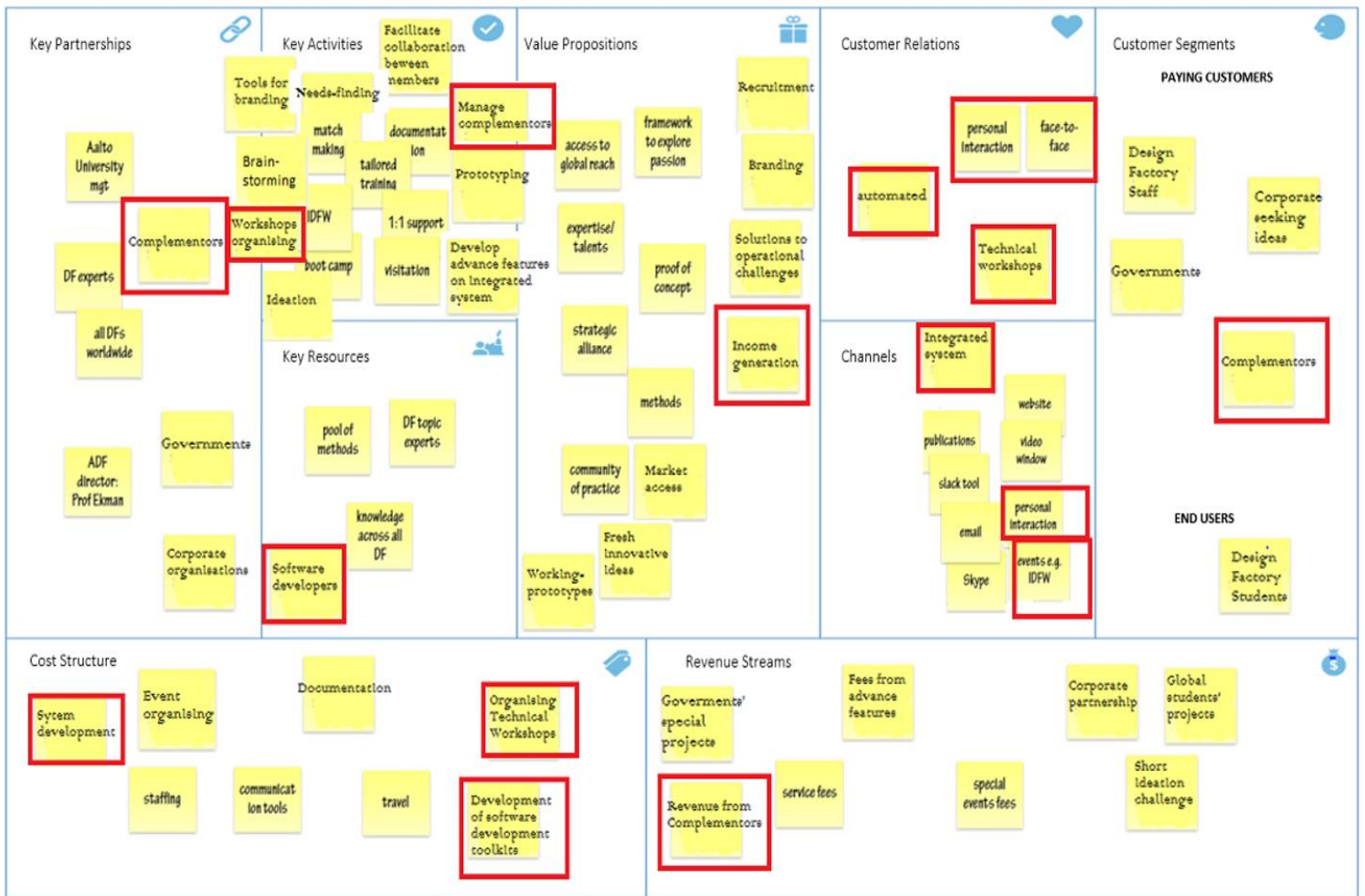

Figure 26: Business Model Canvas for Revenue from Complementors

Revenue Stream 7: (**Target customer:** Wealthy individuals)

Philantropic support

The customer group needed in order to generate revenue from philantropic support is the wealthy individuals. Generally, the value these wealthy individuals seek is societal impact (Freedman, 1989). Based on this knowledge, the value propositions necessary to meet the expectations of this new customer group could be the implementation of projects focused on societal improvement and social responsibility. The key resources needed are primarily the Design Factories, the Subject Matter Expert at Design Factory topics, proofs of concept to show case the achievements of the various Design Factories as well as software developers to integrate these proofs of concept into the system and develop tools that can help interested wealthy people engage with the network—in a more efficient and fun way. Thus, the key activities may involve event organising and software development.
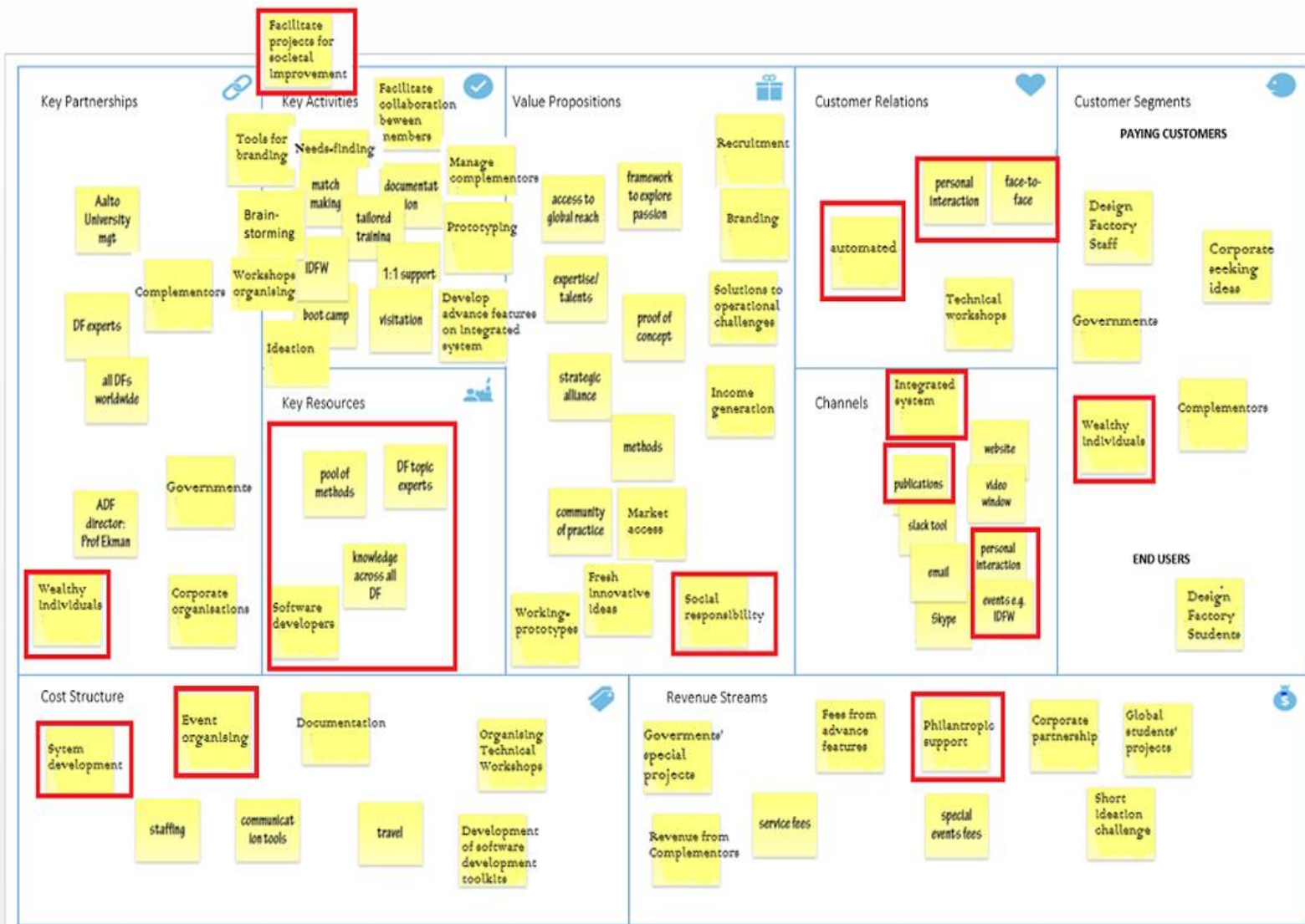

