



University of St.Gallen

**Transforming the Rwandan brick sector  
into a competitive industry cluster –  
industry facilitation in theory and  
practice**

**Master thesis**

International Affairs and Governance  
University of St. Gallen (HSG)

**Silas Markert**

Im Schäferfeld 3

D - 14480 Potsdam

Matriculation number: 14-616-346

12<sup>th</sup> February 2017

Examiner: Dr. Urs Heierli

## Abstract

Nowadays, development organizations focus on strategies how to create sustainable impact which continues even after a project's assignment at place. One way of creating long-lasting effects is to build and promote industries. Thereby, it is an important target that these industries become competitive in order to be self-sustaining. According to Michael E. Porter, clusters can greatly contribute to achieve this goal.

Industry facilitators are needed when such sectors either do not exist or grow due to different types of barriers. In those cases, external help is required to overcome the challenges. Organizations or actors who facilitate industries typically act over several years and take on complex challenges. Therefore, they need regular data to understand their project's progress.

The thesis analyzed the case of Skat Consulting's project "Promoting off-farm employment through climate responsive construction material production" (PROECCO).

Insights from a theoretical and practical analysis about the challenges for PROECCO have been developed further during an on-site assignment in Rwanda for several months. Based on the findings, not only strategies, proposals and advice were provided but also put into action. In this regard, monitoring and evaluation tools were implemented and integrated into the project's procedures in order to create permanent access to significant and comprehensive information.

With the help of the monitoring tools, PROECCO can validate and refine its strategy in the future in order to successfully create a self-sustaining construction material market in the African Great Lakes Region.



**Figure 1:** Brick enterprises in Rwanda

**Source:** Own photographs

## **Acknowledgement**

I am very grateful to Dr. Urs Heierli and Daniel Wyss who made my research project in Rwanda possible. Through the work in the project, I could gain valuable insights about the program PROECCO - Promoting off-farm employment through climate responsive construction material production. Without their support and expertise-sharing this thesis would not have been possible.

In this regard, I also want to point out the Heinrich-Böll-Foundation which supported me throughout my entire university studies from 2011 until 2016. The enriching workshops, discussion with excellent scholars and alumni as well as the financial support tremendously helped me during my time at university and in Rwanda.

Special thanks also go to my parents and my whole family who have encouraged me to put my heart into my beliefs and supported me throughout my academic career in any possible way.

## Table of contents

<b>Abstract</b> .....	<b>II</b>
<b>Acknowledgement</b> .....	<b>III</b>
<b>Table of contents</b> .....	<b>IV</b>
<b>List of figures</b> .....	<b>VI</b>
<b>List of tables</b> .....	<b>VI</b>
<b>List of maps</b> .....	<b>VII</b>
<b>List of abbreviations</b> .....	<b>VII</b>
<b>1 Introduction, Outline and scope</b> .....	<b>1</b>
1.1 Problem description: Lack of competitive domestic markets .....	1
1.2 Focus case: Industry facilitation in the construction material sector.....	3
1.3 Aim of the thesis: Implementing a customized monitoring tool to support industry facilitation.....	5
<b>2 Methodology</b> .....	<b>7</b>
<b><u>Part I: Theoretical analysis</u></b> .....	<b>8</b>
<b>3 Industry competitiveness</b> .....	<b>9</b>
3.1 From traditional aid to market approaches .....	9
3.2 Competitiveness of an industry .....	10
3.3 Assessing competitiveness of an industry .....	11
3.4 Cluster theory .....	13
3.5 Cluster benefits .....	15
<b>4 Industry facilitation</b> .....	<b>18</b>
4.1 Why are industry facilitators needed? .....	19
4.1.1 Creating new markets .....	19
4.1.2 Scaling an industry .....	22
4.1.3 Making a market competitive and self-sustaining.....	25
4.1.4 Long-term success of industry facilitation through ownership .....	28
4.2 Why do industry facilitators have to learn?.....	30
4.3 How can industry facilitators learn? .....	31



---

<b>Part II: The brick sector in the Great Lakes region.....</b>	<b>33</b>
<b>5 Brick industry facilitation.....</b>	<b>34</b>
5.1 Country overview of Rwanda.....	34
5.2 History of brick-making in Rwanda .....	37
5.3 Skat Consulting and PROECCO .....	39
5.4 Current activities and challenges of PROECCO .....	42
5.5 Provided assistance.....	44
5.5.1 Investment calculation.....	44
5.5.2 Sales center monitoring .....	46
5.5.3 Overall monitoring .....	48
5.5.4 Implementation and generating data.....	53
5.5.5 Maintenance of the tools.....	55
5.6 First insights of the monitoring .....	56
5.7 Other observations.....	57
5.8 Limitations and forecast .....	58
<b>6 Conclusive Remarks.....</b>	<b>60</b>
6.1 Contributions .....	60
6.2 Epilogue.....	60
<b>Appendix.....</b>	<b>VIII</b>
Appendix B: History of brick-making .....	VIII
Appendix B: Questionnaires .....	XIII
Appendix C: Central monitoring tool .....	XIX
Appendix D: Embedded monitoring and evaluation files.....	XXII
<b>References.....</b>	<b>XXIII</b>
<b>Internet References.....</b>	<b>XXVIII</b>
<b>Declaration of Authorship and Academic Honesty .....</b>	<b>XXXII</b>
<b>Declaration of Discretion.....</b>	<b>XXXIII</b>

## List of figures

<b>Figure 1:</b> Brick enterprises in Rwanda.....	II
<b>Figure 2:</b> Michael Porter’s diamond model of national advantage.....	12
<b>Figure 3:</b> The cluster of the Californian wine industry.....	14
<b>Figure 4:</b> Metalworking Cluster in the USA divided into economic areas.....	15
<b>Figure 5:</b> Key benefits of clusters.....	16
<b>Figure 6:</b> Example of a full value chain.....	21
<b>Figure 7:</b> Scaling barriers.....	23
<b>Figure 8:</b> Impact based on the type of organization.....	26
<b>Figure 9:</b> Porter’s five forces.....	27
<b>Figure 10:</b> Political map of the African continent after the Berlin Conference of 1884.....	35
<b>Figure 11:</b> Trends in Rwanda’s HDI component indices between 1980 and 2014.....	36
<b>Figure 12:</b> Prices and resources needed for different types of walls with the same size (traditional bricks are left and modern bricks are on the right side).....	39
<b>Figure 13:</b> Program phases of PROECCO.....	40
<b>Figure 14:</b> Break-even calculation per scenario.....	45
<b>Figure 15:</b> Outcome measurement per scenario and production step.....	46
<b>Figure 16:</b> Stock measurement per brick type and quality.....	48
<b>Figure 17:</b> Three different levels of monitoring.....	49
<b>Figure 18:</b> Production figures of the Kigali cluster over time.....	50
<b>Figure 19:</b> Production capacity utilization calculation of the Kigali cluster over time.....	51
<b>Figure 20:</b> Value chain of the brick industry.....	59
<b>Figure 21:</b> Painting on the tomb of Rekhmire illustrating the production process of bricks with wooden molds.....	IX
<b>Figure 22:</b> The Colosseum in Rome was made with a high proportion of bricks.....	XI

## List of tables

<b>Table 1:</b> Modern Bricks substitute traditional bricks at a stable market share level.....	41
<b>Table 2:</b> Wall material of dwelling in Rwanda.....	42
<b>Table 3:</b> Input screen for the investment cost scenarios.....	45
<b>Table 4:</b> Stock measurement system for sales centers.....	47
<b>Table 5:</b> Exemplary performance of a brick producer rated in stars.....	53

## List of maps

<b>Map 1:</b> Forest Area in Rwanda .....	2
<b>Map 2:</b> Availability of clay in Rwanda, Burundi and South Kivu.....	4
<b>Map 3:</b> Potential Clay Reserves in Rwanda.....	38

## List of abbreviations

BMC	Building Material Center of PROECCO in Kigali
DRC	Democratic Republic of Congo
PROECCO	Promoting off-farm employment and income in the Great Lakes region through climate responsive construction material production
SDC	Swiss Agency for Development and Cooperation
SKAT	Swiss Resource Centre and Consultancies for Development
SMS	Short Message Service
UN	United Nations
UNDP	United Nations Development Programme
USA	United States of America

# 1 Introduction, Outline and scope

*“Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services”*

Target 3 of the Sustainable Development Goal 8 in United Nations (2017)

## 1.1 Problem description: Lack of competitive domestic markets

The world population is growing by approximately 1.1 percent every year<sup>1</sup>. Calculations have revealed that 6.5 percent of all people ever born in human history are currently alive<sup>2</sup>. A main driver for this increase in global population are high birth rates in developing countries<sup>3</sup>. In effect, governments in these regions struggle to accommodate the quickly rising population with affordable, safe and sustainable housing opportunities.

In reaction, the United Nations Development Programme has incorporated the objective to ensure “access to safe and affordable housing” into the Sustainable Development Goals agenda. This objective, under the superordinate goal of building sustainable communities and cities, shows the gravity of the worldwide challenge.

On the African mainland, Rwanda and Burundi are measured to be the most densely inhabited countries<sup>4</sup>. Additionally, their population is continuously showing an annual growth rate around three per cent indicating a population doubling time of approximately 25 years<sup>5</sup>. Due to the rising number of people, more building material is requested for accommodation. Currently, the population growth greatly exceeds the necessary number of housing units being constructed in a year.

The rising population aggravates the problem of land scarcity in the region<sup>6</sup>. In many East African countries, there is a tradition of inheritance-related land partitioning among farmers. Over generations, parents have divided their land and distributed it to their

---

<sup>1</sup> World Bank (2016)

<sup>2</sup> Haub, C. (2011). p. 1

<sup>3</sup> Haub, C. (2012)

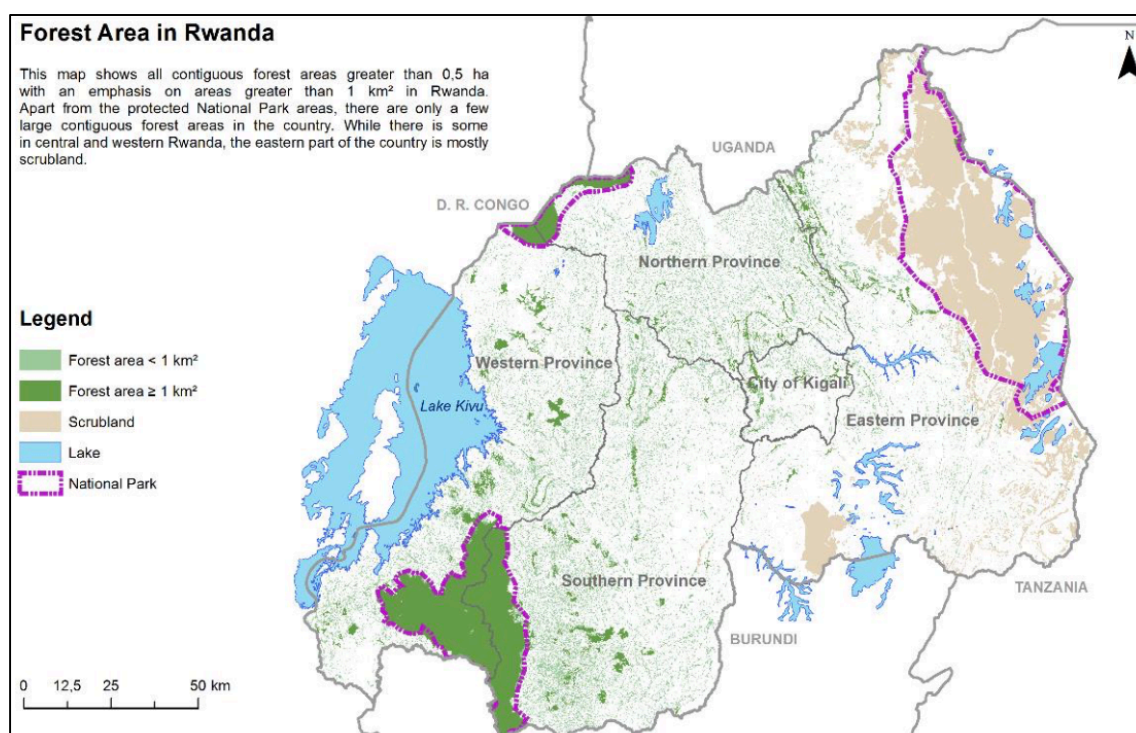
<sup>4</sup> United Nations Department of Economic and Social Affairs (2015)

<sup>5</sup> Ansoms, A. & Marysse, S. (2011). p. 4

<sup>6</sup> Construction Review Online (2016)

offspring which resulted in a severe fragmentation of the land. In consequence, farmers have generated lower levels of agrarian income limiting their opportunities to improve professionally and personally. Today, a level far below the United Nations Food and Agricultural Organization's minimum for sustainable agricultural livelihood has been reached<sup>7</sup>. Therefore, numerous descendants of farmers have to seek for other business or employment opportunities.

In fact, the building material sector in the Great Lakes Region bears high potentials for employment and income generation<sup>8</sup>. However, the sector is still mostly undeveloped and is thereby also causing a remarkable environmental footprint. Bricks are usually burnt in energy-inefficient kilns or illegally on open fires with a high percentage of spoilage<sup>9</sup>. Thereby, hundreds of thousands tons of fuelwood are burnt per year causing a deforestation level of currently approximately 70 percent in Rwanda (*see Map 1*) and a corresponding increase in greenhouse gas emissions<sup>10</sup>. Moreover, the wood of marshlands is often exploited and reduces their potential for agriculture<sup>11</sup>.



**Map 1: Forest Area in Rwanda**  
**Source:** Skat Consulting Rwanda (2015)

<sup>7</sup> Skat Consulting (2016). p. 4

<sup>8</sup> Skat Consulting (2016). p. 4

<sup>9</sup> Glanville, J. (1992). p. 5

<sup>10</sup> Nsengimana, T. (2014)

<sup>11</sup> Glanville, J. (1992). p. 5

Due to these prevalent undeveloped production methods, local businesses suffer from a bad reputation. Often, they tend to be uncompetitive in comparison with foreign providers. Either the quality does not meet the necessary requirements or prices are much higher than those of suppliers from abroad<sup>12</sup>.

Especially Rwanda is currently witnessing an enormous lift in the construction sector and a steadily increasing demand for real estate developments. However, the region remains with great amounts of unused potential for local businesses and the major share of the demand is met through imports from outside the region. During the last years, construction material was among the top-listed imported goods in Burundi and Rwanda. In 2014, Rwanda imported building materials worth \$227.8 million while the country's exports remained at \$21.1 million in that field<sup>13</sup>.

In fact, the economic growth and its corresponding increasing demand for construction material in the region could not yet be transformed into the creation of a strong building material production sector. On the one hand, between 2001 and 2014 Rwanda has constantly experienced one of the highest growth rates worldwide with around eight percent per year<sup>14</sup>. On the other hand, the building material sector remained with only few large-scale construction material firms being based around Kigali and with few small enterprises which usually do not meet the requirements to fully supply an entire construction project with their own material.

In conclusion, the sector continues to lack fabricating affordable products of high quality and in great amounts<sup>15</sup>. Therefore, the Great Lakes Region remains with enormous unused potential for off-farm employment and income generation. Furthermore, the traditional way of construction material production has severe consequences for the environment.

## **1.2 Focus case: Industry facilitation in the construction material sector**

Within the Agenda 21 of the United Nations, brick making is pointed out as a possibility how to reduce poverty in rural areas. Brick production is highlighted as an effective strategy for industry promotion due to its relatively simple technical and economic requirements. Also, small brick producers are considered to particularly

---

<sup>12</sup> Construction Review Online (2016)

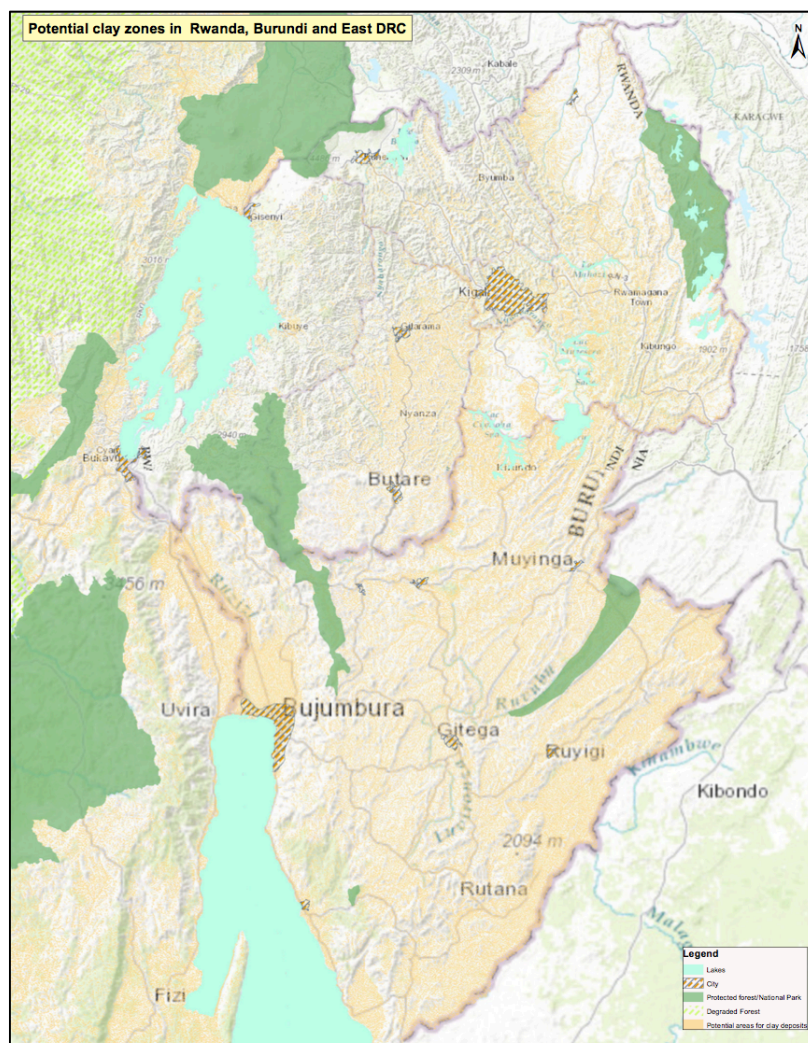
<sup>13</sup> Ngarambe, A. (2015)

<sup>14</sup> Hutt, R. (2016)

<sup>15</sup> Gahigi, M. (2016)

benefit of other infrastructure development projects since they can provide the necessary building material for such endeavors.<sup>16</sup>

Considering the general availability of the required resources for brick production in sub-Saharan Africa and relatively low technical requirements for brick production itself, businesses can quickly be established<sup>17</sup>. The Great Lakes Region possesses rich clay reserves as well (*see Map 2*). Hence, brick-production is possible throughout the entire region and it is especially suitable and advantageous to generate income and employment in areas with few other business opportunities. Although workers and former farmers seeking for jobs in the construction material production sector may not always be capable of creating their own enterprises due to certain investment costs, they may still seek for employment within the same sector offering them stable incomes and thus possibilities to improve their livelihoods.