Figure 27: Business Model Canvas for Philanthropic support

Revenue Stream 8: (**Target customer:** Wealthy individuals and corporate organisations)

Endowment funds

At this point, we already have corporate organisations and wealthy individuals as existing customer groups on the business model. An endowment fund is a unique support structure that may be used for almost any purpose. The fact that the conditions guiding the offering and use of an endowment are so different from other revenue sources warrants a special focus from a business model perspective. The conditions guiding the endowment funds are important determinants of what the value propositions should be. In most cases that involve the offering of endowment funds for educational purposes, the value propositions have been innovative projects that enhance the human race (Freedman, 1989). The other building blocks necessary to deliver on this proposition are similar to those discussed above – for revenue stream 7.
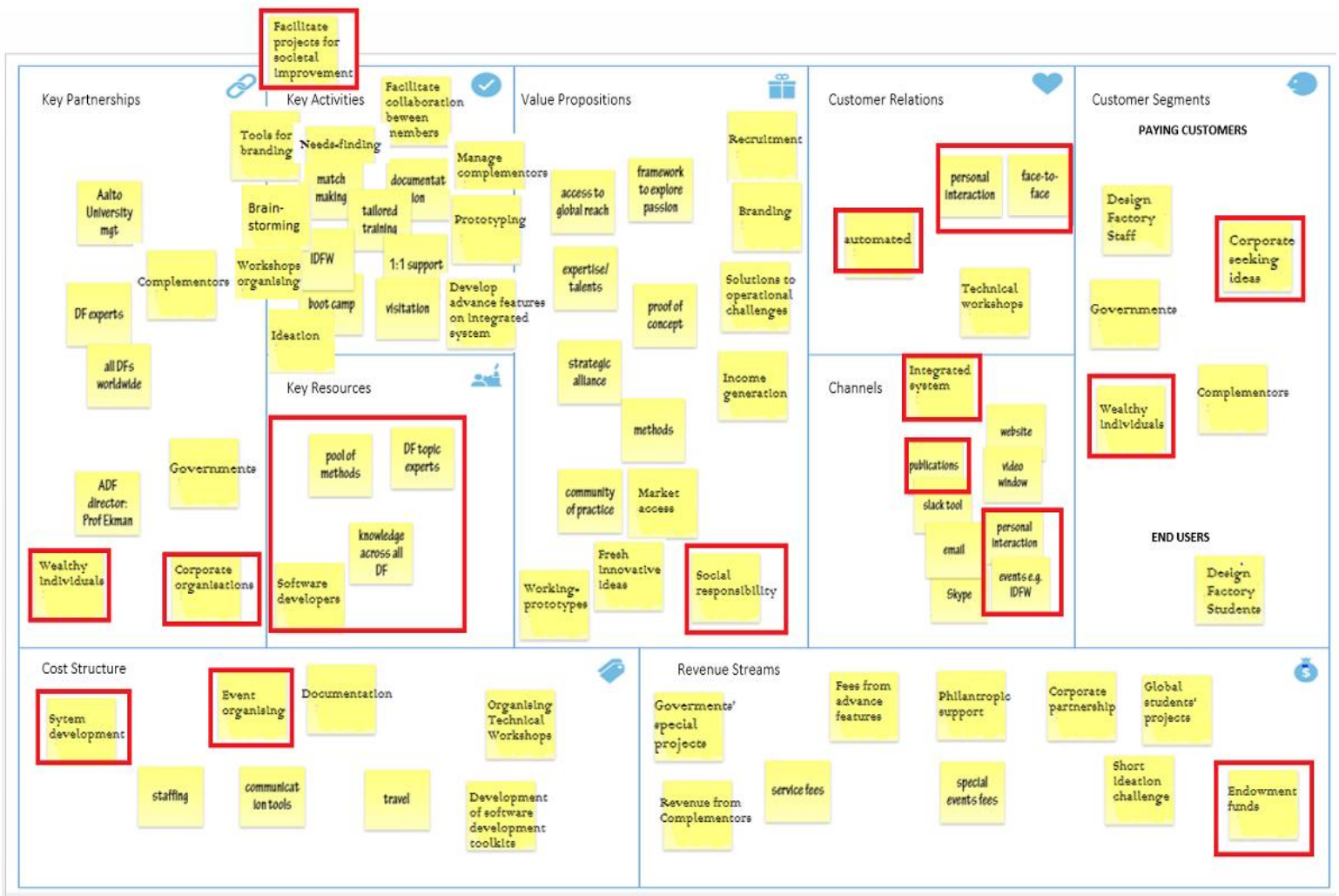

Figure 28: Business Model Canvas for Endowment funds

Revenue Stream 9: (**Target customer:** Design Factory Staff)

Revenue from exclusive events

The value proposition here is professional empowerment. These exclusive events may be organised through the Internet (webinar) or through face-to-face interactions (workshops or seminars). The key resources are the event organisers, all Design Factory hubs, the integrated system and the special guest. The cost structure is in the hosting of the events and the development of features that support these events on the webinar on the integrated system. Customer relations are both automated and face-to-face.
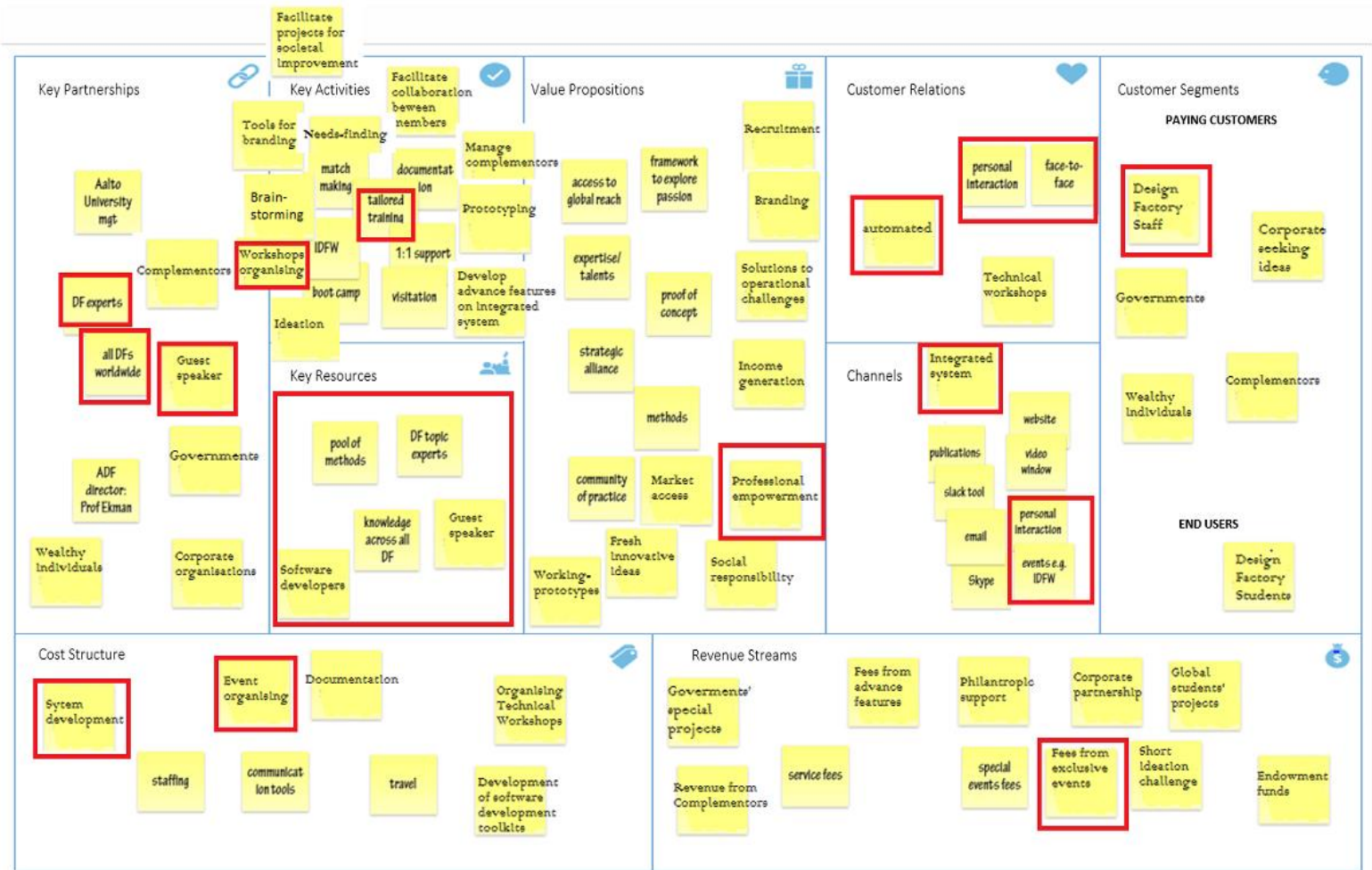