**Map 2:** Availability of clay in Rwanda, Burundi and South Kivu  
**Source:** Skat Consulting Rwanda (2016)

<sup>16</sup> United Nations Department of Economic and Social Affairs (2016)

<sup>17</sup> Alemayehu, M. (2000). p. 97

Furthermore, improving the efficiency, quality and profitability of traditional building material production is a commonly used approach for sustainable development<sup>18</sup>. Traditional businesses have to be adapted according to modern requirements and possibilities. In result, local markets and supply chains may be created or extended and will provide regionally produced goods which decreases the dependence on imports and reduces the outflow of capital from the area.

In this regard, the program “Promoting off-farm employment and income through climate responsive construction material production” (PROECCO) of Skat Consulting aims to establish a building material industry in the Great Lakes Region. Thereby, PROECCO integrates different target fields of impact in one project and pursues a broad and sustainable approach. The focus areas of the program are job creation, income generation and technological progress in order to increase the livelihood of the rural population and to reduce harmful environmental pollution and wood clearing caused by building material production.

### **1.3 Aim of the thesis: Implementing a customized monitoring tool to support industry facilitation**

Promoting the construction material production of a region is a promising strategy to alleviate poverty and to reduce the environmental footprint. However, creating businesses and markets or intervening into a sector is a complex challenge and generally requires to act on both the supply and demand side to create the desired long-lasting impact.

In the case of the Great Lakes region, the countries face an enormous demand for construction material whereas the supply of construction material remains low<sup>19</sup>. Hence, the interventions for an actor encouraging local business currently need to focus predominantly on the supply side to match supply and demand as it is required regarding rules of the market. Therefore, entrepreneurs must be promoted through teachings, workshops, technical or administrative support and expertise sharing activities in order to create and scale their businesses.

An industry facilitator needs to constantly study and to accordingly adapt to the business and market environment. Without a fundamental understanding of these topics, the creation of a market, its scaling and transformation into being self-sustaining is an impossible task.

In this regard, it is a helpful tool for industry facilitator to quantify the efforts and activities of partnering businesses to detect strengths, weaknesses, needs, threats and

---

<sup>18</sup> Osunkunle, A. & Ogwuche Audu, H. (2014). p. 2

<sup>19</sup> Skat Consulting (2016). p. 9



opportunities of the firms and of the entire industry. Based on this, actors who are promoting an industry learn themselves and may adapt their strategies accordingly. Finding out about best practices on how to support partners is essential for this endeavor and requires monitoring and evaluation procedures on a regular basis. Based on the results, customized effective support can be provided. Moreover, entrepreneurs themselves shall be incentivized to use the evaluation information to better understand and improve their businesses.

In that sense, the thesis builds upon PROECCO's approach, to empower brickyards in rural areas and to innovative entrepreneurs who are willing to establish permanently operated construction material yards<sup>20</sup>. The aim is to contribute to the project's industry facilitation efforts by creating significant monitoring and evaluation mechanisms. The results shall be an essential to support PROECCO in establishing a competitive construction material industry in the African Great Lakes region.

---

<sup>20</sup> Skat Consulting (2016c)

## 2 Methodology

In order to study effective industry facilitation and to develop an informative monitoring tool for PROECCO, a comprehensive approach was taken that includes both theoretical research and first-hand experience from working together with the team of the industry facilitator in Rwanda, Burundi and Congo.

The theoretical basis summarizes the background on the role of an industry facilitator mainly based on Michael Porter's theories, presenting the characteristics how to establish and scale a sector, and how to make it self-sustaining. The theoretical foundations are deducted from international literature on industry facilitation, monitoring and evaluation, performance and impact measurement as well as sustainable development in general. Thereby, the study is enriched with relevant examples of other contexts and from PROECCO itself. Such examples are selected for the purpose of a strong connection between theory and practice.

Secondly, the case of PROECCO will be analyzed in detail. This practical part builds upon a seven-month internship of the author in the Great Lakes region where he could achieve valuable insights about the project's status quo and held numerous meetings with the PROECCO-team in order to understand the current challenges and necessities of the program. Seeking for answers to questions from the staff of PROECCO allowed the author to adjust the work specifically according to the requirements of the program.

Therefore, information was obtained from academic papers and studies, literature and newspapers, as well as from unpublished reports, data and maps directly prepared by Skat Consulting Rwanda. Furthermore, being involved in meetings with representatives of the Swiss Development Cooperation (SDC) and the design of the logical framework of the project document, that PROECCO submits to its contracting agency every three years as a report about its activities and strategy, was an important task to get a full understanding about the progress of the program. Finally, field studies together with coworkers of PROECCO gave the author the opportunity to meet numerous brick-producing entrepreneurs and to better understand their production procedures.

Based on this information, comprehensive monitoring tools were designed in the most beneficial way for the program. They are presented in the second part of this thesis and aim to be the central steering tools for PROECCO's industry and performance evaluation. It will also be explained how the tools were handed-over and used as well as how they may be adjusted in the future to allow the highest possible impact for the project in the long term.

## **Part I: Theoretical analysis**

The chapter departs with an overview of the background and evolution of market approaches in development work. These strategies still receive increasing attention and aim at creating sectors and supporting them to become competitive.

In the following, the analysis highlights the significance of and determinants for competitiveness of a sector in order to make industries self-sustaining. Furthermore, clusters are studied as beneficial structures which support this goal. Thereby, Michael Porter's theories represent the focus of the study.

In the second part of this chapter, the role of organizations or enterprises is studied who aim at turning an industry into a competitive market. It is pointed out why industry facilitators are needed and what kind of obstacles they face. Depending on the project's progress, different types of barriers and challenges need to be mastered.

Subsequently, it is pointed out that industry facilitators constantly have to gather information in order to be able to effectively target specific challenges. Based on the emphasis of the importance of learning mechanisms, it is described how the necessary information may be acquired.

### 3 Industry competitiveness

*“Creating markets generates jobs and sustainable economic growth, builds thriving companies and lifts people out of poverty.”*

Philippe Le Houérou in Le Houérou, P. (2017)

#### 3.1 From traditional aid to market approaches

For more than 100 years, official development assistance and foreign aid have shaped structures in many different ways and fields around the world. Beginning with colonization, countries started to give money to colonized countries in less developed areas of the world. In most cases, colonial powers initiated infrastructure projects in their colonies of that period of time or directly focused on either economic growth or providing support for basic needs<sup>21</sup>. Even after the years of colonization, foreign support kept mainly aiming at economic development and represented a major strategy of foreign policy during the cold war<sup>22</sup>.

By the 1980s, donor countries reviewed their strategies of aid and started to follow development approaches that focused on policy reforms as well as on more comprehensive and broader contexts compared to former actions of intervention and direct market measures. Topics such as poverty alleviation, sustainable development, development of trade capacity, gender equality, women’s empowerment, and violent conflict prevention became essential determinants for development.<sup>23</sup>

In the 1990s the focus shifted towards aid effectiveness. Since then, much attention has been paid to find the most efficient ways how to use aid money and how to create sustainable impact in the long term in order to ensure a self-sustaining continuation after temporary development projects expire<sup>24</sup>.

*“But as important as official assistance is to improving people’s lives, the reality is that it is trade and private capital flows that will make the real difference that are more, more, much more significant”*

Colin Powell in Powell, C. (2002)

---

<sup>21</sup> Philips, K. (2013)

<sup>22</sup> Edwards, S. (2014)

<sup>23</sup> Nowak, W. (2014) p. 459

<sup>24</sup> Ehrenfeld, D. (2004)

In line with sustainable development and self-sustaining aid, development agencies gained interest about establishing and promoting industries in order to achieve long-lasting impact. The arising idea was to create and to build entire value chains that are able to continue their work after the development project duration and without further interventions from organizations or government agencies. This approach had been studied since the late 1890s starting with Alfred Marshall but it received increasing attention after the publication of Michael Porter's book *The Competitive Advantage of Nations* in 1990<sup>25</sup>.

### 3.2 Competitiveness of an industry

In theory, open global markets should diminish the importance of location in competition. Nowadays, numerous goods and also services are accessible from distance or through global markets to any company at any place<sup>26</sup>. However, in reality the world continues to be dominated by economic concentrations.

One of the most influential scholars on that topic of economic concentrations is Harvard University Professor Michael E. Porter. He has published numerous books and articles on the dynamics of competitiveness in business. Competitiveness is defined as the extent to that a group of operating firms within a certain industry is able to compete in the regional and global economy while assuring or improving wages and living standards for ordinary citizens.<sup>27</sup>

Competitiveness is determined by microeconomic and macroeconomic competitiveness, as well as certain endowments. Firstly, the microeconomic competitiveness and productivity depends on the quality of the business environment, state of cooperation and interconnection, and the sophistication of local operations and competition. Secondly, macroeconomic competitiveness refers to the economy-wide context for productivity to arise. Thirdly, certain endowments including the geographical location, population, land area and natural resources create a basis for prosperity.

In order to create a competitive industry, the status quo has to be fully understood and set into context. On the one hand, a business's performance in a certain environment has to be evaluated. On the other hand, the market environment has to be assessed based on its suitability to promote businesses. Business and market intelligence are technical terms that describe these perspectives.

---

<sup>25</sup> Porter, M. E. (1990)

<sup>26</sup> Porter, M. E. (1998). p. 1

<sup>27</sup> Porter, M. E. (2015). p. 3

### 3.3 Assessing competitiveness of an industry

Michael Porter has set several milestones regarding the assessment of competitiveness. One of the most prominent frameworks is the Diamond of National Advantage. The framework integrates theories of his previous work on businesses, value chains, and competitiveness.

The approach was considered as groundbreaking because it regards competitiveness of nations and businesses for the first time as a part of a greater setting with mutual influences.

*“Leaders of businesses, government, and institutions all have a stake—and a role to play—in the new economics of competition. This task will require fresh thinking on the part of leaders and the willingness to abandon the traditional categories that drive our thinking about who does what in the economy.”*

Michael E. Porter in Porter, M. E. (1998)

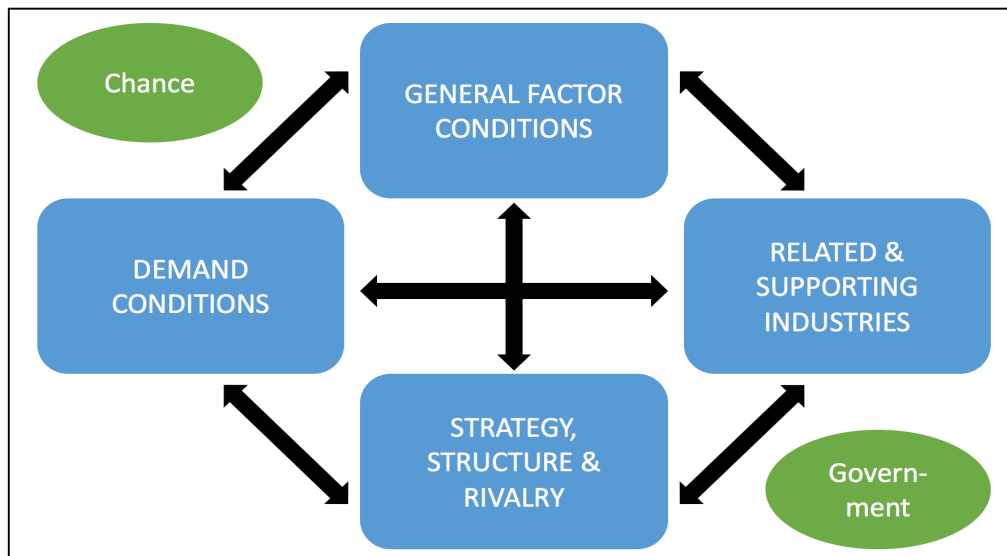
Traditional theories mostly claimed that countries and regions inherently possess location, land, resources, population and labor as the key determinants for a comparative economic advantage<sup>28</sup>. In contrast, Michael Porter’s diamond argues that countries can also create new advanced factor endowments. These can be factors such as skilled labor, culture, governmental support or a strong technology.

According to Porter’s diamond, the unique factors of an economy’s nationality as well as its inherent culture determine the advantages for companies on international markets. Thus, the diamond model can serve companies of different scales. It may be applied to measure the competitive advantages of local conditions for small and new companies as well as businesses which are entering the international market to compare with those of other countries.

Porter’s theory consists of four interrelated fields that form a diamond when they are graphically arranged (*see figure 2*).

---

<sup>28</sup> Investopia (2016)



**Figure 2:** Michael Porter's diamond model of national advantage

**Source:** Own illustration, based on Porter, M. E. (1990)

Firstly, the field factor conditions regards topics such the availability of labor and raw materials in the region. Secondly, demand conditions stress the importance of domestic demand in pressuring companies into making their products more competitive<sup>29</sup>. Thirdly, related and supporting industries may provide inputs that are advantageous for internationalization and innovation. The fourth factor regards how companies are managed and organized. This factor creates pressure and competition within the market which helps to make companies more innovative and efficient.

Government and chance are two external variables that both influence the four factors of the diamond model. According to Porter, chance events generate discontinuities that enable shifts in the competitive position while government interventions benefit or disadvantage the four key determinants of the diamond in an industry.

Apart from that, an industry becomes competitive through the characters of its actors. There must be dynamics within the sector that guarantee a positive change of the industry. Without innovation, drive and entrepreneurial spirit an industry will be unlikely to succeed.

The diamond theory highlights the importance of considering different elements of an economy in order to create a stimulating, dynamic and competitive business environment<sup>30</sup>. Thereby, proximity of competing, supplying and demanding companies amplifies all of the pressures for firms to innovate and upgrade.<sup>31</sup> This theory is essential to be considered for organizations which are creating or promoting markets in order to shape their strategy.

<sup>29</sup> Porter, M. E. (1990)

<sup>30</sup> Porter, M. E. (1998). p. 30

<sup>31</sup> Porter, M. E. (1998). p. 30

### 3.4 Cluster theory

The reasons for economic concentrations have been studied for a long time. First, they were understood as agglomerations in urban areas or regarding a certain industry<sup>32</sup>. Being based on cost effectiveness reasoning, these studies were undercut by the globalization of markets, supply sources, technology, transportation possibilities as well as decreasing transportation and communication costs.

Today's understanding of clusters has changed<sup>33</sup>. Thereby, Michael Porter's publications had a great influence on the rethinking of geographic business concentrations. Porter defined clusters as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate"<sup>34</sup>.

The structure of clusters creates collective responsibility, mutual dependence among the involved actors and leads to conditions that favor productive competition<sup>35</sup>. Furthermore, clusters are regarded as a system of interconnected firms and institutions whose value as a whole is greater than the sum of its parts. In fact, clusters are understood to be a manifestation of Porter's diamond at work meaning that functioning clusters are important to create competitive industries<sup>36</sup>.

In terms of their scope, clusters affect the competitiveness of an industry both nationally and internationally. They encourage competition and cooperation between companies, and influence rivals such as producers of substitutes. Such competition keeps the industry dynamic and creates pressure on the entire economic sector to increase innovation and efficiency which makes cluster members more competitive on the international level.

Cluster theory advocates to build on emerging concentrations of firms. It encourages the cooperation between those companies within an industry that possess the strongest linkages or spillovers<sup>37</sup>. Thereby, these linkages between firms mark the affiliation and size of a cluster.

The wine cluster of California is a prominent example for a complete cluster containing supply, demand, processing and support units (*see figure 3*).