Figure 29: Business Model Canvas for revenue from exclusive events

Revenue Stream 10: (**Target customer:** Design Factory Alumni)

Revenue from a Design Factory Alumni Association

A Design Factory Alumni Association is the last customer group to be added to the business model. The main value propositions to this group include the following: continual support from the network, networking opportunties, professional mentoring, access to potential recruits and a chance to give back to the alma mater. Key activities may include event organising, seminars or webinars. Channels of communication may take the form of personal interactions, events, or via the integrated system. Customer relations are therefore both face-to-face and automated. Possible costs incurable on the side of the central administration are in the event organising and the development of software features that supports alumni interactions on the integrated system.
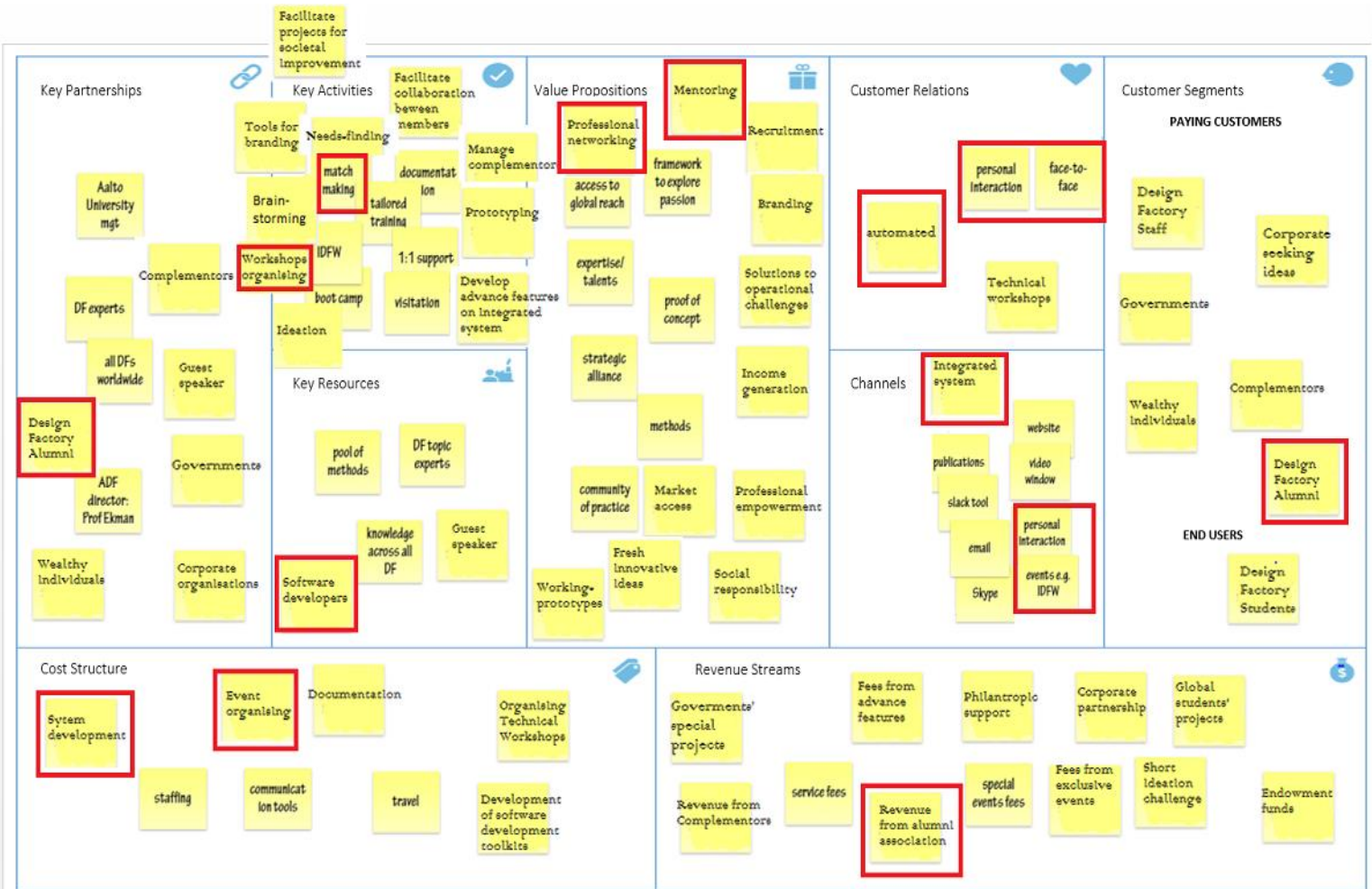

Figure 30: Business Model for Revenue from Design Factory Alumni Association

Revenue Stream 11: (**Target customer:** Corporate organisations)