---

<sup>32</sup> Porter, M. E. (1998b). p. 13

<sup>33</sup> Porter, M. E. (1998). p. 30

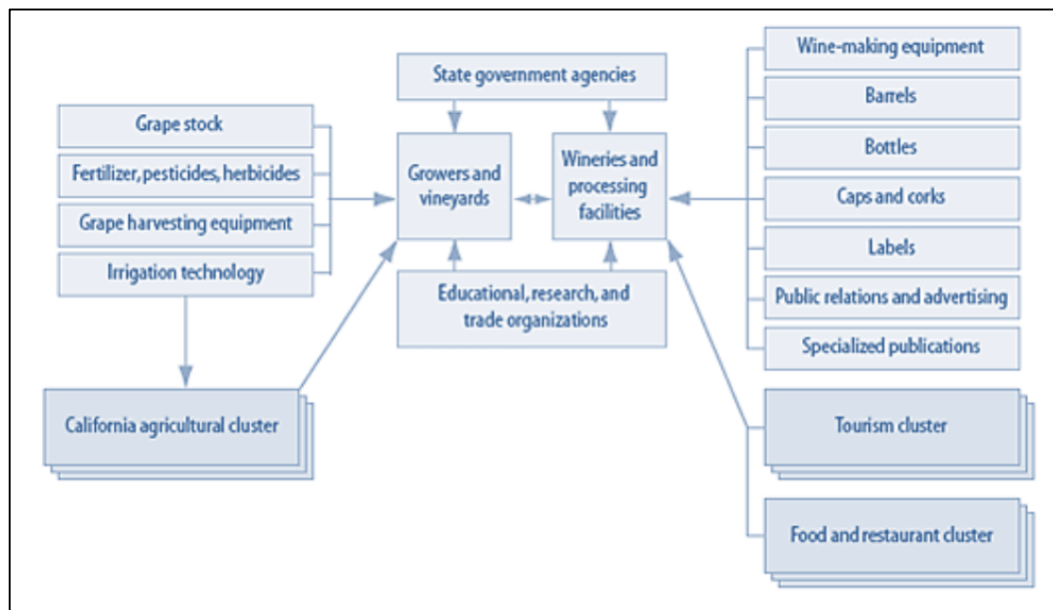
<sup>34</sup> Porter, M. E. (2000). p. 16

<sup>35</sup> Porter, M. E. (1998). p. 30

<sup>36</sup> Porter, M. E. (1998). p. 30

<sup>37</sup> Porter, M. E. (1998b) p. 9





**Figure 3:** The cluster of the Californian wine industry

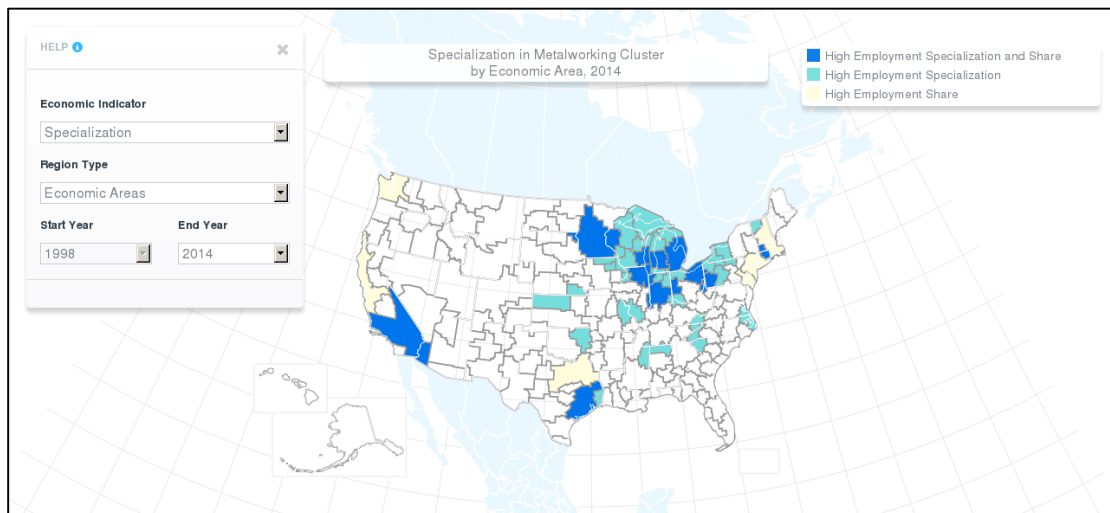
**Source:** Porter, M. E. (1998), p. 4

The cluster includes subsectors, hundreds of commercial wineries, product processing enterprises, equipment providers, institutions, governmental agencies and a strong sector on the demand side<sup>38</sup>. Furthermore, competition exists within each part of the cluster that keeps it dynamic and triggers improvement of products, services and processes.

Clusters can consist of different subclusters which contain even stronger correlations between each other but they are all still considered as concentrations of firms within a superior main cluster<sup>39</sup>. Such subclusters can appear in certain regions such as in the example of the American metalworking industry cluster (*see figure 4*). In this case, the national cluster consists of smaller subclusters like the Rust Belt reaching from the Great Lakes to the upper Midwest State.

<sup>38</sup> Porter, M. E. (1998). p. 4

<sup>39</sup> Porter, M. E. (2007). p. 3



**Figure 4:** Metalworking Cluster in the USA divided into economic areas  
**Source:** Harvard Business School (2016)

Development organizations increasingly rely on the far-reaching effects of clusters. Since the 1990s, the idea of cluster building has strongly influenced policy making. Cluster development has become a trend topic to many government and development programs. In result, numerous cluster facilitation initiatives have been started. For example, the World Bank alone actively funded 266 cluster projects<sup>40</sup>.

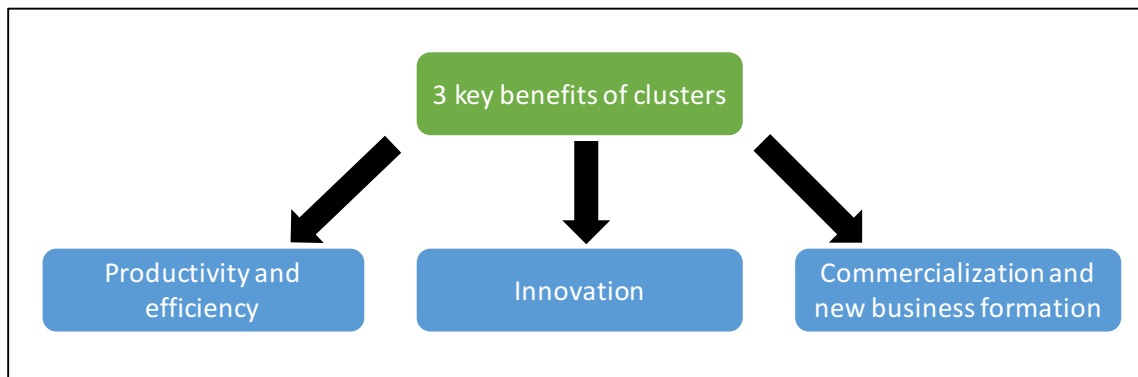
### 3.5 Cluster benefits

Clusters play an important role in the studies of foreign aid because they reflect fundamental impact. Empirical studies revealed that small and medium sized enterprises which are part of clusters possess a competitive advantage compared to isolated firms due to their higher collective efficiency<sup>41</sup>.

The extent of benefits that are acquired through clusters depends on their field of action and the specific case. Nevertheless, three key benefits are typically pointed out (*see figure 5*). An increase of productivity of the companies in the cluster can be observed. Clusters drive innovation in the area of expertise, and they encourage the formation of new businesses.

<sup>40</sup> Lundequist, P. & Power, D. (2001). p. 686

<sup>41</sup> Pietrobelli, C. & Rabellotti, R. (2004). p. 4



**Figure 5:** Key benefits of clusters

**Source:** Own illustration, based on Porter, M. E. (2016)

Firstly, productivity can be increased through various factors. Mutual dependences, competition and pressure within clusters facilitate the access to specialized employees and inputs, information, institutions and public goods. Furthermore, due to complementing cluster activities and extended performance measurement of activities the productivity is typically increased.<sup>42</sup>

Secondly, companies within clusters tend to possess strong bonds. These linkages are beneficial for innovation. Due to the cooperation, buyers perceive trends and needs faster and more clearly. Hence, they can adapt their products according to the needs without risking to lack sufficient demand. Furthermore, participation in a cluster offers possibilities to perceive new operation, delivery and technology possibilities as well as information sharing for effective innovation. Lastly, the competition in a full cluster will create pressure to innovate and improve. However, clusters can also prevent radical innovation steps because of dependences on other companies in the cluster. Furthermore, without sufficient competition and a risk of being excluded, when the performance is inadequate, companies may not feel the need to innovate.<sup>43</sup>

Thirdly, clusters are usually beneficial for the formation of companies. New businesses are often formed within existing clusters since opportunities and market niches can be perceived more easily within an existing system. Furthermore, such an environment already offers a market and provides skills, inputs, staff and assets. Hence, the risks are lower and easier to perceive for both entrepreneurs and financing institutions which will then allow new companies better means to make investments. In result, clusters often grow in breadth and depth over time and thus enhance their own cluster advantages.<sup>44</sup>

<sup>42</sup> Porter, M. E. (1998b). p. 16

<sup>43</sup> Porter, M. E. (1998b). p. 17

<sup>44</sup> Porter, M. E. & Caves, R. (1977)

Each of the three aspects depends on certain other factors as well. Personal relationships, communication networks and institutions are only a few which are important factors for cluster benefits and competition.

Research has confirmed that clusters also provide positive influences for workers, firms and regions resulting in higher income levels, employment growth, improved regional economic performance and resilience during downturns<sup>45</sup>. Moreover, through the proximity and repeated exchanges between companies in a cluster better coordination and trust will be fostered<sup>46</sup>. Certain additional cluster advantages may also depend on external factors or spillover effects from firms of other industries<sup>47</sup>.

Porter highlighted the fact that the number of clusters depends on economic development. Hence, the quantity of subclusters and companies rises with increasing sophistication of competition as well.<sup>48</sup>

Finally, clusters alleviate problems that are natural in arm's-length relations without enforcing inflexibilities of vertical integration or management challenges of upholding formal linkages such as in partnerships, alliances or networks. In fact, companies and institutions in a cluster are informally linked and stand for a form of organization that offers flexibility, efficiency and effectiveness.<sup>49</sup>

Although clusters support the process of such relationships, they do not arise automatically and need to be specifically promoted. Hence, they are part of the economic policy in many countries where informal and formal organizing mechanisms as well as certain norms can be specifically shaped in order to promote them.<sup>50,51</sup>

---

<sup>45</sup> Muro, M. & Katz, B. (2010). p. 5

<sup>46</sup> Porter, M. E. (1998). p. 6

<sup>47</sup> Porter, M. E. (1998b). p. 13

<sup>48</sup> Porter, M. E. (1998b). p. 13

<sup>49</sup> Porter, M. E. (1998). p. 6

<sup>50</sup> Porter, M. E. (2015). p. 17

<sup>51</sup> Porter, M. E. (1998b). p. 13

## 4 Industry facilitation

Those actors are called industry facilitators which focus on promoting supply of products, creating demand and shaping the broader business environment. Thereby, it is the goal to create a self-sustaining and competitive industry which is capable of operating by itself after the industry facilitator ends its support. When reaching this objective, the industry facilitator succeeds in creating more sustainable impact and in a broader context than conventional development projects.<sup>52</sup>

*Industry facilitators act to resolve scaling barriers, at the levels of both the enterprise and its wider business ecosystem, to the benefit of many firms, not just one. They do this in order to help promising market-based solutions — which are commercially viable and benefit the poor — accelerate towards scale.*

Koh, Hegde & Karamchandani in Koh, Hegde & Karamchandani (2014), p. 12

Actors which promote industries shape both its supply and demand side. They empower numerous firms and aim to establish advantageous market conditions and sales markets<sup>53</sup>. In this regard, effective industry facilitation focuses on the entire value chain and considers forward and backward linkages within the industry as well as linkages to other sectors. Hence, the relationships and interdependences between parties within an entire sector are regarded. Depending on the position of an industry and the linkages, positive effects of industry facilitation may also be observed in other related industries of a sector.

Due its complexity, understanding the market forces is a key concern for successful industry facilitation<sup>54</sup>. A holistic understanding of an industry regarding its composition is crucial to promote it. Hence, industry facilitators consider different actors including companies, governmental agencies, academia, training providers, associations and institutions in a specific field<sup>55</sup>.

Over time, industry facilitators acquire new knowledge based on their former actions. These insights are important to progressively understand businesses and their environment and markets in order to design industry facilitation activities more effectively. They are also important in cases of attempted industry facilitation where market approaches have failed in the past and new strategies are used.

---

<sup>52</sup> Koh, Hegde & Karamchandani (2014). p. 78

<sup>53</sup> Koh, Hegde & Karamchandani (2014). p. 16

<sup>54</sup> Heierli (2008). p. 39

<sup>55</sup> Porter, M. E. (1998), p. 3

*“The role of an industry facilitator is not an easy one and there is no copy-paste solution available that can be used anywhere. It needs some subtle and intuitive skills to judge when it is right to act directly, when it is better to facilitate, or in other words: sometimes one needs to push, sometimes to pull, and sometimes to step besides. The art is to know when what is most appropriate. This requires quite a good dose of pragmatism”*

Dr. Urs Heierli in Skat Consulting (2016), p. 67

In conclusion, it is the ultimate goal to create or to scale an industry beyond the size of a pioneer and up to the size that the industry is self-sustaining. Moreover, the intended industries shall be inclusive and contain all steps along the value chain as well as providing necessary tools and administrative support. In an ideal case, the industry drives a scaling process by increasing supply and demand as well as quality improvements and innovation through competition.

## **4.1 Why are industry facilitators needed?**

Nowadays, countries are polarized into those which have succeeded in implementing open, competitive and international economies and those which have not<sup>56</sup>. Hence, it is a complex challenge to establish or facilitate industries in the developing world that are able to compete with international rivalry. Furthermore, due to fast economic progress in some regions of the world the gap compared to new or obsolete economies is growing. Hence, competing with economies on an international level is increasingly challenging for developing countries.

Industry facilitators are needed to create new markets, to scale them and to make them competitive and self-sustainable. Throughout this process, several types of barriers may exist that can usually not be removed by individual market actors alone. In contrast, industry facilitators have greater influence and networks. They support the efforts to remove barriers in order to promote the creation of competitive industries.

### **4.1.1 Creating new markets**

The challenges for an industry facilitator within a newly or recently created sector are typically more sophisticated than in already existing markets. The reasons behind that is the task for an industry facilitator to create both supply and demand. This requirement is essential to build inclusive industries<sup>57</sup>. It guarantees the creation of a functioning market and can turn push markets into pull markets.

---

<sup>56</sup> Wignaraja, G. (2002)

<sup>57</sup> Koh, Hegde & Karamchandani (2014). p. 10

In the context of development work, new products and services are typically introduced into an existing or entirely new market and they need to be promoted. Often, customers are skeptical about the product or do not perceive the advantages sufficiently. Also, potential stakeholders have to be taught about the advantages of the product or service because they may not perceive the favorable aspects sufficiently<sup>58</sup>. Such characteristics describe push markets. In these situations, an industry facilitator must convince different market actors about the benefits of the new product or service. Push markets are characterized by high efforts of education as well as the need to actually create visibility, recognition and positive perception of a certain product or service. Hence, acting on the supply and demand side in communicating products' or services' benefits to potential providers and customers represents a crucial step to facilitate an industry in a push market.

In contrast, products and services are well-perceived and desired by consumers in pull markets although the product might be an innovation and stakeholders did not know about it before informing them. Even though stakeholders might need some explanation, the necessary effort for an industry facilitator to promote the product or service in a pull market is significantly lower than in a push market. Based on the rules of the market, excess demand will prompt more supply and thereby accelerate the creation of markets. High demand creates more supply because entrepreneurs face lower risks to sell their products and services. Thus, it is essential for industry facilitators to pay high attention not only on the supply side as in most conventional development approaches but also specifically on the demand side in order to transform push markets into pull markets.

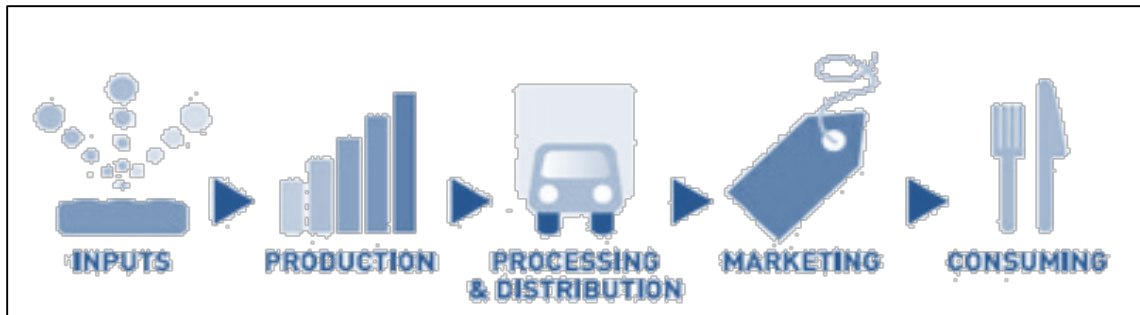
Industry facilitators in the developing world typically start from a very low level. The countries in which they are acting tend compete in the world market with their resources or cheap labor. Beyond this level, development ambitions mostly require the formation of functioning clusters. Moreover, clusters are also important for countries moving from middle income to advanced economies. With increasing wealth of an economy, the need for clusters increases due to their drive for innovation.

Based on their effectiveness, many industry facilitators use cluster theories to build industries. For them, it is important to consider that clusters typically grow along supply chains because of the advantages of collective efficiency. This is mainly because cluster structures offer business opportunities with low risk and thereby attract other businesses to join the cluster which results in its growth.

Hence, the forward and backward linkages in an industry, which give indication about the size and dynamics of the market, are an important indicator how to facilitate cluster building. The linkages explain how clusters grow up to complete industries which include whole value chains from inputs to consumption (*see figure 6*).

---

<sup>58</sup> Murray, Gao & Kotabe (2011)



**Figure 6:** Example of a full value chain

**Source:** Centre of Innovation, Imagination and Inspiration (2016)

A promotion of linkages within clusters contributes to establish a solid basis for development. The actors will be empowered, their interactions facilitated, access to new markets enabled and international standards targeted. Thereby, collective strategies deepen trust between companies, empower business associations and facilitate external connections of clusters.<sup>59</sup>

In conclusion, concentrations of businesses with high numbers of or potential for linkages are considered as worth supporting and industry facilitators are required to provide a beneficial environment for these businesses. Hence, even a few enterprises can be capable of initiating the development of a new industry and might also create beneficial side-effects to other sectors.

As a concept of development economics, Hirschman introduced his approach of unbalanced growth<sup>60</sup>. According to this theory, forward linkages are formed when investments are encouraged in further downstream stages of the value chain. In contrast, backward linkages exist when investments are encouraged on earlier stages.

Companies that supply or demand a certain good or service will locate their businesses in proximity to their business partner. Thereby, they contribute to the growth of the entire industry and take part in the formation of geographic concentrations. "The growth of an industry leads to the growth of the industries that supply inputs to it"<sup>61</sup>. For example, running a successful bakery raises the number of sales and increases the production. Hence, a bakery will order more ingredients and create business opportunities for such providers which will then locate their business in proximity to the down-stream demand in order to save costs for transportation and to facilitate cooperation. This effect is considered as a backward linkage. In contrast, forward linkages exist when a business within a value chain leads to the growth of industries that use the aforementioned product or service as their input. Relating to the example of the

<sup>59</sup> Pietrobelli, C. & Rabellotti, R. (2004). p. 8

<sup>60</sup> Lipton, M. (1962). p. 642

<sup>61</sup> McPherson, Botes & Lane (2015). p. 11



bakery, a downstream linkage would be the opening of a café in the same area which buys cakes from the bakery and sells them to its customers.