Revenue from non-intrusive data

The insights gleaned from analysing data may be a source of value to a variety of people. Therefore, the generation of revenue from data is a relatively broad topic. As a matter of simplicity, I would limit the potential beneficiary of the knowledge and insights from the integrated system's usage data to corporate organisations. The value proposition will be trends from various markets. The key activity essential is data mining and the key resources are the software developers – this includes data analysts and other technical personnel. The channel of communication will be the integrated system and consequently the customer relations will be automated by default. The associated cost is in software development and the key partners are the corporate organisations consuming the services and products developed from the data.
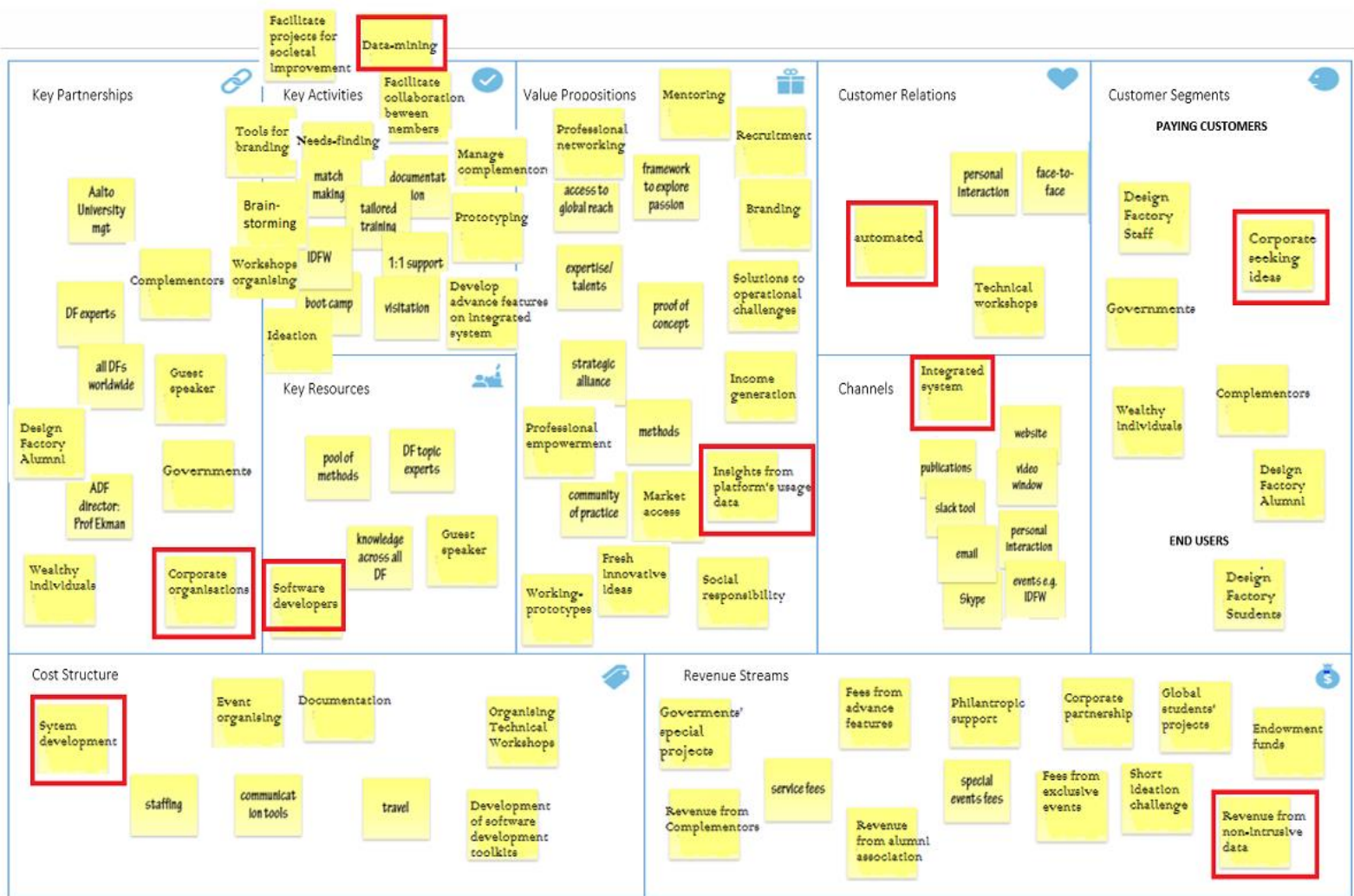

Figure 31: Business Model Canvas for Revenue from non-intrusive data

In summary, the new business model of Design Factory Global Network may be represented as shown below:
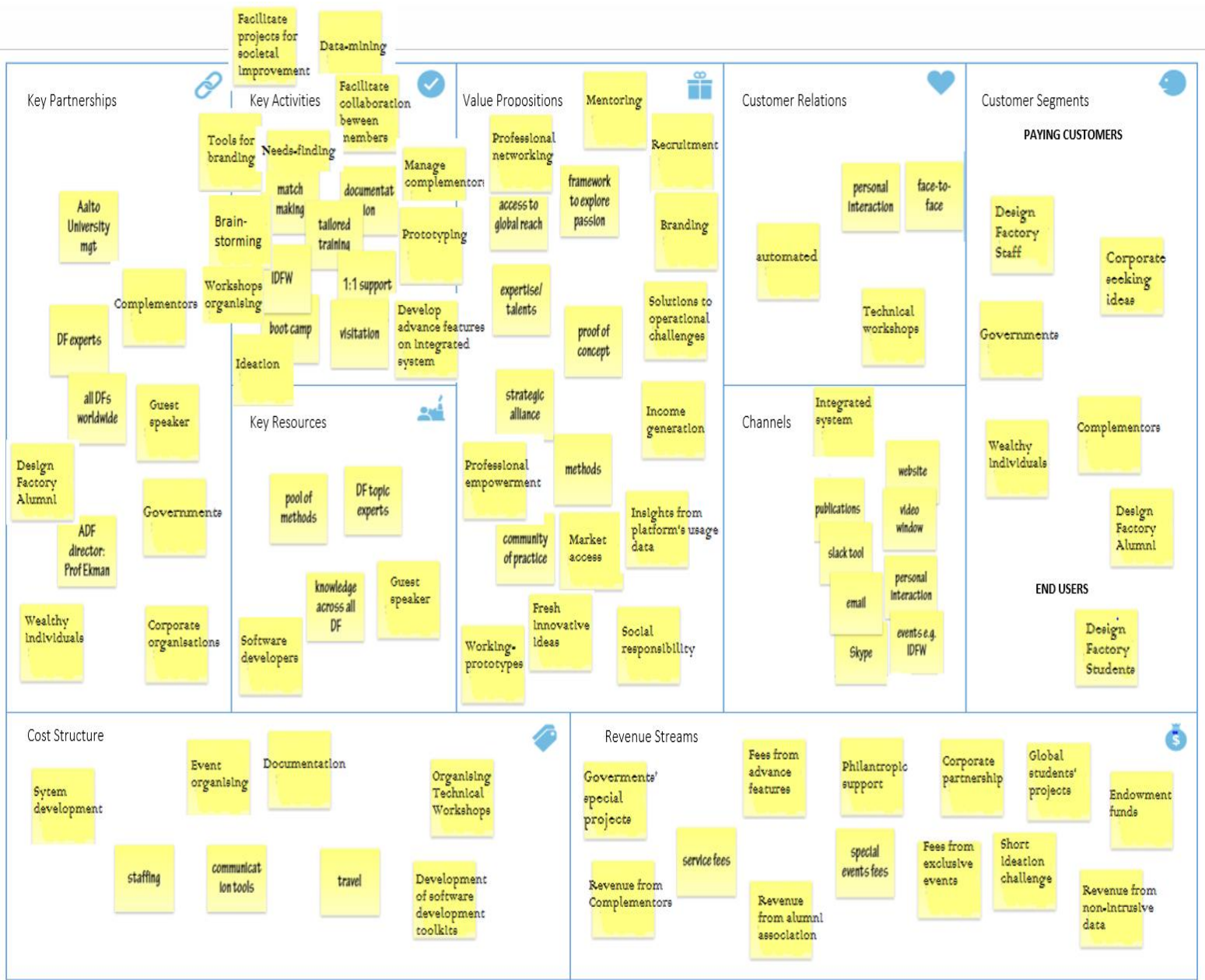

Figure 32: A New Business Model recommended for Design Factory Global Network

6.4.   RISKS AND MITIGATIONS

Risk consideration is vital in decision making. Associated risks affect the desirability of the potential choices (Cook & Masakowski, 2007). An essential aspect of risk is uncertainty. Some scholars argue that risk is just uncertainty about the future. Boundless (2017) maintains that uncertainty and risk are not the same. Whereas uncertainty refers to probable outcomes that are unknown, risk may be described as a type of uncertainty that involves the real possibility of loss. Almost every decision is made up of uncertainties and risks. In the context of this study, I shall use the term "risks" to collectively describe both concepts (risks and uncertainties). As Zio (2007) argues, one of the many ways by which risks can be described is using the probability and impact of an event.

In view of the above recommendations, I felt the need to draw attention to some possible risks that must be taken into consideration as part of the decision-making process. Table 6 gives a summary.

Risk	Impact	Probability	Mitigation
1 Too many requests for support from new members			Encourage and empower existing members to support to new members
2. Violation of open source software license			Ensure that the terms and conditions of the open source project are properly understood (Gold, 2012)
3. Discontentment over membership fee amount			Take economic context into consideration when setting the amount as per empirical findings
4. Failure to meet high expectations of companies			Ensure expectations are mutually understood and quality standards are strictly adhered to (Bililign, 2013).
5. Applying for special project funding is document intensive			Use templates whenever possible
6. Data spillage and leakage			Use appropriate application proxy firewalls and secure database models. Furthermore, monitoring, auditing and logging of data.