Apart from linkages, industry facilitators have to consider many other factors. During early stages of industry facilitation, the focus is often set on improving general conditions such as education, skill levels, technological capacities, access to finance, and improving institutions. With time, further investments in specific assets will be needed<sup>62</sup>.

Also, the right preconditions for cluster building have to be created in different areas at early stages. In most developing countries, economic activities concentrate around the capital cities or in coastal areas. In these instances, other regions lack suitable institutions, governmental support, infrastructure and suppliers.<sup>63</sup> Therefore, industry facilitators have to act early to enable well-balanced growth which will also reach the usually poorer rural population.

In certain cases, government policies may hinder cluster building in developing countries. The absence of subsidies and adequate business areas can disperse industries and prevent the formation of clusters artificially. Then, industry facilitators need to represent the interest of small enterprises which are not powerful enough to share their concerns with authorities directly. Otherwise, vertical integration will occur which reduces competition, cluster building and accordingly the pressure for innovation.<sup>64</sup>

Overall, the right conditions for businesses are essential for cluster formation and need to be the focus of industry facilitators which want to create new markets that include the whole value chains from turning raw materials into finished products and selling them to customers<sup>65</sup>.

#### **4.1.2 Scaling an industry**

In many situations, small clusters or industries face barriers to scale up. This process is twofold. On the one hand, companies have to be empowered directly and on the other hand barriers need to be removed. Thus, industry facilitators have to follow a broad strategy to develop competitive markets.

Industry facilitators which aim to scale an industry often find situations where firms in an operating market are either not willing or in the position to remove scaling barriers. Hence, they face complex challenges and have to regard different focus areas. Thereby, what happens within individual companies are the most obvious and essential scaling barriers but other related factors profoundly influence a business's performance as

---

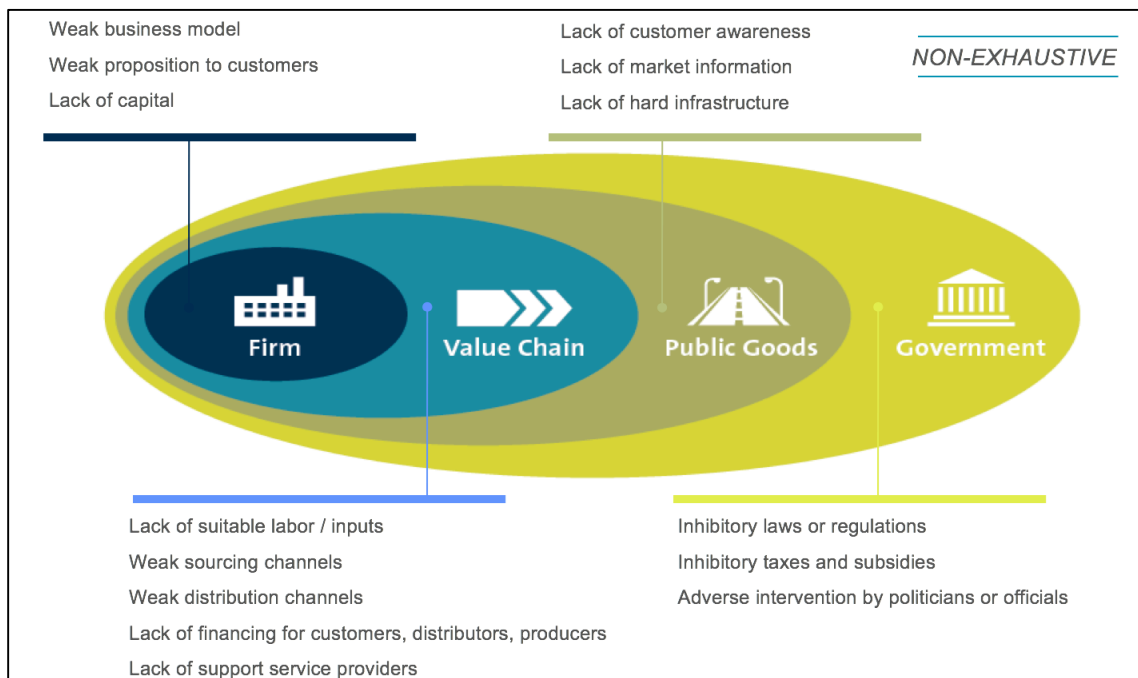
<sup>62</sup> Porter, M. E. (1998). p. 19

<sup>63</sup> Desai, S. , Nijkamp, P. & Stough, R. R. (2011). p. 11

<sup>64</sup> Porter, M. E. (1998). p. 19

<sup>65</sup> United Nations Industrial Development Organisation (2002)

well<sup>66</sup>. These other factors are summarized *in figure 7* and refer to the value chain, public goods and government actions.



**Figure 7:** Scaling barriers

**Source:** Koh, Hegde & Karamchandani (2014), p. 11

Challenges within the company refer to leadership, managerial or technical skills of the company. Barriers in the value chain address obstacles in regard of cooperation with other companies within the cluster. The category of public goods suggests barriers such as missing awareness of new products, comprehension of their benefits, product standards and hard infrastructure as key challenges. Finally, the section government regards missing political actions or rules which prevent scaling. Such inadequate conditions for scaling cover low flexibility, inadequate regulation and aggravating procedures of governmental bodies.<sup>67</sup>

In development countries, certain challenges are especially noteworthy to be considered for the process of scaling up. Typically, small enterprises do not have access to partnerships or a network of fellow companies with the same interest. These cooperations could provide specific expertise, access to finance or markets, efficiency increases or general support. Moreover, networks are crucial to represent an industry's interest towards political and institutional actors. For example, the Schwab Foundation took a leading role in promoting small enterprises by creating a network of them which offers a prime source to acquire insights from best practices on how to cope with scaling

<sup>66</sup> Koh, Hege & Karamchandani (2014). p. 12

<sup>67</sup> Koh, Hege & Karamchandani (2014). p. 12

challenges<sup>68</sup>. Through such networks or an organization representing them, firms receive the possibility to channel the interest of several companies in order to communicate their concerns and proposals for improvement. In cases where firms are not able to advocate for themselves or lack adequate information, industry facilitators can help by directly representing and campaigning their interests or by establishing networks to enable the exchange information with other relevant stakeholders.

Single entities and especially firms are often not able to take up the position to remove specific constraints because of their small size or limited management skills and financial restrictions. Oftentimes, market players do not take action because they hope for other parties to take the risk and costs that would benefit the entire sector. This situation is defined as the prisoner's dilemma. It would be beneficial for everybody to cooperate but nobody takes the action to make the investments because the cooperation of other actors is not guaranteed.

In similar cases, the involved parties rather take the position of hoping for another stakeholder to make progress or carry the burden. This situation of free riding hinders an industry from progressing or might even restrict the access for everybody<sup>69</sup>. In rural South Africa, most water supply projects are operated and maintained by communities rather than by the state. The water supply is typically non-excludable and thus creates incentives to free ride. Although it is essential for all citizens to have access to water, citizens often wait and hope that others will pay the price for reparations. Hence, communities frequently face problems to raise the necessary money for maintenance which thereby restricts access to water for the whole community. Finally, appropriate maintenance is not affordable and the facilities often deteriorate or break down.<sup>70</sup>

At times, it can also be more beneficial for a company to uphold barriers if it entails an overcompensating advantage for them. In this regard, firms may even directly benefit from market and scaling barriers since they can put certain firms into an advantageous situation of monopolies. Therefore, they would counteract against the attempt to remove constraints in the market.

Scaling may be hindered due to a lack of understanding as well. Firms may not detect or understand barriers for scaling as such. In other cases, the required action would need capacities that are too risky or costly for a company compared to the potential benefit or return. In fact, reaching new customers or educating consumers about new products that require extensive explication and persuasive power for the actual usage is a pricey endeavor and might not be profitable for selling companies in the near future. Thereby, the costs may be higher than the expected return.

---

<sup>68</sup> Schwab Foundation for Social Entrepreneurship (2015)

<sup>69</sup> Kayser, O. & Budinich, V. (2015). p. 65

<sup>70</sup> Breier, M & Visser, M. (2006). p. 2

In situations where individual actors are unlikely to cooperate, tend to free-ride or actively hinder the removal of market barriers, industry facilitator need to take over the role to break the deadlock and initiate positive change for the industry. They must take the lead to mediate between the involved parties in order to allow a sector to grow and to create competition. Furthermore, resources or grants in the form of loans or subsidies can be made available by an industry facilitator to empower companies and to create competition.

Apart from removing barriers, there are certain strategies for industry facilitators to support the scaling of an industry in general.

Firstly, industry facilitators can use effective communication and explanation to the general public and to governmental authorities of the new industry as a leverage. The public image has to be understood as an important marketing tool for the purpose of establishing and scaling a market fast and sustainable<sup>71</sup>. In conclusion, social enterprises that seek growth need to direct resources towards their marketing and public relations departments in order to fuel their growth strategies.

Secondly, creating a competitive advantage of an industry's product will allow the industry to outperform its competitors and scale the own sectors. Porter's diamond theory highlights which features create a stimulating, dynamic and intensely competitive business environment which allows an industry to create such an advantage. Hence, industry facilitators need to address leaders of governments, businesses, and institutions which all influence the economics of competition<sup>72</sup>. Especially the role of local authorities regarding their business environment has become more important due to increasing global competition<sup>73</sup>. Finally, the competitive advantage can be gained by offering customers a better quality of products or lower prices. When these characteristics or other unique selling propositions are created, customers will prefer one product or service over another and brand loyalty can be generated<sup>74</sup>.

#### **4.1.3 Making a market competitive and self-sustaining**

In order to achieve a large scale level, businesses of a cluster have to grow closely together. Collective impact is characterized by five key conditions that were defined by John Kania and Mark Kramer from Stanford University in 2011. The five criteria are a common agenda, shared measurement systems, mutually reinforcing activities, continuous communication, and the presence of a backbone organization<sup>75</sup>.

---

<sup>71</sup> Morgan, N. (2012)

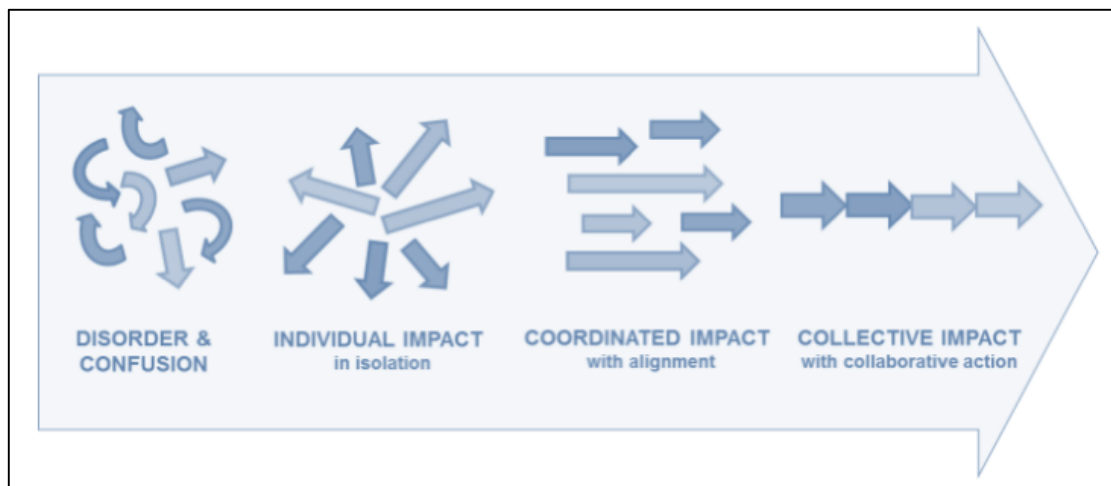
<sup>72</sup> Porter, M. E. (1998). p. 29

<sup>73</sup> Porter, M. E. (1990). p. 1

<sup>74</sup> Porter, M. E. (1979)

<sup>75</sup> Kania, J. & Kramer, M (2011)

When industry facilitators manage that all five key conditions are applied, the companies within a cluster work together most effectively. They create better outcomes for themselves and also generate social progress. These companies can approach complex problems and create large-scale changes or achieve impact through collective action. In comparison, worse organized efforts of companies including disorder, individuality, or overlap are likely to reduce efficiency as it is illustrated *in figure 8*.



**Figure 8:** Impact based on the type of organization

**Source:** Santa Fe Community Foundation (2016)

Hence, the greatest impact is created when companies understand themselves as part of a cluster in which they mutually benefit of each other. In this regard, an industry facilitator must regard the industry and its clusters as a whole. In large and geographically far-spread economies, industry facilitators may also split the industry into different subclusters that shall later grow together in the long term.

In order to transform an industry into a self-sustaining market, it is crucial to focus on its competitiveness. For the purpose of competitiveness assessment and measurement for an industry, Michael Porter's framework of the Five Forces is a suitable tool to categorize and assess the different challenges.

In 1980, Porter introduced the five forces analysis in his book *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. With this new approach he reacted to the concept of SWOT-analysis which Porter perceived as not sufficiently rigorous<sup>76</sup>. Furthermore, the term competitiveness was seen to be understood too narrowly.

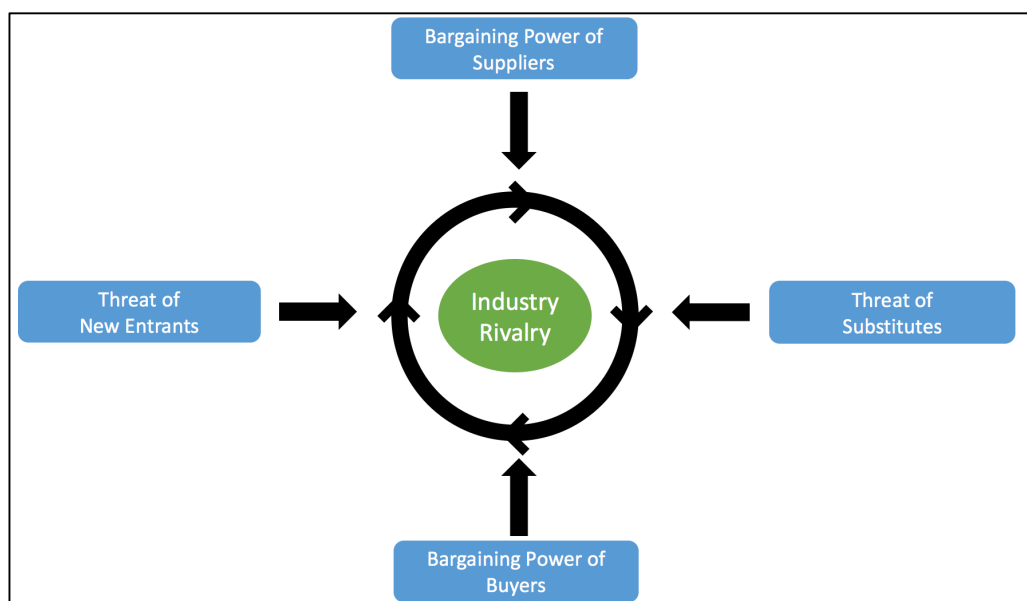
By introducing the five forces, Porter broadened the understanding of competition. The new idea was a systematic way to look at industries and to analyze a firm's role within them. According to Porter's theory, producers should not only consider the obvious but

<sup>76</sup> Porter, M. E., Argyres, N. & McGahan, A. M. (2002), p. 43

also more complex approaches. For example, automobile producers may not only consider their direct competitors but also manufacturers for alternative means of transport.

Competition ensures that an industry stays dynamic and innovative as well as resistant against other competitors. In Porter's framework of five forces, five different factors determine the competition and thereby also the industry's profitability which greatly affects the attractiveness of an industry.

The competitive landscape consists of main drivers according to Porter. These are rivalries between direct competitors, bargaining power of consumers, bargaining power of suppliers, threat of newcomers in an industry, and threat of substitutes (*see figure 9*). Their individual importance depends on each case. For example, due to new online movie screening opportunities (e.g. Netflix) cinema operators may prioritize focusing on keeping previous customers counteracting the threat of substitutes compared to trying to hinder other movie theaters from entering the market representing a threat of new entrants.



**Figure 9:** Porter's five forces

**Source:** Own illustration based on Porter, M. E. (1980)

Michael Porter's approach helps to understand the industry beyond the inner value chain. Industry and cluster building highly depend on the former and current business environment of the region that can either positively or negatively influence companies. Hence, critical masses within a certain industry can show an exceptional success on the one hand. On the other hand, certain industries may almost be non-existent although the necessary resources are available at place.

When constraints are detected, facilitators of an industry have multiple means how to improve the competitiveness within and of the value chain and cluster. The implementing organization may thereby draw on different activities that need to be assessed on certain criteria to choose why they may be pursued. These standards include factors such as an estimation on the impact on small enterprises, number of benefitting companies, timeframe for the intervention, synergy opportunities and cost effectiveness of the intervention.<sup>77</sup>

Furthermore, four key elements may be taken into consideration to select the right means of support. Firstly, low-income customers' demand has to be understood and may not be confused with their needs. This is essential to create a pull market which offers low risk for suppliers. Secondly, the market environment and economic conditions consistently have to be reviewed together with all relevant stakeholders. Thirdly, barriers to scale both inside the firms and outside in the ecosystem need to be reviewed to allow for effective scaling of the industry. Fourthly, progress need to be reviewed in order to ensure sustainable growth and to avoid unintended side effects.

#### **4.1.4 Long-term success of industry facilitation through ownership**

Cluster and value chain members should sense a feeling of ownership throughout the process of industry facilitation. Although it may be necessary for the industry facilitator to take on ownership during the first phases of the project, the implementing organization should withdraw from direct transactions between participants of the cluster in the long term. Ownership in this regard means that the cluster members will take initiative, responsibility and accountability and create trust between each other. Unless cluster members take ownership of the management and operations of the competitiveness process, long-term success of the industry is unlikely.<sup>78</sup>

*It is not facilitators that must scale industries, but firms.*

Koh, Hegde & Karamchandani in Koh, Hegde & Karamchandani (2014). p. 88

Throughout the implementation of a project it may be first be the industry facilitator incorporating ownership for activities within the industry but it finally needs then to be passed on to the stakeholders. In early phases where companies are small and are not yet well-connected for example to express their needs or burdens to government authorities and other stakeholders, industry facilitator may take over greater parts of these duties than in later stages.

---

<sup>77</sup> USAID (2016)

<sup>78</sup> USAID (2016)

In detail, taking ownership is mainly about taking initiative. This appears when market actors believe that it is within their responsibility to take action and not someone else's. They themselves are accountable for the final quality and punctuality of the outcome. Ideally, problems are detected before they actually appear. Nevertheless, it doesn't mean that market actors cannot delegate work. Appropriate people may be contacted to take over responsibility for solutions. Taking ownership means that there must be an obligation for the overall outcome of the reach of responsibilities. Ideas need to be taken forward and involve the actors which can contribute to achieve the goals.<sup>79</sup>

To support stakeholders in taking ownership, decreasing the risk, introducing self-selection mechanisms and a rolling exit strategy are important means for an industry facilitator.

In developing countries where markets are recently created, the risk of investment and initial transactions on a market is perceived as very high. Entrepreneurs might feel insecurity about selling or acquiring products and services. Fearing involvement hinders companies from taking initiative and responsibility. Therefore, the industry facilitator can help by establishing links between companies to ensure demand and supply. This lowers risk and fosters relations within the supply chain and cluster to build trust. Thereby, the implementing organization shall not be perceived as a primary party for transactions and may only act as a bridge for stakeholders to get in touch with each other.<sup>80</sup>

A second important medium to enhance ownership among stakeholders is to set preconditions to any form of assistance. This process is called self-selection and refers to the change of behavior that is targeted by the implementing organization. Certain rules or standards may be the reference level for the support. Businesses that are not interested or willing to undertake certain risk or responsibility to reach the benchmark would self-select out of the support of the industry facilitator. Thereby, the idea can be moved forward that stakeholders take accountability and responsibility.

In result of using active self-selection, the companies that are willing and capable of taking ownership will remain in the industry. During that process, the industry facilitator continues a smooth and ongoing exit strategy. For this purpose, guidelines and performance indicators frequently have to be reviewed and shifted according to the timeline and expectations in order to allow the industry to function without the facilitators support. Towards the end of the implementing organization's mandate a new way of support, such as a federation, should be at place that represents and supports the clusters and its members.

---

<sup>79</sup> Tanner, W. (2016)

<sup>80</sup> Tanner, W. (2016)



Overall and most certainly, an industry facilitator should use a strategy to develop transparent and market-based relationships that promote upgrading and growth of the market. An implementing organization must ensure that business relations in the cluster are not dependent upon its own involvement and ownership is finally taken on by enterprises.<sup>81</sup>

## 4.2 Why do industry facilitators have to learn?

Since traditional economic development approaches often do not have the desired impact, modern approaches focus on deeper understanding of the drivers of competitiveness. For example, industry facilitators shall rather focus on competitiveness than on job creation per se. In this sense, core drivers for wages and jobs can be detected. Furthermore, potentials and strengths may be used to empower an industry rather than primarily reducing weaknesses. Nevertheless, detected weaknesses shall also be treated. They need to be prioritized among themselves and may then be specifically addressed. In result, industry facilitators develop an overall strategy instead of a list of single tasks. Such an approach may be established and adapted based on relevant data.<sup>82</sup>

*“Industry facilitation must continually adapt once it is in motion”*

Koh, Hegde & Karamchandani in Koh, Hegde & Karamchandani (2014). p. 87

Typically, implementing organizations pursue long term projects. Hence, they face a complex challenge because needs and priorities may change over time. Being capable of adjusting the strategy will provide flexibility and adaptability to the industry facilitator and allows to maintain the industry facilitators’ effectiveness of work.

During the course of the project, the business environment may change and different actors and partners need to be closely involved. Some goals of the industry facilitation efforts may be easier to realize than expected while others make less progress than estimated. Therefore, many industry facilitators begin their efforts with a “try-out phase” that allows them to validate or reshape their strategy before the roll-out and scale is prepared. Additional insights and expertise are acquired throughout the project duration and have to be integrated into the project’s strategy. Finally, maintaining a high degree of flexibility throughout the project duration is crucial to conduct successful industry facilitation.

---

<sup>81</sup> Bock, H (2016)

<sup>82</sup> Porter, M. E. (2015). p. 20

### 4.3 How can industry facilitators learn?

Industry facilitation is an intervention into a system and thereby creates specific methodological challenges to ensure effectiveness. It is important to understand the industry as a whole as well as clusters, business environment and businesses' performance to achieve a large-scale change. Therefore, the industry facilitator constantly has to acquire expertise.

In this regard, academia refers to the terms gathering business and market intelligence in this context. Market intelligence describes the information about a company's markets which supports precise and assured decision-making.<sup>83</sup> Business intelligence refers to a set of tools that helps to understand businesses' activities.

In order to generate market and business intelligence, monitoring and evaluation systems that collect relevant data of individual businesses, clusters and the industry are crucial to steer the industry facilitation efforts most effectively. Such systems should provide regularly updated information to policy makers and stakeholders of the industry. Ideally, a comprehensive and coherent overview of the necessary information is provided.

When these evaluation frameworks are established, the data must be updated on a regular basis to enable time series analysis and to detect improvements, stagnations or deteriorations regarding the industry facilitator's efforts as well as changes of the framework conditions. Therefore, industry facilitators need to define and use indicators that are easily applicable, representative and significant for the purpose. With such a toolset, changes may ideally be early detected. Subsequent interventions can then minimize costs for the adjustment and prevent industry facilitators from pursuing obsolete approaches.

However, it is important to consider that the impact of a singular industry facilitator may not always be contemplated in isolation since there might be several facilitators influencing the industry or factors that empower the industry which but cannot be directly ascribed to one specific stakeholder. Therefore, the focus should be on the development of the industry rather than aiming to evaluate own efforts isolated from other influencing voices.<sup>84</sup>

*“As you widen your scope to deal with a major social problem, the harder it becomes to measure your impact because it is tougher to isolate cause and effect. It's no longer a simple linear relationship, but a complex set of relationships.”*

Hanna, J. (2010)

---

<sup>83</sup> Cornish, S. L. (1997)

<sup>84</sup> Koh, Hegde & Karamchandani (2014). p. 92

In result, the monitoring will reveal where clusters and supply chains may be strengthened in specific and prioritized ways and where support is required for the empowerment of the industry.

Since industry facilitators typically work in emerging or developing economies, information is usually scarce or not available. Hence, monitoring and evaluation efforts require strong dedication in terms of time and money<sup>85</sup>.

Based on the findings of the monitoring and evaluation and in order to gain a deeper understanding, detailed case studies may be conducted. Coupled with the evaluation of the data from the indicators, these approaches will allow the industry facilitator to draw the comprehensive conclusions.

Finally, industry facilitators need to be ready to take action since opportunities may disappear. Flexibility and adaption of the strategy and a sound information flow need to be ensured to guarantee industry facilitators' effectiveness of work and to maximize their impact in order to succeed in making the industries complete and self-sustaining.

---

<sup>85</sup> Koh, Hegde & Karamchandani (2014). p. 92

## **Part II: The brick sector in the Great Lakes region**

The second part of the thesis presents the case of an industry facilitator in the Great Lakes Region. The project has been active since 2013 and targets a comprehensive approach by creating impact on several levels. The focus in this chapter has been on Rwanda where the project is mostly operating apart from also being active in Burundi and Congo.

After an introduction about the context of the project, the work of the industry facilitator is explained. Thereby, the status quo and the project's current challenges are pointed out.

Special emphasis in this chapter is put on the provided assistance throughout the time of the assignment of the master student. Different tools were designed and implemented. The task to create and actually integrate the tools in the running procedures of the project, required considerable effort and represent a major part of this thesis.

It is explained how the implementation was conducted to guarantee a long-lasting application. Finally, first insights from the monitoring activities and other observations are pointed out.

## 5 Brick industry facilitation

*“The link between work and human development is synergistic. Work enhances human development by providing incomes and livelihoods, by reducing poverty and by ensuring equitable growth.”*

United Nations Development Programme in UNDP (2015). p. 3

### 5.1 Country overview of Rwanda

The Republic of Rwanda is located in East Africa and belongs to the Great Lakes Region. It is the fourth-smallest country on the African mainland and neighbors Burundi the Democratic Republic of Congo, Uganda and Tanzania<sup>86</sup>. Being divided into five provinces, the country is dominated by mountains in the central and Western Rwandan regions. This feature gave the country its name “Land of thousand hills”. Furthermore, it is characterized by a temperate tropical highland climate and experiences each two dry and rainy seasons per year.

The earliest human settlement of Rwanda reaches back to the Neolithic period around 8000 BC<sup>87</sup>. By means of archaeological excavations, it was revealed that settlements of hunter gatherers existed during the late stone age. In the Iron Age, population figures increased in the region<sup>88</sup>.

In the beginning of the 15<sup>th</sup> century, clans coalesced into kingdoms which finally resulted in eight kingdoms within the area of the present country Rwanda by 1700<sup>89</sup>. Around 1850, the Kingdom of Rwanda, as one of these eight kingdoms, became increasingly dominant and reached its greatest extent in the 19<sup>th</sup> century during the rule of King Kigeli Rwabugiri<sup>90</sup>. Under his leadership administrative reforms were introduced that caused a growing rift between the Tutsi and Hutu populations<sup>91</sup>.

According to the results of the Berlin Conference of 1884, the territory of today’s Rwanda was assigned to Germany as part of German East Africa and thereby marked

---

<sup>86</sup> Central Intelligence Agency (2016)

<sup>87</sup> Chrétien, J.-P. (2003). p. 45

<sup>88</sup> Dorsey, L. (1994). p. 36

<sup>89</sup> Chrétien, J.-P. (2003). p. 482

<sup>90</sup> Chrétien, J.-P. (2003). p. 160

<sup>91</sup> Mamdani, M. (2002). p. 69

the beginning of the colonial era<sup>92</sup> (see figure 10). During that time the social structure of the country was significantly altered<sup>93</sup>.



**Figure 10:** Political map of the African continent after the Berlin Conference of 1884  
**Source:** United Nations Secretariat (2016)

After World War I, Belgium received the colony as a result of the League of Nations mandate which divided former German grounds. Reforms were introduced in several fields including health, agriculture and education as well as the use of French as the official language. German colonizers had continued the differentiation of the different tribes from King Kigeli Rwabugiri and under the Belgian mandate the tension where exacerbated through the introduction of identity cards irrevocably defining every individual to one tribe and the systematic privileging of the ethnic group of Tutsi. In 1959, the tensions heavily escalated for the first time and forced 100.000 people to flee to neighboring countries.

Through the decision of a vote by referendum in 1961, the country decided to abolish its monarchy, was separated from Burundi and achieved independence in the following year<sup>94</sup>. The years after were characterized by outbreaks of violence. In 1990, a civil war broke out when Tutsi refugees began to conquer territory in the northern part of Rwanda<sup>95</sup>. A ceasefire was agreed in 1993 but broken when the presidential plane was shot in April 1994 marking the beginning of the genocide in Rwanda. In the following 100 days, approximately one 800.000 Tutsi and moderate Hutu were killed and about

<sup>92</sup> United Nations Secretariat (2016b)

<sup>93</sup> Prunier, G. (1995). p. 25

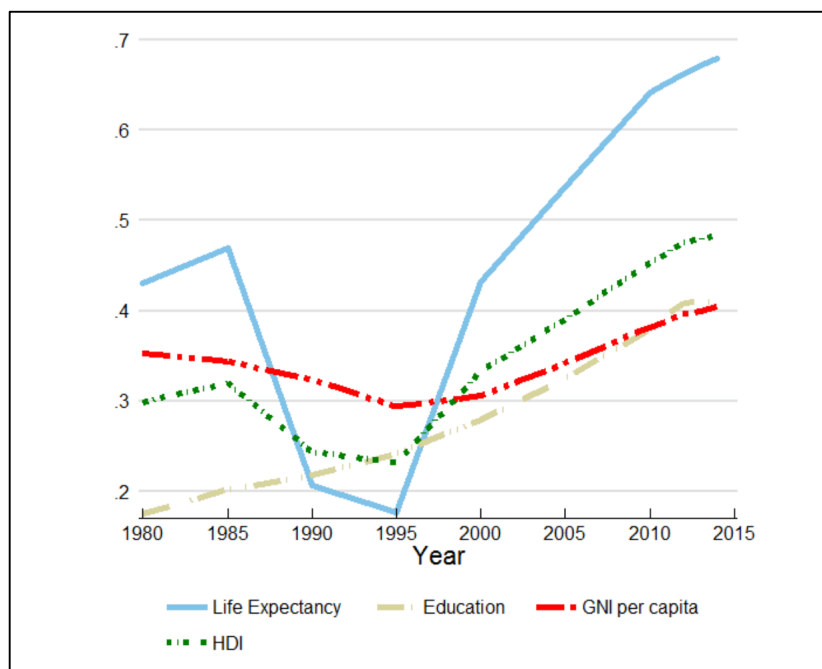
<sup>94</sup> Prunier, G. (1995). p. 25

<sup>95</sup> Prunier, G. (1995). p. 93

two million people escaped to the neighboring countries<sup>96</sup>. As a result, Rwanda's Human Development Index, which combines education, life expectancy and income per capita indicators, drastically fell from 0.320 in 1985 to 0.232<sup>97</sup>.

The population had undergone a constant increase starting from 2.9 million since Rwanda's independence. By 1990, the number of inhabitants began to decrease dramatically from 7.2 to 5.6 million due to the numerous casualties and refugees to other countries caused by the civil war and genocide.

After this dark chapter in the Rwandan history, the country has developed very quickly. In 2014, the human development reached 0.483 (*see figure 11*)<sup>98</sup>. In the same time, population has more than doubled reaching over 11.3 million in 2014. Furthermore, Rwanda became one of the most densely inhabited countries in Africa and a population where more than 60% of the citizens are 25 or younger<sup>99, 100</sup>.



**Figure 11:** Trends in Rwanda's HDI component indices between 1980 and 2014  
**Source:** United Nations Development Programme (2015), p. 3

Also in economic terms, Rwanda has witnessed a quick increase over the last years. Thereby, the mainly rural population primarily contributes to the country's economic growth. Domestic production is concentrated on subsistence agriculture as well as tourism, minerals, tea and coffee. However, the Rwandan government has undertaken

<sup>96</sup> Tiemessen, A. (2004). p. 57

<sup>97</sup> United Nations Development Programme (2015). p. 3

<sup>98</sup> United Nations Development Programme (2015). p. 2

<sup>99</sup> World Bank (2016b)

<sup>100</sup> Central Intelligence Agency (2016b)

efforts to facilitate foreign investment in the country. Part of this strategy was the addition of the English language to the existing two national languages French and Kinyarwanda<sup>101</sup>. Over the last years, Rwanda was accounted to be one of the fastest-growing economies in the world with an annual GDP growth rate around 7%<sup>102</sup>. In result, Rwanda's GDP has risen tenfold between 1994 and 2013<sup>103</sup>. The country not only tries to attract foreign investment but also to create and to strengthen domestic production. One of these targeted sectors is the construction material production sector<sup>104</sup>.

## 5.2 History of brick-making in Rwanda

Although brick-making with fired clay blocks reaches back thousands of years and industrial production was spread in Europe at the end of the 19<sup>th</sup> century already, in most parts of Africa brick production is still relatively new and usually brick-production continues to be mostly handmade<sup>105</sup>. In Rwanda, bricks as building material were also introduced comparatively late.

In the Rwanda's history, other forms of housing were used. Traditionally, a large percentage of Rwandans lived in beehive-shaped huts and shared the house with other people of their lineage<sup>106</sup>. Thereby, wealth determined the size and beauty of the accommodation. A typical house was constructed with cypress poles which were stuck in the ground and bound with reed and bamboo as a ring in the center. The façade was done with overlapping bunches of grass<sup>107</sup>.

With the beginning of colonization in the Great Lakes Region, the architecture experienced substantial new influences. In the early 19<sup>th</sup> century, the necessary production techniques had been introduced by the colonial administrators for government buildings and the first European missionaries in order to build churches<sup>108</sup>. At the time of German colonization, the construction of buildings in Western European style was first introduced and earliest houses of this style were built in the Northern regions of Rwanda. These methods were continued under the Belgian administration after World War I. In consequence, more and more houses were started to be built in a rectangular shape with wooden windows instead of the round huts<sup>109</sup>.

---

<sup>101</sup> McGreal, C. (2008)

<sup>102</sup> Holodny, E. (2015)

<sup>103</sup> World Bank (2016c)

<sup>104</sup> African Development Bank (2014). p. 32

<sup>105</sup> Ciptum, C. et al. (2014). p. 97

<sup>106</sup> Adekunle, J. (2007). p. 14

<sup>107</sup> Adekunle, J. (2007). p. 74

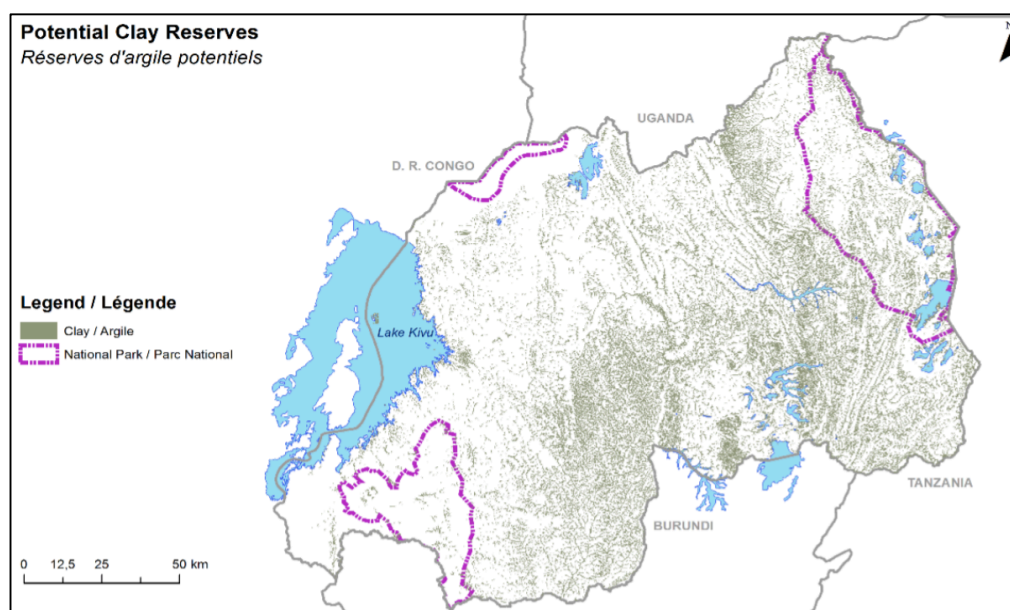
<sup>108</sup> Jefremovas, V. (2002). p. 21

<sup>109</sup> Adekunle, J. (2007). p. 75



Over time, all types of houses were increasingly built with bricks in this region including an increasing number of private houses in urban areas. During the time of Belgian colonization, a number of foreign entrepreneurs started producing bricks in large factories. Also few Rwandans started the brick business before 1960 and the companies grew after Rwanda's independence<sup>110</sup>.