Table 6: Summary of associated risks and mitigations

- **Too many requests for support from new members:** All the new members joining the network have made it clear that one of their motivations for joining is to gain access to some form of support structure. The fact that they are paying may also influence their expectations. In as much as the central administration and the other existing members are willing to provide the needed support to new members, caution must be exercised to ensure that helping others does not impede the progress of the network – in terms of innovations. To mitigate this risk, the central administration should encourage and empower existing members to perform some of the support tasks that are currently handled solely by the central administration. Requests from new members should also be redirected appropriately according to the availability, skills, resources and willingness of the old member.

- **Violation of open source software license:** Every project is linked to some license agreements – with different terms and conditions. Some conditions are very simple and straight forward whilst others may not be as simple. The choice of a particular open source code must be associated with the license agreement. Violation of the license agreement may attract legal implications and this can have a significant negative impact. The probability of this occuring is relatively low. One way of mitigating this risk is by making sure that the terms and conditions of the open source projects used are properly understood.

- **Discontentment over membership fee figure:** Some members may feel that they are paying too much (membership fees) as compared to others. The likelihood of this happening is relatively low but it is wise to think about it beforehand. Should such a situation arise, the negative impact on the network may be medium. This situation may be prevented by taking the economic context into consideration when setting the membership fee figure.

- **Failure to meet the high expectations of companies:** It is obvious that Design Factory Global Network (DFGN) has a lot to offer companies that are willing to leverage the available skills, knowledge base and resources. It is therefore necessary to manage the expectations of these companies very carefully. Failure to manage the high expectations of corporate partners may lead to disappointments. Whilst the probability of this happening is relatively low, the impact is medium. One way of mitigating this risks is to have clear expectations of all participants and monitor them carefully. An agreed set of quality standards must be adhered to by all parties and wherever possible each participant should be empowered to deliver on their promise/target.

- **Applying for special project funding is capital intensive:** The documents required to support applications for funding can be very overwhelming – both in terms of time and resources. In Europe, for example, I learned that, sometimes, it can take up to one year to collect all the necessary documents required to apply for a particular funding with no guarantee of success. Unfortunately, the probability of this happening is relatively high. The impact is relatively low if appropraite mitigations are implemented. Possible mitigations for this risk include the use of templates wherever needed, this will help fast track the rate at which forms and other applications are completed.

- **Data leakage and spillages**: In much the same way as oil spillage, there is also a risk of data leakage and spillages which can have grave consequences (Hamilton, 2017). A data spill is defiend as "the accidental or deliberate exposure of classified, sensitive or official information into an uncontrolled or unauthorised environment or to persons without a need-to-know" (Australian Goverment DoD, 2012, p.1). Possible mitigation plan may include monitoring, auditing and logging of data. The use of application proxy firewalls and secure database models are also advised (Gordon, 2007).

7. SUMMARY AND CONCLUSION

7.1.   SUMMARY

The initially stated objective of this study was **to develop a new business model with a plan for alternative revenue streams for Design Factory Global Network (DFGN)**. I am confident that this objective has been achieved.

Although the term "new business model" was used, there was never an officially formulated or described "old business model" of Design Factory Global Network. Therefore, in order for me to achieve the set objective, I made efforts to understand, describe and document what constituted the current business model of the network by conducting a qualitative research. The instruments of inquiry were mostly interviews, observations and data from secondary sources. Based on my data analysis and empirical findings, I successfully developed a new business model for the network using Osterwalder's (2004) Business Model Canvas – as per Figure 34.

The term "alternative" in this context refers to revenue streams that will complement the current funding that comes from the Finnish government. At the time of writing this thesis, the introduction of annual membership fees – as a potential source of revenue - was still under scrutiny and part of my task was to find out whether or not members will be willing to pay. My recommendation, based on the outcome of data analysis and empirical findings is that: only new members should be charged annual membership fees for a minimum of three years. Independent existing members should be exempted.

In addition, I recommended that:

- Official documents should be signed as part of the registration process of new members and the rights and obligations of every member – new and old – should be made explicit.
- An integrated web-based system should be developed to serve as one-stop-shop for Design Factory Global Network

Further, the following alternative revenue streams were suggested:

1. Companies pay annual subscription fees to join the "integrated system" platform
2. Companies pay to participate in the global students' projects
3. Companies pay to participate in short ideation challenges aimed at solving companies' mission-centric problems
4. Governments' funds for "special" projects
5. Members pay annual subscription fees to access ''advanced functionalities'' on the integrated system
6. A fraction of the income generated by complementors from users of the proposed integrated system
7. Philanthropic support from companies or wealthy individuals who are passionate about innovations in education
8. Endowment funds for innovation in education
9. Fees from special exclusive events during International Design Factory Week (IDFW)
10. Revenue from the alumni association of Design Factory Global Network (DFGN)
11. Generate revenue from non-intrusive data

7.2.   CONCLUSION

Earlier in this study, I established the fact that Design Factory Global Network (DFGN) is indeed a multi-sided platform (MSP) as it connects and facilitates interactions between the different sides (Design Factories). I also mentioned the fact that the concept of multi-sided platforms goes beyond internet-based companies (e.g. eBay, Amazon, Apple AppStore) and I cited the early marketplaces and auction houses as examples of the long-standing systems built on the concept. Managing communication between the different groups of users is therefore an important aspect in the governance of any platform (Evans, 2012; Tiwana, 2013). The empirical findings in this study support the claim of other scholars (Hein et. al., 2016) regarding the fact that documentation and decision-rights (i.e. clearly stated rights and obligations) are critical to the successful governance of any platform organisation, as these promote trust, transparency and accountability.

The study also showed that well established members were unwilling to pay annual membership fees whilst, on the other hand, new members joining the network were prepared and willing to pay. It was interesting to note that the willingness of the new members to pay the annual membership fees was tied to some expectations of Return-On-Investment (ROI). What constitutes the Return-On-Investment for each of the new members varies slightly but the commonality is that they all believe that they will learn and gain from the presence of the older members (including the central administration) of the network. This is consistent with existing literature (Armstrong & Wright, 2005; Hagiu, 2006) concerning the fact that if a group of participants (side-A) stands to benefit more from the platform due to the presence of another group of participants (side B), side-A should be charged while side-B is subsidised. Hence, my recommendation is that only new members should be charged annual membership fees.

Further, the continuing increase in the membership of Design Factory Global Network (DFGN) may be taken as an indication that many institutions of higher learning are beginning to wake up to the realization that interdisciplinary education that is student-centric and focused on solving real-world challenges is critical in the 21st century education.

To conclude, I have suggested an action plan (Exhibit 5) for the implementation of the ideas offered for alternative revenue streams.

8. RELIABILITY AND VALIDITY OF THE STUDY

8.1. RELIABILITY OF THE STUDY

Reliability of a research refers to whether the data collection techniques and data analysis would reproduce consistent findings if the study were to be carried out by another researcher or on another occasion.

To ensure **reliability**, I made conscious efforts to avoid the following:

- Avoid participant's errors: Participant's errors are factors which may adversely alter the way interviewees respond. In order to avoid these errors, I made sure that interviewees fully understood what the research and its objectives were about before the interview sessions. I also tried to ask clear and straight forward questions.
- Be aware of a participant's bias: A participant' bias is any factor which may produce a false response.
- Avoid researcher error: This is any factor which alters my interpretation as a researcher. To avoid errors, I made use of two different recording tools (one on the computer and the other on my cell phone) to ensure clarity of sound and prevent any loss of data. Further, I scheduled the interview sessions in a manner that would allow me to fully analyse and reflect on the data and necessary background information before the sessions. I also took note and wrote memo during and immediately after every interview session. These served as my instant reflection exercise.
- Be aware of the researcher's bias: I made efforts to recognize all factors which arose in my analysis of an interviewee's response, by staying as objective as possible all through the study.