Although the country possesses great reserves of clay (*see map 3*), fired bricks remained unavailable for the majority of the population due a lack of technical expertise regarding the production. Instead, the resources were usually used for simple clay walling.



**Map 3:** Potential Clay Reserves in Rwanda

**Source:** Skat Consulting Rwanda (2015)

In the 1980s, Rwanda's countryside was dotted with small and large brick and tile making industries. In rural areas, small brick enterprises accounted for one of the most important employment fields. This is because, the initial investment costs were very low for the predominant and simplest ways of production<sup>111</sup>.

In 1985, the Swiss Agency for Development and Cooperation (SDC) and Skat Consulting established the first large scale brick industry in Rwanda called Ruliba<sup>112</sup>. Since then, only one other brick factory, named Atelier Mechanique Generale du Rwanda (AMEGERWA), has been built. Apart from them, there are currently only few small scale entrepreneurs in the region who produce modernized bricks which are efficiently fired, demonstrate standardized dimensions and offer increased stability.

<sup>110</sup> Newbury, C. (1988). p. 175

<sup>111</sup> Jefremovas, V. (2002). p. 21

<sup>112</sup> Ruliba (2016)

Most of the entrepreneurs and companies in the region are still producing traditional bricks on open fires.

### 5.3 Skat Consulting and PROECCO

PROECCO is a project of Skat Consulting, headquartered in St.Gallen/Switzerland, that aims to “help in the fight against poverty through support to the livelihoods of disadvantaged and marginalized people”<sup>113</sup>. It follows an approach that considers numerous development goals such as environmental protection, job creation, poverty reduction and industry facilitation and combines them in one project. It does so by encouraging cost effective and technologically efficient as well as environmentally and socially sustainable ways of brick production. Based on these high technological, performance, social and environmental requirements, the end product is called “modern brick”. This name symbolizes the advances compared to the traditional way of production which is still predominant in the Great Lakes Region.

PROECCO illustrates the improvements of building with modern bricks compared to traditional ways of construction in its Building Material Center (BMC) in Kigali. The modern approach uses less resources, offers more stability and is up to 40% cheaper than traditional methods (*see figure 12*).



**Figure 12:** Prices and resources needed for different types of walls with the same size (traditional bricks are left and modern bricks are on the right side)

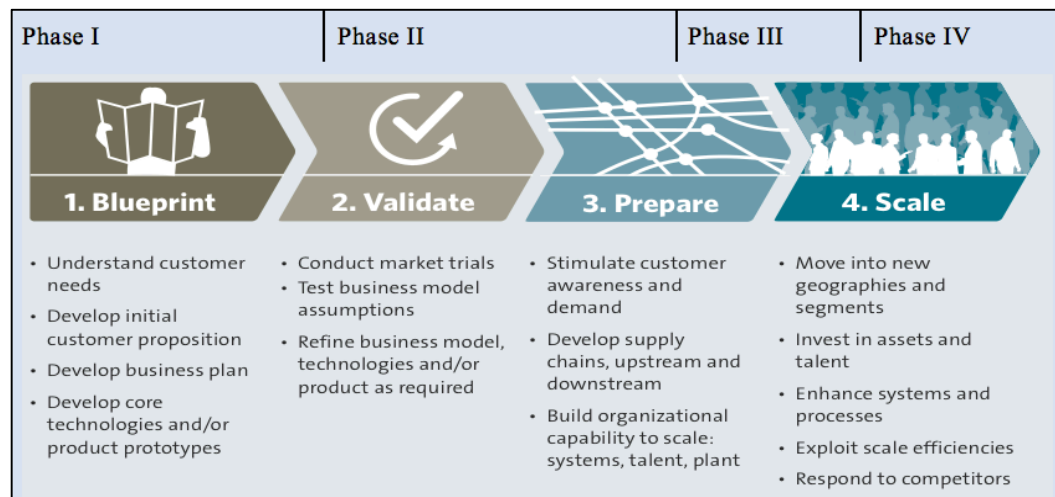
**Source:** Own photo from a laboratory of PROECCO in Kigali

The program targets job creation mainly for young people who often lack employment opportunities in the agrarian sector due to land scarcity. The opportunities of self-sustained farming are limited due to existing policies that forbid land-partitioning under a certain size and leave some of the descendants of a family without sufficient or any land for agriculture. Hence, PROECCO encourages entrepreneurs to take the role of

<sup>113</sup> Skat Consulting (2016b)

business pioneers by creating new enterprises which are permanently operating in the sector of building material production.

The program started in 2013 and was divided into four phases that are each three years long making it an overall project duration of 12 years. These four sections are titled blueprinting, validation, preparation and scaling according to the overarching goal of each three-year phase (*see figure 13*).



**Figure 13:** Program phases of PROECCO

**Source:** Skat Consulting (2016). p. 64

Initially, the program focused on two main areas which are in Burundi and five locations in Western Rwanda. From there, the scope was planned to be extended to the entire Great Lakes region. The focus areas are often internally called clusters or federations. They are subclusters of the Great Lakes Region cluster but may also be referred to as clusters in this thesis in accordance with PROECCO's communication.

At this stage, PROECCO has completed the first three-year phase. During this period of time, the team of PROECCO has established a deep understanding of the construction and building material sector in the Great Lakes region. Numerous technologies were tested regarding their applicability in the region. Entrepreneurs of brick and tile making were trained and supported on how to establish their businesses. Moreover, PROECCO instructs entrepreneurs directly and teaches trainers in order to reach producers within the entire region.

The geography department of PROECCO has mapped and shared the most suitable regions for clay extraction and processing. Business services and technological advice were offered to support the entrepreneurs in establishing, developing and managing their businesses.

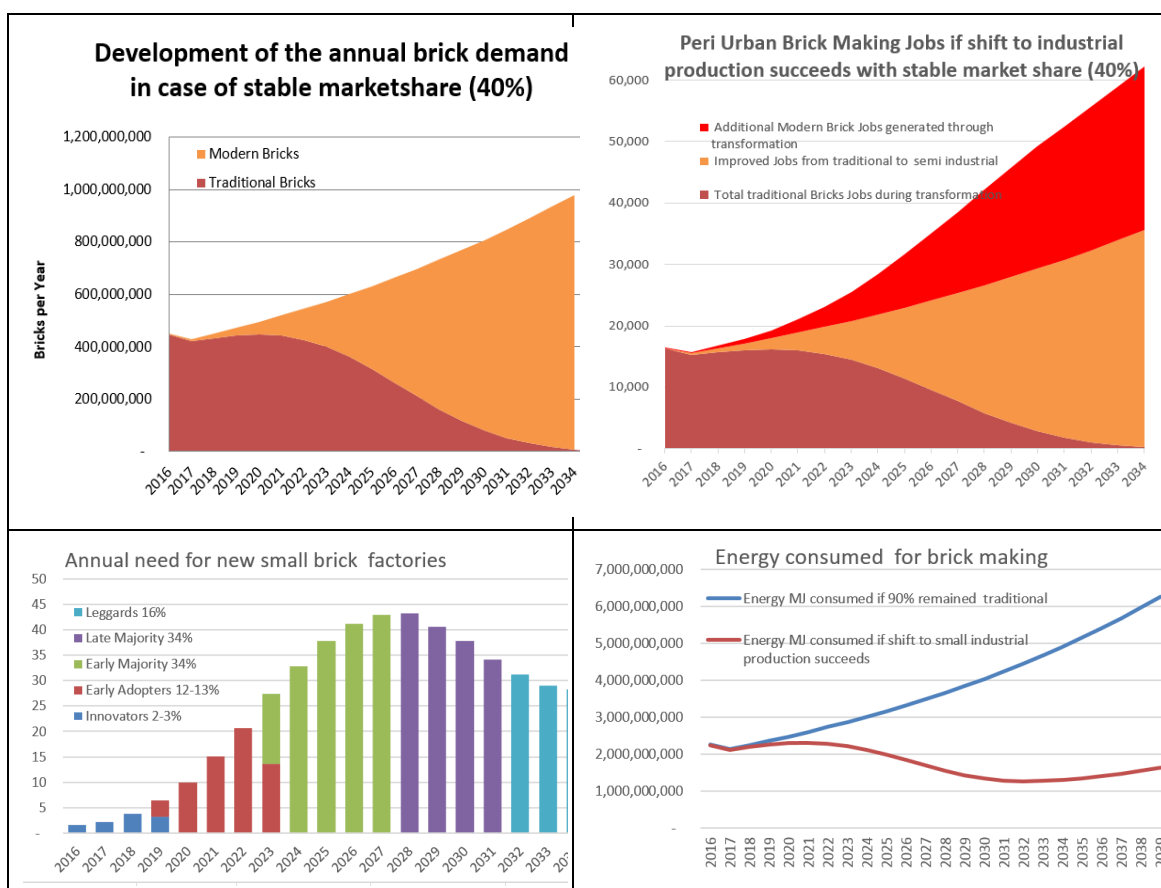
Expertise sharing is a key concern for PROECCO as well. In this regard, a knowledge hub was created at the Kigali office in order to make technical information and literature

available. Additionally, specialists can be consulted. Furthermore, activities for the exchange of information and knowhow and hosts networking events in the knowledge hub.

During the first phase, the high potentials for brick producers have been pointed out confirming the approach to make enterprises more efficient through new technologies and to scale up the regional building material sector.

In summer 2016, PROECCO entered the second project phase. During these next three years, the main focus is to validate and refine assumptions, technologies and products of the first phase through testing and surveying. After that in phase three and four, the program’s main attention will be on supply chain management and scaling up.

In the long term, PROECCO expects to replace traditional brick-making with modernized ways of production. With a stable market share for twenty years, production of annual bricks will increase more than twofold providing numerous new jobs while total energy consumption can be reduced due to improved efficiencies (*see table 1*).



**Table 1:** Modern Bricks substitute traditional bricks at a stable market share level  
**Source:** Skat Consulting (2016). p. 5

## 5.4 Current activities and challenges of PROECCO

During the second phase of the project, PROECCO is facing the major challenge to scale the industry. Therefore, the project focusses on the support of decision-makers, training provision along the value chain and most of all scaling production and transaction numbers and thereby creating and stimulating the market. As mentioned *in chapter 1.1*, there is enormous demand for building material in the region but not yet sufficient supply of good quality. Hence, it is the major task to scale companies, to integrate new firms into existing clusters and to improve companies' outcome quality.

Especially, in the field of affordable housing there is immense potential for local building material suppliers. The Rwandan Integrated Household Living Conditions Survey from 2010/11 highlighted that only 2.5% of wall material used in the country were fired bricks (*see table 2*)<sup>114</sup>.

EICV3	Wall material						Total	Total no. of HHs (000s)
	Mud bricks	Mud bricks covered with cement	Tree trunks with mud	Tree trunks with mud and cement	Oven fired bricks	Other		
All Rwanda	36.1	18.7	35.2	5.5	2.5	1.9	100.0	2,253
Kigali City	9.7	50.2	17.6	14.5	5.3	2.8	100.0	223
Southern Province	29.6	18.7	43.6	6.1	1.8	0.0	100.0	549
Western Province	56.5	11.4	24.3	1.3	2.3	4.3	100.0	528
Northern Province	42.5	13.1	35.1	3.1	3.5	2.7	100.0	411
Eastern Province	29.0	17.3	44.7	7.2	1.3	0.3	100.0	542
Urban	19.7	43.4	17.1	10.7	6.8	2.2	100.0	331
Rural	39.0	14.5	38.3	4.6	1.7	1.9	100.0	1,922
Q1	45.6	5.1	45.8	1.5	0.2	1.8	100.0	381
Q2	43.7	9.6	42.6	2.6	0.4	1.1	100.0	415
Q3	40.9	12.8	39.3	4.4	0.5	2.1	100.0	448
Q4	35.5	19.0	35.7	6.7	1.2	1.9	100.0	490
Q5	19.7	41.0	17.6	10.7	8.6	2.4	100.0	519

**Table 2:** Wall material of dwelling in Rwanda

**Source:** National Institute of Statistics in Rwanda (2011). p. 29

During the following three years, the proportion of oven fired bricks for walls has experienced a slight increase of 0.3% up to 2.8% throughout the country<sup>115</sup>. In accordance with these findings, the main target of PROECCO for phase two is to transform the entire value chain of the industry in order to improve quality and quantity. Therefore, the high proportions of traditional brick making shall be upgraded. Small-scale brick manufacturers need to be converted into environmentally friendly and more efficient companies<sup>116</sup>. This implies to prompt brick makers to produce throughout the entire year and to create stocks in order to guarantee instant supply without delays.

<sup>114</sup> National Institute of Statistics in Rwanda (2011)

<sup>115</sup> National Institute of Statistics in Rwanda (2014)

<sup>116</sup> Skat Consulting (2016). p. 65



In addition, the market for “modern bricks” is still a push-market. Potential investors need to be convinced to get involved in the market. Currently, demand for modern bricks stagnates since there is not enough supply. In return, this reduces again the supply since sales markets are not there or seem risky for producers. It is a vicious circle which PROECCO tries to break. Apart from PROECCO’s multiple existing efforts such as collective sales points for modern bricks of different producers and financial planning for entrepreneurs, it is mainly the scaling process that will create increase visibility and sales in the long term to make it a profitable and low-risk industry for companies.

Close cooperation such as information sharing and collaboration with authorities and business partners is aimed to increase the impact of the program. In fact, a more sustainable housing policy is promoted through the objectives of Rwanda’s official housing policy. Especially, affordable housing is perceived as a powerful strategy to connect supply and demand for modern bricks while offering houses of improved quality to the general public and scaling the market.

For effective scaling, significant and frequent monitoring activities are needed to observe changes regarding businesses and the business environment. This will support the goal of effective steering as a form of industry facilitation and should reflect the impact, project progress and potential restrictions of the program. The information should include significant economic, technical, environmental and social details in the form of indicators in order to visualize the preparation process for mass scaling of the sector.

Finally, the brick sector in the Great Lakes Region is very complex due to the amount of entrepreneurs and their specific characteristics. Hence, it is an important goal to focus on the relevance, practicability and feasibility of the monitoring and evaluation in order to guarantee its actual application in the future. On the one hand, the tool is supposed to deliver comprehensive information. On the other hand, it should be kept simple to guarantee a consistent data collection. With a too sophisticated or complex data assessment the project could come up against its limits of capacities. Therefore, the tool is supposed to focus on the essentials for PROECCO.

In result, the team of PROECCO can support clusters to become competitive in order to be prepared and resistant against any kind of threat that is displayed in Porter’s theories. Furthermore, PROECCO’s findings through monitoring and evaluation procedures will improve its steering and contribute to create ownership among the brick producers. This means to help developing brick producers who possess a skill set to shape their own future, take responsibility and are independent from the industry facilitator. With these skills, they will be able to drive change within their own company, contribute to the empowerment of clusters and positively benefit the entire sector.

So far, PROECCO started acquiring own data about the construction material sector in the Great Lakes Region. The project's economics department acquired data regarding producers. During phase one, Dr. Urs Heierli provided PROECCO recommendations about which fields are relevant to be evaluated. However, a monitoring tool did not yet exist at the end of the project's phase one and time series data was not available.

## **5.5 Provided assistance**

Within the scope and as a major part of this master thesis, PROECCO received advice in designing and implementing customized monitoring and evaluation tools as well as in acquiring the necessary data. Based on PROECCO's needs, three main tools were created. These instruments have already been implemented and facilitate investment for new entrepreneurs, provide information about sales centers and monitor operating brick producers.

The tools were designed separately for reasons of clarity and comprehensibility since they are used for different purposes. However, they complement each other and are used for a holistic understanding of PROECCO's activities and its environment.

With the intent to create tools with the highest possible applicability, numerous discussions with staff in leadership roles from PROECCO, SDC and the local companies were conducted in a very frequent manner. Furthermore, literature review, the involvement into formulating the strategy of the project's second phase and especially the close collaboration with the economics department of PROECCO gave insights on how the tools should finally be designed.

### **5.5.1 Investment calculation**

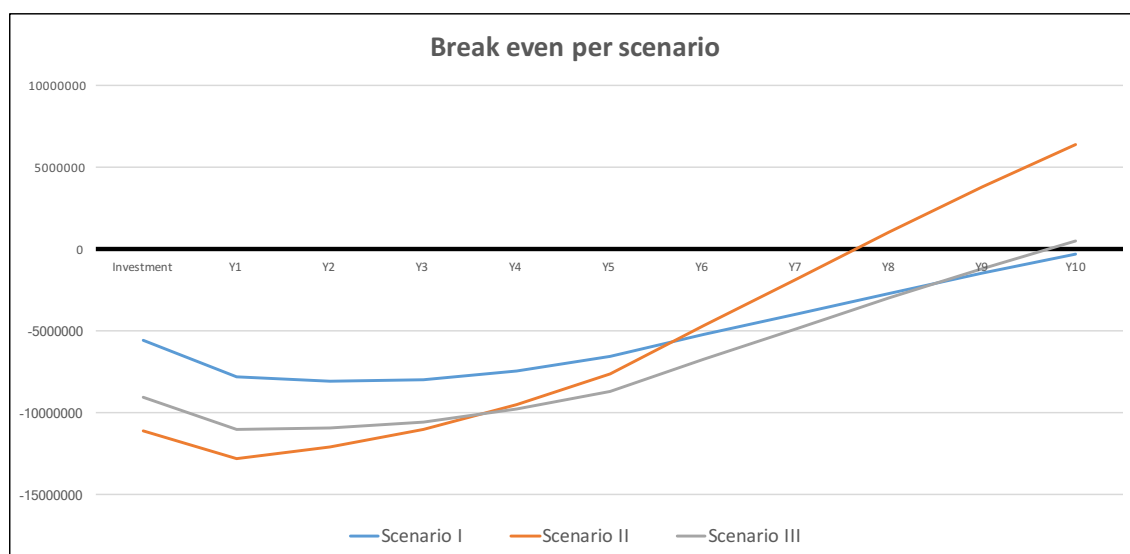
The investment calculation tool shall help to illustrate costs for those entrepreneurs who are willing to engage in the industry or who aim to scale up their businesses. Based on existing data of the economics department, the tool offers the function to compare three different scenarios for investments. Within these scenarios the intended equipment for production and firing can be specified (*see table 3*). Also, the production mix regarding different types of bricks and tiles can be adjusted. Finally, financial and desired storing capacities for each scenario may also be taken into consideration.