8.2. VALIDITY OF THE STUDY

Research validity refers to the ability of the research approach to measure what it intends to measure (Brink, 1993). To ensure **validity**, I took the following into consideration:

- Construct validity: This refers to the extent to which my research measures what it claims to measure. Given that there was no prior research on the business model of Design Factory Global Network, I saw it fit that the best approach was a qualitative methodology that would make it easy for me to explore, describe and eventually develop the model. As such, I choose the grounded theory.
- Internal validity: This is concerned with whether the research findings are a true reflection or representation of reality. I ensure internal validity by focusing on questioning on the following themes which are directly in line with my research objective: the goals of each Design Factory as a member of the parent institution, being part of Design Factory Global Network, comparison of "Design Factory" concept with other options, community of Practice, strategic Alliance and funding of the network. I also ensure validity by comparing what various interviewees said concerning a particular theme and through the use of their (interviewee's) words in coding.
- External validity: This is concerned with whether my findings can be generalized. I ensure external validity by making certain of the fact that the sample is representative of the entire Design Factory Network. For instance, there were two members from the American continent, one from Asia, one from Australasia and two from Europe. By interviewing the professor of practice in addition to the key decision makers of Aalto Design Factory, I was also able to ensure external validity in my discussion on funding.

9. LIMITATIONS OF THE STUDY

9.1.   MODEL LIMITATIONS

Although this study has achieved its objective, there were limitations. Below are limitations related to the model:

- The research objective: The requirement from the sponsor organization is that the deliverable or recommendations made at the end of the study must be practical and implementable. As such, only ideas that can be put into practice were dwelt upon.
- Willingness-To-Pay annual membership fees: Asking members if they would be willing to pay for services they have been getting for free is a limitation. It is a common knowledge that if given the choice, customers will always want to pay less.
- Study restricted to familiar people: This study was limited to only the existing members of Design Factory Global Network (DFGN) and individuals who are already familiar with the concept.
- Proposed recommendations: I was unable to fully explore some of the recommendations I proposed due to the complexities of the subjects. Although these topic areas will be suggested as possible areas of further research, I feel that they may be seen as limitations.

9.2.   METHODOLOGICAL LIMITATIONS

Below are limitations related to my research methodology:

- Sample size: The fact that there were no representations from North American and African educational institutions may also be considered a limitation. In the same vein, the sample is mostly dominated by participants from developed countries – such as Finland, South Korea, Australia, and Switzerland. The data would have been richer if there were more participants from developing countries – such as India and Nigeria.
- Survey instruments: Only a qualitative approach was used and the survey instruments were limited to interview, observation and data from secondary sources.
- Lack of prior research studies: The fact that there was no prior research – to the best of my knowledge - regarding the business model may also be seen as a limitation, as there was a relatively sparse theoretical basis on which to base some of my findings.
- Members only: This study was limited to only the existing members of Design Factory Global Network (DFGN) and staff members who are connected to it – in one way or another.
- Self-reported data: The fact that a significant portion of the data I collected was self-reported may be seen as a limitation since it is relatively difficult to independently verify such data.
- Measure used to collect the data: Even though students do not directly interact on the Global Network level, it would have been better to have their input on the various activities and goals of the various Design Factories.
- Grounded Theory requirement: As a method of research inquiry, the grounded theory approach seems a little complicated for the scope of a master-level thesis. Whilst I followed all the steps suggested by Charmaz (1990) and Sbaraini, Carter, Evans, & Blinkhorn (2011). Time constrained the number of possible iterations, I therefore consider this as a limitation.

9.3.   LIMITATIONS OF THE RESEARCHER

I am aware of the fact that researchers are important components of qualitative research methods. Therefore, I feel the need to mention the limitations I experienced as the researcher:

- Access: Access to the representatives of the various Design Factories was limited, for example, by geographical distance as they were all located outside Finland. As a result, all the interviews were conducted via Skype. Apart from the fact that my interactions and observations were limited, I sometimes had technical issues with Internet connectivity.
- Drawing tool: The software application used in the generation of the Business Model Canvas limits the number of characters in a text entry, thus making it necessary for me to shorten my sentences and use abbreviations
- Longitudinal effects: The study was conducted under a strict time constraint, as one of the requirements for my master's degree; as such I had a limited time, unlike professional researchers or professors, who can dedicate years or even their lifetimes to explore certain topics.
- Cultural and other type of bias: As human beings, we all have bias which maybe as a result of where we come from, what we have been through or our spiritual orientation among others. I am aware of this limitation and I took extra care to put aside my personal biases as an individual and ensure that the study was conducted as objectively as humanly possible.

10. AREAS OF FURTHER RESEARCH

10.1. AREAS OF FURTHER RESEARCH

The following may be considered as areas of further research:

- ***How much should be charged as annual membership fees and on what conditions?***
  I have made a recommendation regarding this topic, that only new members should be charged annual membership fees. One possible area of a further research may be to determine the exact amount that a new member should pay – but nothing remains constant. I observed that similar international networks of educational institutions pay approximately 1000 euros per year depending on various factors. To mention a few, Cumulus Network charges 1200 euro, the World Design Organization™ (WDO) charges 1000 euro and World Lottery Association (WLA) 700 euro – on the average.

  In their quest to promote a diverse membership that represents the interests of various regions around the world, many international organisations charge varying amounts depending on a variety of factors. My data analysis shows the need for the economic situations, budgets and size of members to be taken into consideration when determining the exact amount. In the case of the World Wide Web Consortium (W3C), factors such as the organisation's annual revenues, type, and location of headquarters are often used. The World Fair Trade Organisation (WFTO) and the World Lottery Association (WLA) charges are based on the revenue of the member, Cumulus charges are based on the size of the organisation and the membership-type.

- ***How much extra work is needed to earn extra money? What kind of margin is attainable?***
  In order to benefit from the above recommendations, the central administration needs to complete some tasks. Given that time and resources are limited, it will be useful if there is a study that would determine how much extra work is needed for Design Factory Global Network to earn a certain amount of income – in a given time.

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EXHIBITS

EXHIBIT 1: INTERVIEW QUESTIONS

EXHIBIT 1A: INTERVIEWS FOR THE VARIOUS DESIGN FACTORIES ABROAD

Themes: Details

- **Goals of Design Factory (DF) as a member of the parent institution**
  - What is the motivation for the establishment of the DF?
  - What are the goals of the DF?
  - How do these goals fit into the parent institution mission, goals and plans (both short and long term)?
  - What are your target customer group? *Customer segment*
  - How does the DF relate these customers? *Customer relationships*
  - How does your DF add value to these people's lives? *Value proposition, Key activities*
  - What resources do you engage? *Key resources*
  - Through what channel? *Distribution channel*
  - Through any partnership? *Key partnership*

    Business Model element(s): Customer segment, Value proposition, Customer relationships, Distribution channel, Key activities, Key partnership

- **DFGN membership**
  - Why join Design Factory Global Network (DFGN)?
    - What are your expectations, if any?
    - Are your expectations currently met or exceeded?
  - What is your understanding of DFGN or in your opinion, why does DFGN exist?
    - How can you leverage the capabilities of other DFs to become better?
    - What resources do you engage as a DFGN member? *Key resources*
    - Through what channel function as a DFGN member? *Distribution channel*
    - What partnership do you engage as a DFGN member? *Key partnerships*
    - Are you happy as a member of DFGN or do you feel something is missing?
    - What do you think DFGN should do to be better?
    - Are you willing to pay for some extra services?
  - What makes your DF unique in the network?
    - How can your DF add value to DFGN with your uniqueness?
    - How can you help other DFs with your uniqueness?
      - And make money? *Revenue stream*

    Business Model element(s): Customer segment, Value proposition, Key resources, Distribution channel, Key partnerships

- **Revenue model**
  - How is your DF (staff, facilities etc.) funded? *Cost structure, Revenue stream*
  - Does your DF give its academic credits or through other departments?