					FILL IN THE GREEN CELLS (NO OTHER CELLS IN THIS DOCUMENT)		
Production equipment		Unit costs per year in RWF	Bricks per day	Output in 10 years	Scenario I	Scenario II	Scenario III
Production	Manual Machine	1000000	800	2000000	2	1	1
	IPRC Machine	5000000	2000	5000000	3	1	3
	Chinese Machine	30000000	12000	30000000	1	1	1
	Brazilian Machine	80000000	24000	60000000	2	1	1
Firing	Ugandan kiln	18000000	4000	10000000	4	1	1
	Kiln full	50000000	10000	25000000		2	3
	Kiln half	35000000	5000	12500000	1	3	1
Storing	Drying	2000000	7000	17500000	3	6	6
Means of finance	Equity						
Production mix		Control Sc. I	Control Sc. II	Control Sc. III			
Production mix	Sales: Bricks-10'				30,00%	20,00%	10,00%
	Sales: Brick-17.5'				10,00%	20,00%	30,00%
	Sales: Block 12'	100,00%	100,00%	100,00%	30,00%	20,00%	20,00%
	Sales: Max-pan 16'				20,00%	20,00%	20,00%
	Sales: Roman tiles				10,00%	20,00%	20,00%

**Table 3:** Input screen for the investment cost scenarios

**Source:** Screenshot of the investment calculation tool designed for PROECCO

Based on these personalized entries, a break-even point is automatically calculated for each of the scenarios (see figure 14). The illustration reveals that the parameters of scenario two are most advantageous. Although it starts with the higher than scenario one and three, the strategy two reaches profitability earliest and shows a steeper slope.



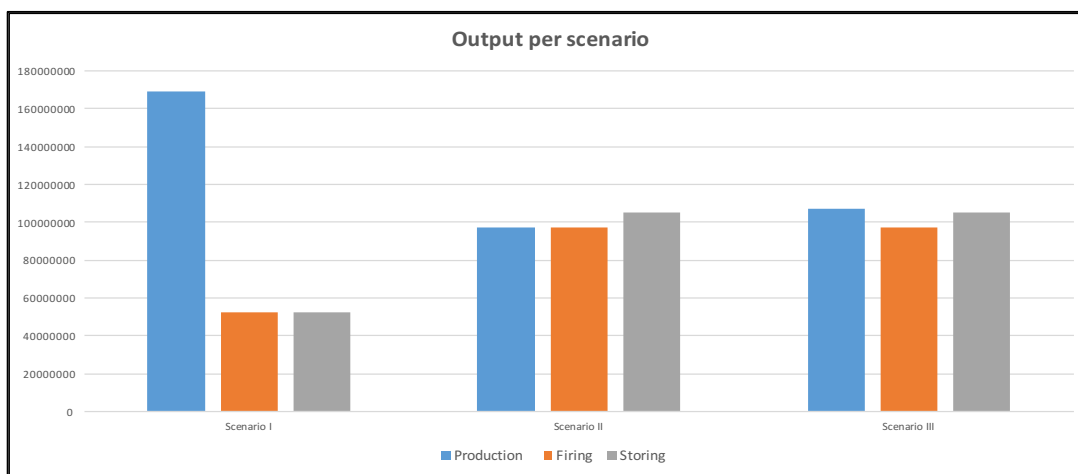
**Figure 14:** Break-even calculation per scenario

**Source:** Diagram of the investment calculation tool designed for PROECCO

Furthermore, a balance of the outcome and capacities for each scenario supports producers to generate equal amounts in forming and firing bricks and to possess sufficient stock capacities for them (see figure 15). Considering figure 15, the producer should follow the scenario two or three which show relatively equal number in production, firing and storing facilities. In both cases, it will be unlikely that the producer faces production stops due to over or under capacities. Scenario one should not



be selected because it will obviously cause overcapacities in production which may not be processed further. Detecting such mismatches is an important asset of this tool.



**Figure 15:** Outcome measurement per scenario and production step  
**Source:** Diagram of the investment calculation tool designed for PROECCO

Interested entrepreneurs need to use these control mechanisms to adjust their inserted parameters until both illustrations show matching and desired outcomes. In the exemplary situation, scenario two is most profitable while both scenario two and three match the capacities. In consequence the entrepreneur should finally chose scenario two which is most favorable regarding both aspects.

By applying the tool, investors increase their planning security through highlighting after how many years their investments will have paid off and their company gets profitable. Furthermore, the output calculation enables higher efficiency within the entire production process. In result, companies and investors face lower risk of investment and are more likely to engage in the brick and tiles industry.

For this purpose, the tool was already used during the Rwandan Home Expo in autumn 2016<sup>117</sup>. Currently, there are numerous local and foreign investors searching for opportunities to engage in the economy. Thereby, business potential and existing demand make the construction material appealing. The tool helped to attract business people and to invite them for follow-up information provided by PROECCO.

### 5.5.2 Sales center monitoring

The second monitoring tool supports inventory build-ups. Currently, none of the brick producers has built own stocks for bricks and tiles that are large enough to immediately provide sufficient bricks for an entire house. Typically, brick companies produce only after receiving orders.

<sup>117</sup> Bizimungu, J. & Kyanga, S. (2016)

PROECCO is aiming to build sales centers called outlets. Ideally, those centers will be run and owned by local clusters and store bricks of different producers of a cluster. Introducing such outlets encourages the brick producers to shift from on demand to on-stock production. Furthermore, in these sales centers bricks are categorized into different quality standards with different pricings. Hence, customers can choose the desired type of brick according to requirements of their construction project and receive them instantly. This steady availability of bricks will support the transformation from a push into a pull market where satisfied demand incentivizes businesses to increase their supply.

In 2016, PROECCO started buying bricks from producers who were lacking sufficient demand for their supply in order to keep them profitable and operative. These bricks were stored in the project's laboratory in Kigali which is called Building Material Center (BMC). This location serves as the first sales center of PROECCO. Currently, more than 70.000 bricks from seven different entrepreneurs are stored at the BMC. However, no inventory monitoring tool existed which complicated the sale of bricks and purchase of new ones due to limited storing capacities.

For this purpose, a table for the monitoring of BMC's stock was drafted and has successfully been used since then (see table 4). It is designed in a way that easily allows extensions and transfers. Thereby, it serves as a template for other sales centers in the future.

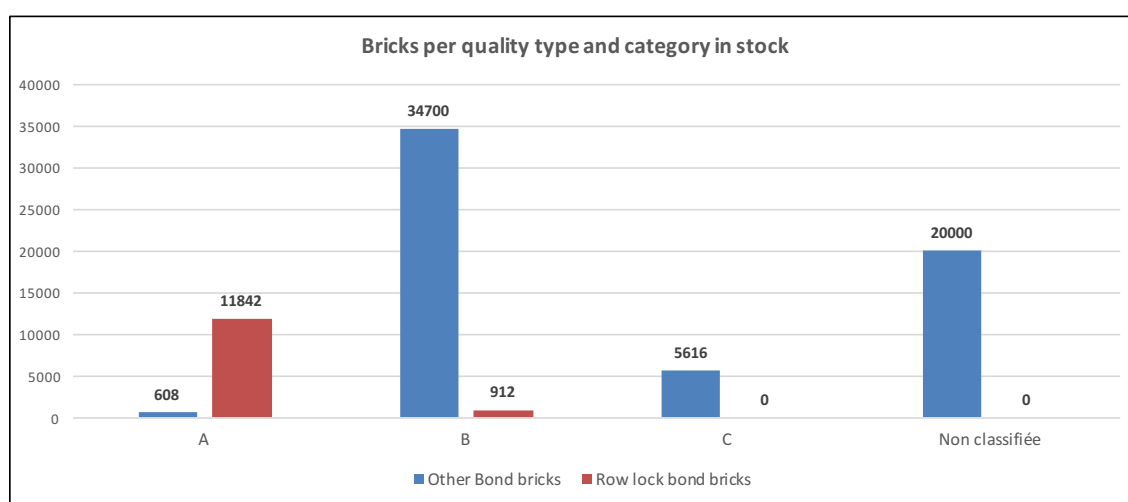
Any inputs or outputs shall be put in the tab of the entrepreneurs		Current Stock					Aggregated Purchase					Aggregated Sales				
		Categorie				Total per brick type	Categorie				Total per brick type	Categorie				Total per brick type
Producer	Specification	A	B	C	Non classified	Total	A	B	C	Non classified	Total	A	B	C	Non classified	Total
Enterprise 1	Other Bond bricks	0	2708	0	0	2708	0	2708	0	0	2708	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprise 2	Other Bond bricks	0	9282	0	0	9282	0	9282	0	0	9282	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprise 3	Other Bond bricks	0	17222	5616	0	22838	0	17222	5616	0	22838	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprise 4	Other Bond bricks	0	5488	0	0	5488	0	5488	0	0	5488	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprise 5	Other Bond bricks	0	912	0	0	912	0	912	0	0	912	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprise 6	Other Bond bricks	608	0	0	0	608	608	0	0	0	608	0	0	0	0	0
	Row lock bond bricks	6222	0	0	0	6222	6222	0	0	0	6222	0	0	0	0	0
Enterprise 7	Other Bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Row lock bond bricks	5620	0	0	0	5620	5620	0	0	0	5620	0	0	0	0	0
Including bricks not on pallets	Others (not on pallets)	0	0	0	20000	20000	0	0	0	20000	20000	0	0	0	0	0
	Broken/unusable bricks at BMC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Row lock bond bricks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BMC Total with others	Other Bond bricks	608	34700	5616	20000	60924	73678	608	34700	5616	20000	60924	73678	0	0	0
	Row lock bond bricks	11842	912	0	0	12754	11842	912	0	0	12754	11842	912	0	0	0
BMC Total without others	Other Bond bricks	608	34700	5616	0	40924	608	34700	5616	0	40924	608	34700	5616	0	0
	Row lock bond bricks	11842	912	0	0	12754	11842	912	0	0	12754	11842	912	0	0	0
Only on pallets	BMC Capacity	1.21%	69.19%	11.20%	0.00%	40924	99.8%	0.83%	47.10%	7.62%	27.15%	82.69%	95.3%	0.00%	0.00%	0.00%
	Utilization in Other	16.87%	1.30%	0.00%	0.00%	9110	99.8%	11.48%	0.88%	0.00%	0.00%	12.36%	0.00%	0.00%	0.00%	0.00%
(850 other bricks per pallets)	Other Bond bricks	80	70	50	40	Maximum Capacity	80	70	50	40	Maximum Capacity	80	70	50	40	Maximum Capacity
	Row lock bond bricks	70	60	40	30	Maximum Capacity	70	60	40	30	Maximum Capacity	70	60	40	30	Maximum Capacity
Amount of money spent or received							48640	2429000	280800	800000	3558440	4442100	0	0	0	0
							828940	54720	0	0	883660	4442100	0	0	0	0
							Total revenue				Total costs				PROFIT	
BMC PROFITABILITY in RWF (revenue - costs = profit)		0	4442100													-4442100
BMC capacity utilization (only on pallets)		99,8%														

**Table 4:** Stock measurement system for sales centers  
**Source:** Screenshot of sales center tool designed for PROECCO

The tool gives an overview of the input, current stock and output of a sales center. It distinguishes between the total number of bricks in the sales center and the bricks per producer at place as well as their type of quality and shape. Thereby, the share of each specification within the total stock can be observed as well as the current utilization of the stock.

With the option to adjust prices of each brick type, the overall and company-specific revenue for sales and purchases is calculated. This is especially important for PROECCO and the clusters in the future to track whether there are capacities for more purchases and storing in the stock at that point in time. Furthermore, the overall profitability of the sales center is calculated automatically through the tool and among others there is the function to list all past purchases and sales as well as the current stock individually per entrepreneur.

Such measurement functions are important to support or reshape PROECCO's activities and the visualizations (*see figure 16*) help to report the status quo to the program director as well as other relevant stakeholders.



**Figure 16:** Stock measurement per brick type and quality  
**Source:** Diagram of the sales center monitoring tool for PROECCO

### 5.5.3 Overall monitoring

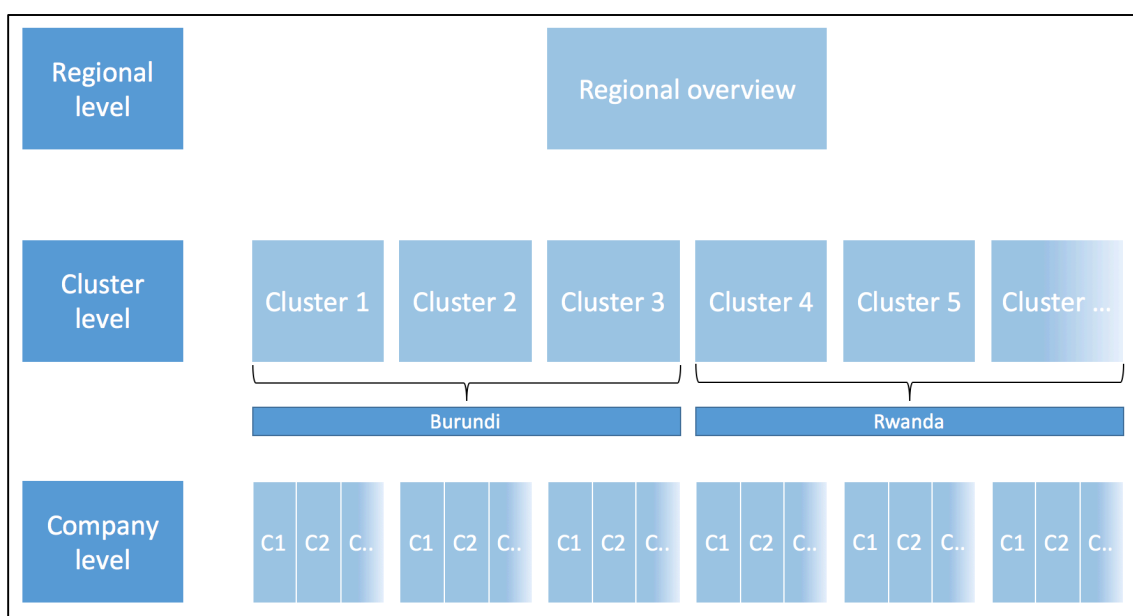
Cluster initiatives ideally use monitoring tools to create business and market intelligence. In this regard, PROECCO aims to evaluate the overall program implementation as well as the relevant environment. Therefore, a central monitoring tool was designed with significantly more information and complexity than the two aforementioned instruments.

The central monitoring tool provides regularly updated information about the industry to PROECCO which may be shared with other stakeholders and selected policy makers. Furthermore, it will be an important asset to document the progress regarding the project's goals, to adjust the strategy and to detect weak points in the value chain. PROECCO may use the acquired information to provide specific support to complete value chains and clusters. Therefore, a monitoring tool considering different local clusters was desired.

Efficient monitoring refers to numerous activities that involve a systematic, planned and purposeful selection of information about characteristics, activities and outcomes of an industry facilitator's work. In this regard, the monitoring considers the fields of economic, environmental, social and technical performance reflecting PROECCO's multiple forms of impact. Furthermore, particularly important targets for PROECCO such as employment trends, working conditions and quality of created jobs are included in the monitoring tool in detail. Also, human and financial input compared to the output can be studied with the information that is provided by the instrument.

The monitoring tool is structured in seven core categories. These are the fields production performance, capacity utilization, firing performance, stock utilization, business performance, social and environmental performance. In these categories, altogether 112 different indicators are measured making it on average 16 indicators per category. These indicators were carefully selected regarding their relevance, applicability and comparability. Especially, applicability and comparability require the usage of quantitative data or a transformation of qualitative into quantitative data in certain cases.

The data is available on three different levels – for the entire industry in the Great Lakes Region, cluster-specific and the company level (*see figure 17*). Thereby, companies of a certain area are grouped into regional subclusters. PROECCO has currently defined six of those clusters in Rwanda, three in Burundi and one in the Congolese South Kivu Lake region. Their individual results are measured and also summarized in an overview for the whole subcluster. These clusters are then brought together in an overview for the entire modern brick and tiles production cluster in the Great Lakes Region.