- How does DF generate revenue? *Revenue stream*
- Does your DF generate revenue from industry partnerships, if yes; how? *Key partnership*

Do you have any suggestions for ways that funding agencies (individually or in coordination with other agencies) can promote better financial planning at the local or national level for water infrastructure funding?

Are there any organizations that you think should work closely with the DWA and its institutions to help it carry out its mandate or mission in terms of funding of water infrastructure?

Are there any organizations that you think should work closely with the DWA and its institutions to help it carry out its mandate or mission in terms of funding of water infrastructure?

Business Model element(s): Revenue stream, Cost structure, Key partnership

- **Innovation and impact**
  - Do you have any initiatives aimed at innovation?
  - Who is funding these initiatives?

- **Community of practice**

- **Strategic alliance**
  - Strengthens
  - Shared knowledge, resources, risks
  - Growth opportunities
  - New markets

EXHIBIT 2: BACKGROUND INFORMATION OF INTERVIEWEES

EXHIBIT 2A: INITIAL STAGE INTERVIEWS

1. Professor Anita Kocsis	
Organisation	Design Factory Melbourne
Title	Associate Professor and the Director
Responsibilities related to DFGN	She is in charge of managing the affairs of Design Factory Melbourne. She is also responsible for building a sustainable place and space that empowers people (e.g. students, professors, researchers, companies) to come up with positively disruptive innovations.

2. Professor Jung hoon (John) Lee	
Organisation	Design Factory Korea
Title	Associate Dean and Co-director
Responsibilities related to DFGN	He is responsible for the co-ordination of the various activities at Design Factory Korea. He also manages the corporate external relationships including international engagements. The other Co-Director deals with Finance and Budgeting.

3. Dr. Markus Nordberg	
Organisation	Ideasquare (CERN)
Title	Co-director
Responsibilities related to DFGN	He is responsible for managing the administration of IdeaSquare. The other co-director is responsible for the scientific aspect of IdeaSquare.

4. Lotta Hassi	
Organisation	IED Design Factory Barcelona
Title	Acting Director
Responsibilities related to DFGN	She manages and co-ordinates the activities and international relations of Design Factory Barcelona.

5. Andrea Ordenes & Rodrigous Rodrigo Alvarez L.	
Organisation	Design Factory DUOC
Title (Andrea Ordenes)	Academic coordinator
Title (Rodrigo Alvarez L.)	Deputy Director
Responsibilities related to DFGN	**Andrea Ordenes:**

	She is in charge of how each of the three Design Factory nodes at DUOC develops its activities and operations. She is also responsible for initiating the adoption of Design Factory concept at other DUOC campus. At the moment, DUOC has 17 campuses across Chile. **Rodrigo Alvarez L.:** He is responsible for finance and budgeting. He also offers support to Andreas in areas such as: value creation, coordination and management of the activities at Design Factory DUOC.
6. Giovanni Ferrucio Ferroni Del Valle and Omar Fernando Ramirez Perez	
Organisation	Design Factory Javeriana (Pontificia Universidad)
Title (Omar Fernando Ramirez Perez)	Director of Design Factory Javeriana
Title (Giovanni Ferrucio Ferroni Del Valle)	Dean of Architecture and Design Faculty
Title (Martin Gomez)	Director of the Industrial Design Programme
Responsibilities related to DFGN	**Omar Fernando Ramirez Perez:** He is responsible for the co-ordination of the various activities of Design Factory Javeriana. **Giovanni Ferrucio Ferroni Del Valle:** He administers the two big areas: Academic and financial aspect of the whole faculty including Design Factory Javeriana. **Martin Gomez:** He is responsible for facilitating collaboration between students and academic staff.

Table 7: Background information of the interviewees for this study.

EXHIBIT 2B: THEORETICAL SAMPLING INTERVIEWEES

1. Professor Hannu Seristo	
Organisation	Aalto University
Title	Vice President, External relations
Responsibilities related to DFGN	He previously served as the Vice President responsible for the knowledge networks e.g. innovations, entrepreneurship and also the three factories at the university which includes Aalto Design Factory. One of his primary responsibilities was funding allocation to Aalto Design Factory.

1. Professor Kalevi Ekman	
Organisation	Design Factory Global Network
Title	Director
Responsibilities related to DFGN	He is the visionary who created Design Factory concept. He manages the affairs of both Aalto Design Factory and Design Factory Global Network. He reports directly to the Aalto University Board.

2. Professor Peter Kelly	
Organisation	Aalto Venture Programme
Title	Professor of Practice
Responsibilities related to DFGN	He is currently teaching entrepreneurial courses at Aalto Design Factory. Over the years, he has provided guidance to Design Factory DUOC (Chile) and has been involved in other international initiatives similar to Design Factory concept. His background/expertise in entrepreneurship and international exposure is relevant to this study.

EXHIBIT 2C: BUSINESS MODEL DEVELOPMENT INTERVIEWEES

9. Lyytikäinen Viljami	
Organisation	Design Factory Global Network
Title	Head of International Operations
Responsibilities related to DFGN	He leads the internationalization of Aalto Design Factory and also serves as a consultant to universities around the world about the Design Factory-model, interdisciplinary education, design thinking process and practices that support co-creation and experimentation.

10. Oinonen Päivi	
Organisation	Design Factory Global Network
Title (Oinonen Päivi)	Design Factory Global Network's Strategist
Responsibilities related to DFGN	She is responsible for the development and the collaboration between the existing and upcoming new members of Design Factory Global Network. She also serves as a consultant to universities around the world on Design Factory model, interdisciplinary education, design innovation process and organisational culture that supports serendipitous interactions.

EXHIBIT 3: INTERNATIONAL DESIGN FACTORY WEEK SCHEDULE (SAMPLE)

IDFW SCL_ OCTOBER 2015

SCHEDULE

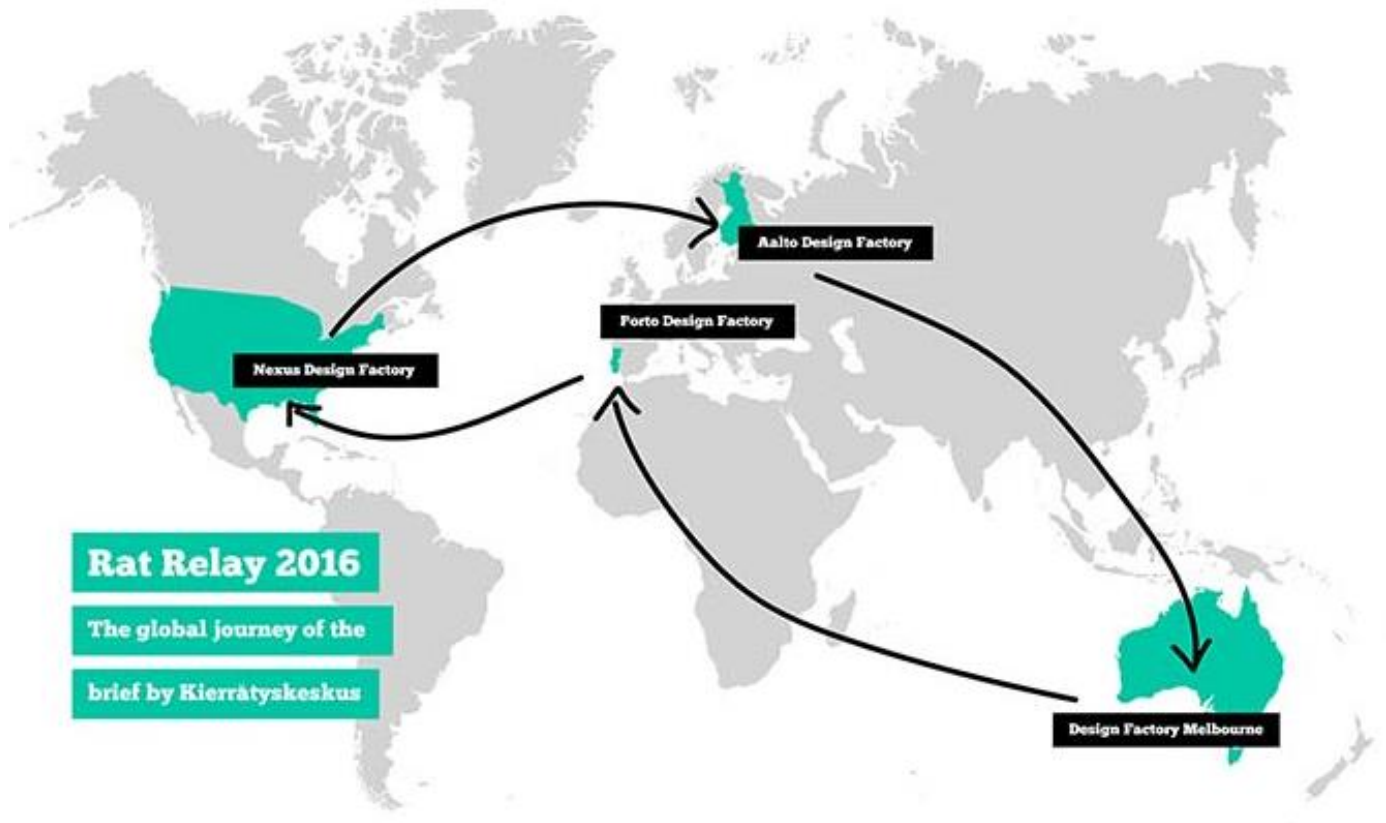|	Mon 5th Oct	Tue 6th Oct	Wed 7th Oct	Thu 8th Oct	Fri 9th Oct
08:00 - 09:00					
09:00 - 10:00	09:00 - 10:00 Breakfast *DDF*	09:00 - 12:30 Collaboration pitches	08:30 - 11:00 Journey to Viña del Mar Campus	08:45 - 11:00 Business Breakfast Kalevi Ekman Anita Kocsis Matti Hämäläinen Harri Toivonen Päivi & Viitsu (activities) *DDF*	09:00 - 12:30 IDFW2015 wrap-up, next steps *DFGN*
10:00 - 11:00	10:00 - 12:00 Welcome and Introduction *DFGN*	PhD Surf School (SDF) Rat Race (PDF) DF Experts Exchange (PDF) Nexus Maximus Global (PNDF) DFGN Blog (SDF) DF ToolBox (ADF) OBI-I (IdeaSquare) *DFGN*			
11:00 - 12:00			11:00 - 13:30 D-Facts Viña del Mar Kalevi Ekman Anita Kocsis Eric Voigt Jussi Hannula Harri Toivonen Peter Kelly *DDF*	11:00 - 12:00 Free time for 1:1 meeting	
12:00 - 13:00	12:00 - 12:30 Official welcome by Duoc UC			12:00 - 13:00 Lunch	
13:00 - 14:00	12:30 - 13:30 Brunch with Duoc UC	12:30 - 13:30 Lunch			12:30 - 13:30 Lunch
14:00 - 15:00	13:30 - 15:00 Pecha Kuchas Remember to submit slides by Friday Oct 2! *DFGN*	13:30 - 15:30 Engagement with DDF students *DDF*	13:30 - 15:00 Lunch at Viña del Mar Campus and transport to Valparaíso	13:00 - 17:00 Open Space Sharing expertise and discussing challenges CROWDSOURCING THEMES! *DFGN*	
15:00 - 16:00	15:00 - 17:00 Tuning-in workshop *DFGN*	15:30 - 17:30 Research funding workshop *SDF*	15:30 - 18:00 "finding new pathways" in Valparaíso *DDF*		13:30 - 22:00 Chilean outdoor experience *DDF*
16:00 - 17:00					
17:00 - 18:00				17:30 - 19:00 D-Facts Santiago Keynotes: Kalevi Ekman Eric Voigt Della Zhou Meri Vainio Peter Joore *DDF*	
18:00 - 19:00			18:00 - 22:00 Tour of Cerro Alegre, drinks & snacks *DDF*		
19:00 - 20:00					

DFGN session | DDF/Duoc UC | Fun time | Lunch time | Open event | Be proactive

EXHIBIT 4: RAT RELAY 2016
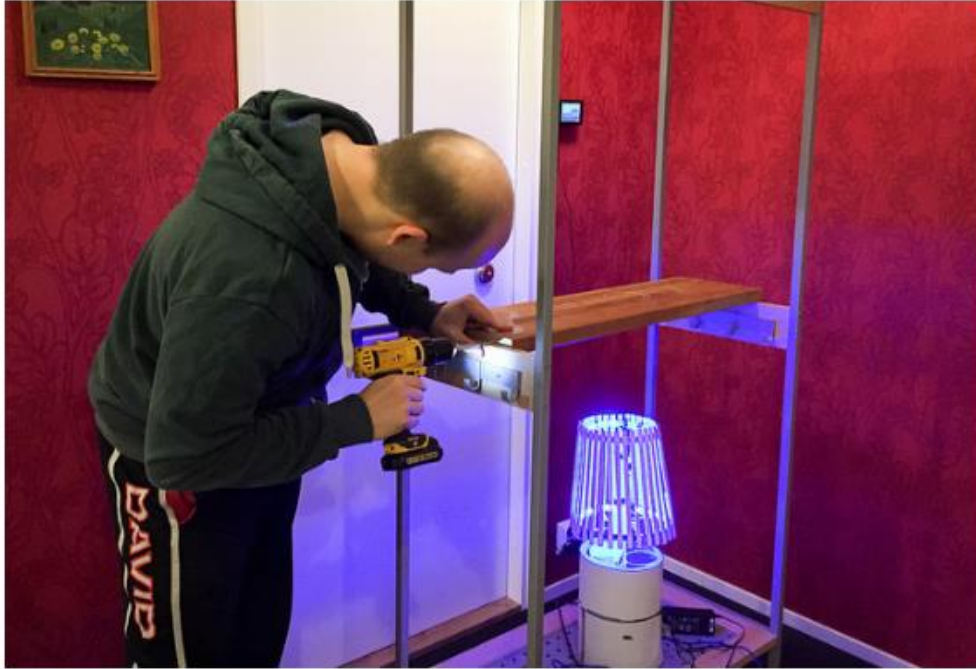
In eight hours' turns you have time to build prototypes, too.

Leveraging the global network to solve global challenges

Aalto Design Factory

Porto Design Factory

Nexus Design Factory

Rat Relay 2016

The global journey of the

brief by Kierrätyskeskus

Design Factory Melbourne

http://www.aalto.fi/en/current/news/2016-02-08-002/

EXHIBIT 5: SUGGESTED ACTION PLAN

The following is a suggested action plan for the implementation of the ideas offered for alternative revenue streams.

YEAR	MONTH	SUGGESTED ACTIONS
2017	January	**Introduce annual membership fees**
2017	June	Development work should commence on the proposed integrated system. This system would serve as a solution to the issues associated with the current use of multiple, disparate systems that operate as standalone applications. The use of open source code and agile methodologies are highly recommended.
	September	Establish Design Factory Global Network (DFGN) alumni association
	September	**Start organizing and generating revenue from exclusive events**
2018	January	Testing of the technical features of the integrated system should commence with early adopters. These users should be made to understand that the system is still under development and their continuous feedback and suggestions are extremely important.
2018	June	The first set of users may be invited to start using the first version of the integrated system.
2019	June	**Complementors should be invited to join the platform.**
	August	Technical features and tools should be developed and deployed on the integrated system to help corporate marketers and recruiters on the platform. Tools should also be developed to help alumni network, socialize and access certain other benefits available in the network.
	September	**Invite corporate organisations to join the platform**
	September	**Introduce membership fees to the alumni association**
	September	**Start applying for government's special projects**
	November	**Start charging network's members for advance functionalities**
2020	June	**Once the platform has achieved critical mass, research should commence on how revenue can be generated from data.**
	September	**Initiate plans for soliciting philanthropic support for the network. It is important that the integrated system is up and running.**
	September	**Start soliciting endowment funds.**