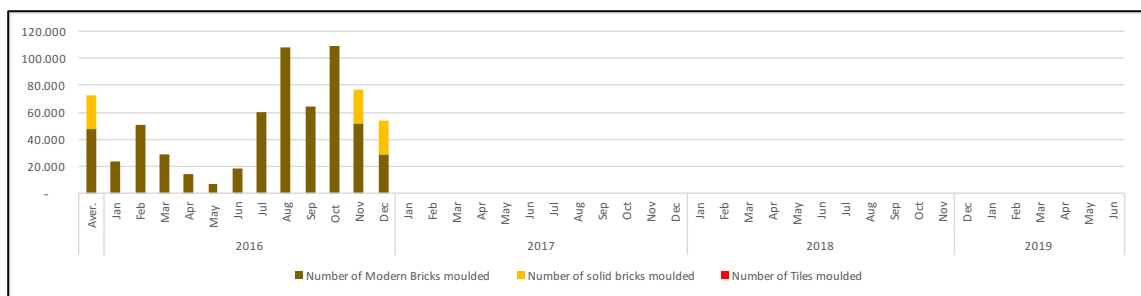


**Figure 17:** Three different levels of monitoring

**Source:** Own illustration to explain the different levels of monitoring

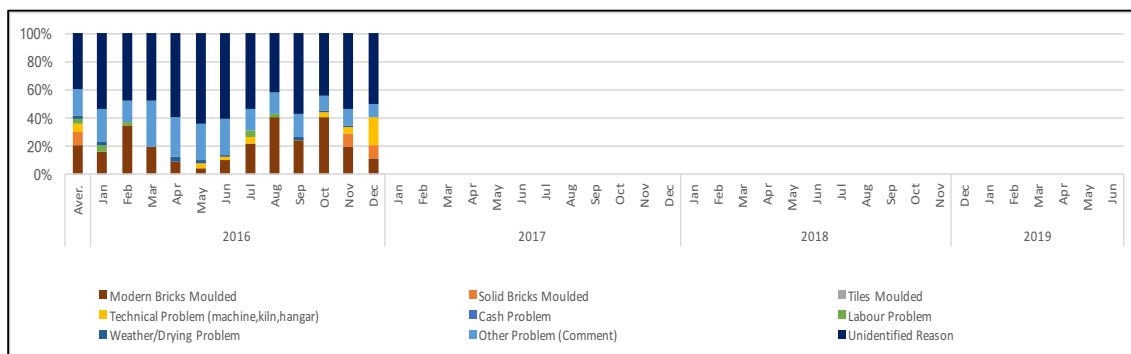
This structure enables PROECCO to examine results through both bottom-up and top-down analyses. Thus, unexpected deviations can be detected more easily and reasoning can be conducted in two different ways or perspectives. Furthermore, linkages between companies within a cluster and also between the clusters are visible. This is especially important for the observation of forward and backward linkages as well as positive side effects.

To instantly support the data evaluation, numerous charts automatically visualize the data and contribute to a better understanding of the data. For example, the monthly production for each producer, each cluster and the entire Great Lakes Region is illustrated regarding modern bricks, solid/traditional bricks and roof tiles by the tool. Thereby, the timeline allows to observe how production has changed over time (*see figure 18*).



**Figure 18:** Production figures of the Kigali cluster over time  
**Source:** Diagram of the monitoring tool for PROECCO

In order to analyze the changes over time, the monitoring tool includes the function to explain why production figures vary in different months. A maximum capacity is calculated based on the number of extruders in a company, types of extruders and working hours per day. If the production falls below the calculated maximum capacity, there are different categories to explain the deviation. Technical, financial, labor, weather and commented other problems serve as predefined reasons for clarification. In case, these categories do not fully indicate the discrepancy, the category “unidentified reason” calculates the difference and suggests a follow-up with the company for clarification (*see figure 19*).



**Figure 19:** Production capacity utilization calculation of the Kigali cluster over time  
**Source:** Diagram of the monitoring tool for PROECCO

This section is especially important for PROECCO to monitor problems in the scaling process of the industry. Through the distinction of different categories, specific barriers to scale can be detected more easily. Hence, PROECCO can shape its strategy according to the findings and intervene with customized approaches for the specific challenges of a producer or cluster.

Regarding the firing process performance of companies, the tool includes data such as the number of fired bricks and tiles per month, their quality after firing, number of defects and the monthly capacity utilization based on the number of kilns, the kiln type and their potential firing cycles. Through this data, the current performance as well as improvements or deteriorations of a company’s firing process can be evaluated by PROECCO.

In addition to sales centers which constantly offer bricks, it is desired by PROECCO that producers of modern bricks establish own stocks in order to further improve the instant brick supply. Therefore, the monitoring tool reveals how many bricks are currently in stock at a company’s place of production. Also, the number of bricks is measured that have been put in and out of stock within certain month. Furthermore, an adjustable target of initially 20.000 bricks has been announced as a target for a company’s inventory which reflects the number of bricks needed for a small house. A compliance calculation regarding this target is included in the monitoring tool as well.

In the section business performance, particular attention is paid to the results of individual companies in terms of profitability. Investment costs, debts and expenditure are contrasted with revenue based on adjustable sales prices for bricks over time. In addition, economic indicators per worker illustrate the efficiency of an enterprise and enable meaningful comparisons between different companies. Among others, the business performance is also pointed out through the necessary monthly support by PROECCO measured in monthly company visits and customer complaints.

PROECCO's approach of industry facilitation stresses the importance of improvements regarding social factors. In this regard, working hours per day, type of employment, workers' age, percentage of female workers as well as safety are reflected in the new monitoring tool for PROECCO. Furthermore, wages including maximum, median and minimum salaries, holidays per month and other benefits for workers such as insurances or food were included in the monitoring tool as important indicators to show the impact of industry facilitation in the construction material over time.

The final category takes the environmental impact into account. Therefore, the quantity of fuel per firing cycle, the usage of clay and total energy consumption per month are noted and used for efficiency measures. Against the background that most traditional brick producers fire bricks on open fireplaces with firewood as their primary fuel, the environmental benefits are examined in clear numbers with the help of the monitoring tool and they reflect the advances of PROECCO's activities in the field of environmental protection in the Great Lakes Region.

Among the explained categories, three were selected that shall indicate an "evaluation at a glance". From the categories production, social and environmental performance, certain key indicators were selected that are automatically transferred into an automatic rating by the monitoring tool. In result, different adjustable criteria determine an overall performance for each of these three sections which are finally illustrated in a classification of five stars. This system is comparable with hotel ratings where different criteria define the amount of stars a hotel receives. The more stars a producer or cluster receives in a category the better is their performance. The overview is provided together with key information of the enterprises. As an example the producer *in table 5* is presented. PROECCO staff can quickly see that the brick producer has an excellent social, satisfactory production and insufficient environmental performance. For reasons of confidentiality the company details are not mentioned *in table 5*.

Federation	1
Name	
Phone	
Products	Modern Bricks,tiles
Kiln_Type	Permanent Kiln
Cluster_Name	
Extruder	Yes
Kiln_Upgrade	Yes
Sector	
District	
Province	
Production rating	***
Social rating	*****
Environmental rating	*

**Table 5:** Exemplary performance of a brick producer rated in stars

**Source:** Screenshot of the monitoring tool for PROECCO

The translation into a star ranking offers the possibility to communicate companies' performances easily. For owners of a brick production business this system is easier to understand than plain performance indicators. Moreover, it is a simplification that provides incentives for producers to receive a higher rating.

In conclusion, the monitoring tool is designed in a way that combines comprehensive information of numerous fields. The data can be examined from several points of view and includes multiple ways of data processing and presentation. This allows for meaningful and efficient monitoring and evaluation for different stakeholders and purposes that will greatly contribute to shape PROECCO's strategy and activities. Additionally, the tool can easily be extended by adding new indicators, companies and clusters.

#### 5.5.4 Implementation and generating data

The three presented tools were integrated into PROECCO's procedures in close cooperation with the team of the economics department. For example, certain data could be used and compiled that was available from earlier surveys of the project. Nevertheless, specific data for the tools is also required in addition to existing figures. Especially, for time series analyses to regularly report the status quo and to detect trends this frequent data generation is essential.

Existing data was mainly used for the investment cost calculation tool. In this tool, regular data generation is not necessary as it is for the other presented monitoring instruments. Figures can be updated upon need but the instrument does not require a frequent process of data acquisition. After presenting the file to the economics



department and the project director of PROECCO, minor extra features were requested based on new ideas that came up when the fully functional tool was seen for the first time. These adjustments were immediately undertaken and the instrument was then used at the Rwandan Home Expo in autumn 2016<sup>118</sup>.

The stock monitoring is intended to facilitate a better connection between supply and demand for modern bricks. Initially, the tool has been designed for PROECCO's BMC but it also serves as a template for future sales centers. The inserted current data for the tool was gathered from transaction receipts as well as physical counting, measurement and calculation to indicate current numbers and capacities.

The tool has been explained and handed over to the BMC manager and his deputy as well as the economics department of PROECCO in order to guarantee an effective implementation and utilization in other regions. It has been agreed that any changes in the stock, due to purchases or sales, are immediately recorded in the monitoring tool. This method has been successfully implemented. Additionally, the file is always saved on an online server which enables permanent access for all relevant members of PROECCO, mainly directors and economists, to access the latest version of the data from any location. Hence, PROECCO's teams in Burundi, Congo, Rwanda and Switzerland can view and edit information simultaneously. Furthermore, the system sends notifications to the allowed editors when the data is updated.

For the central and comprehensive monitoring tool that was presented at third, the data collection is more complex. At first, indicators were subcategorized into three groups - those which are generated weekly, monthly and quarterly. During the first weeks and months after the tool was implemented, staff members of the economics department of PROECCO undertook surveys via phone calls and received additional information from other departments. However, this process was more time-consuming than expected. Furthermore, due to the expected scaling of the sector more and more resources for data generation would be necessary in the future. Hence, other options were considered.

These days, there are numerous computer programs available to conduct surveys in real time through mobile applications on smartphones. Many development organizations use such tools. Users can log-in, submit their data and receive messages. Especially, when the surveys are complex and data is needed frequently, automatic systems are preferred. However, this option is not adequate for brick producers in the Great Lakes Region because the majority of them does not possess smartphones. Most of them use older types of mobile phones without access to the internet. This required to reflect other ways of data generation due to the high priority of effective and comprehensive monitoring for PROECCO.

---

<sup>118</sup> Bizimungu, J. & Kyanga, S. (2016)

After presenting an alternative to the project director of PROECCO and his deputy, it was agreed to implement the suggestion to use a text messaging survey system for the data generation. Therefore, an advisory firm was hired. The company offers the possibility to conduct customized surveys with ordinary mobile phones through short messages services (SMS).

With this system different types of surveys are conducted once per week, month and quarter through the next months with the possibility of an extension of the duration if the system delivers the desired insights (*see Appendix A*). Basically, the less frequently a type of survey is asked the more detailed it is. Among other advantages, companies can take the survey in three different languages (English, French, Kinyarwanda). Due to a reverse billing function of the system, they are not charged for sending messages and they are incentivized to finish the surveys through rewards in the form of airtime which are received when a survey is completed.

The answers of each respondent as well as certain summaries can be viewed online in real time. PROECCO has access to the interface. Furthermore, the contractor provides the data regularly integrated into PROECCO's presented comprehensive monitoring tool (*see chapter 5.5.3*) which then processes the information in accordance with PROECCO'S objectives.

The automatization of data generation saves enormous amounts of working hours and other associated costs for personal surveys via calling and also company visits. Thereby, it lowers the project's cost in the long-term. Nevertheless, the data will regularly need to be proven by PROECCO's economists and still needs to be verified through occasional company visits and samples that are acquired in person.

### **5.5.5 Maintenance of the tools**

During the preparation, creation and implementation of the monitoring tools, consultations with different stakeholders and especially the PROECCO team were frequently undertaken. In this regard, it was guaranteed that the economics departments of PROECCO in Burundi, Rwanda and Congo understand the functionalities and are able to continue the monitoring efforts autonomously without the support of the graduate student from University of St.Gallen. Furthermore, the mutual evaluation of the project's monitoring activities supported the maximization of usability and significance of the instruments.

As a general rule, clarity and comprehensibility as well as an intuitive navigation of the tool were targeted and could finally be implemented to enable a high degree of applicability of the ultimate monitoring tools. Furthermore, indications on how to enter the data and where to make changes are integrated and clearly presented in the monitoring tools.

The economists of PROECCO's three offices in the region have received trainings from the graduate student. Among others, they were taught about the functioning of the tools, how to use and adjust the them and how to report the findings. Although, all economists and selected other staff have acquired a deep and comprehensive understanding regarding PROECCO's monitoring, it has been communicated and technically ensured that the economics department in Rwanda is mainly responsible for the continuation of the utilization of the tools as well as other related duties for an effective follow-up. Thereby, responsibilities are clearly defined and may be delegated by the Rwandan economics department.

Throughout the last months, the responsibility for monitoring and evaluation was gradually handed over to the permanent local staff of PROECCO. For example, after initial leadership of the graduate student in terms of explication of the tool, it was successfully accomplished that PROECCO's economists took over the tasks to present and explain the structure and functions of the monitoring activities to other team members while additions were only made by the master student if necessary. This continuous familiarization strategy was followed to enhance the feeling of responsibility and to avoid delays or breaks in the processes when single team members are not available or at place.

By this time, PROECCO's monitoring is approved and successfully implemented. In order to guarantee a smooth introductory phase, the author of the thesis, who designed the monitoring tools, accepted a contract as consultant for PROECCO to support the transition from implementing the tools to developing a routine of reporting. Also in the future after the end of the temporary contract, he will be available for possibly desired advice.

## **5.6 First insights of the monitoring**

Over the last three years, PROECCO has undertaken research to analyze the market. With the support of the new monitoring tool, certain observations could already be made.

It was confirmed that the brick and tile supply figures are still low and volatile. According to the monitoring tool, the primary reasons for these variations are technical problems and unidentified issues which will require further consideration but are likely to be ascribed to general efficiency problems.

This finding of insufficient supply supports the observation that the Rwandan brick industry is still a push market where investors and stakeholders need to be convinced to put more effort into their businesses and demand for the products of PROECCO's partners still has to be channeled. However, the potential to become a pull market is

undeniable. Once companies start to produce large-scale and to generate high profits, more investors will be attracted and other companies within the supply chain will be positively affected through forward and backward linkages. Such a trend is already foreseeable in Burundi where producers provide steadier numbers of bricks of good quality than in Rwanda.

The non-existent or very low on-stock production of companies supports the theory that supply and demand are not yet well-connected. Enterprises are unwilling to fully engage in the sector, do not have sufficient capital to afford on stock production and fear not to be able to sell the bricks. Hence, on-demand production is prevalent but hinders the growth of the market and partly explains the volatile production numbers. In result, the stock monitoring showed that PROECCO had to intervene by buying many bricks and putting them in their stock at BMC in order to keep the enterprises profitable. Not only for producers but also for PROECCO's first sales center, it is still challenging to sell the bricks which can be observed through the contrast of a capacity utilization being close to 100 per cent and very low sales numbers. Hence, also stock capacities should be increased and sales facilitated to create space for new purchases from brick producers.

## 5.7 Other observations

The industry of modern bricks is still in its infancy. Taking Porter's five forces into account, the threat of substitutes is currently most relevant. This is reflected by the high figures of imports of construction material and cement construction which could absorb parts of the bricks' potential market share. Due to the cost advantage of building with modern bricks, bargaining power of buyers is limited. Furthermore, the small-scale production is still adjustable if product changes are required. Also, bargaining power of suppliers regarding fuel is restricted since different types of fuel serve as substitutes for the firing process which increases the market power of brick producers. Threat of new entrants and competitive rivalry may currently not be understood as a main threat. The two large-scale companies in Rwanda target different costumers and act mainly in Kigali and not in rural areas. Companies of this size are unlikely to be built outside of the capital which is why the potentials for synergies and linkages in the sector with other brick producers should be pointed out instead of fearing competitive rivalry.

In this regard, different types of brick producers will contribute to growth and increased competitiveness of the construction material sector in the Great Lakes Region based on Porter's diamond. The diamond describes how the competitiveness of one company is interconnected with the performance of different companies as well as other factors, the supply chain, customer-client relation and regional factors in a cluster. In result, the

construction material sector in the Great Lakes Region will benefit of business clusters that utilize sectoral synergies and stimulate forward and backward linkages.<sup>119</sup>

This way, the efforts of different stakeholders will contribute to creating new endowments for the construction material sector in Rwanda and the Great Lakes Region according to Michael Porter's national diamond theory. Hence, it seems most important that an industry is existent which will prevent cash drain to foreign suppliers, loss of jobs and rural development opportunities. In this regard, the Rwandan government has recently recognized the great potential and increased its support for the creation of a strong market of local construction material.

## 5.8 Limitations and forecast

First of all, it must be highlighted that PROECCO's monitoring activities have started relatively recently. In order to make well-founded statements, more time will need to pass until sufficient data for well-grounded statements is acquired.

The monitoring tools are customized for the needs of PROECCO and provide very comprehensive information. However, relevant stakeholders will always desire to acquire even greater amounts of data or more detailed information. Nevertheless, too extensive survey procedures could create new challenges such as a lower motivation for respondents to participate due to high necessary efforts or require an amount of working hours for evaluation from PROECCO that is not realizable. Hence, it was a key challenge of the task to select the most relevant and significant indicators. Thereby, the selection is essential to ensure clarity and feasibility of the tools.

Also, certain necessary data had to be expressed in quantitative proxy indicators instead of qualitative information in order to make data comparable and summable for the observation of entire clusters and regional statistics. Especially regarding social and environmental impact, proxy indicators had to be designed. One example is the social goal to prevent child labor. Instead of asking if child labor does or does not exist in a company, the number of workers in different age groups is monitored. There are four groups – "over 50", "30 to 50", "16 to 30" and "under 16". Hidden behind the age group "workers under 16" is the question concerning child labor and it identifies both if child labor exists in general and to what extent it occurs.

The monitoring is a very important asset in program management and steering. It can be considered as the core of it and measures the performance of individual companies, clusters and the entire region and show trends. However, this does not mean that additional information is dispensable. For certain activities the tools need to be combined with other evaluation instruments. For example, case studies may be

---

<sup>119</sup> Briguglio et al. (2003). p. 55

conducted to detect root causes for barriers. For instance, PROECCO is currently preparing a case study for cluster building in the region of Musanze. The acquired data from PROECCO's existing monitoring of the local cluster will be complemented with further specific information. Thereby, the monitoring tool already offers suggestions which areas need to be studied intensely and at place because it reveals weak spots where interventions by PROECCO are necessary. Then, the in-depth case study will provide adequate information that will enhance PROECCO's steering and support the creation of self-sustaining and flourishing clusters in the future. Finally, the monitoring tools will automatically track if the reshaped strategy results in changes in the future.

Based on new expertise it might be necessary in the future to make adjustments of the tool. Indicators, sections, companies and clusters might need to be added, exchanged or deleted. For these reasons, the tools were designed in a way that adjustments can easily be made in the future. In consequence, the tools are characterized by high degrees of flexibility and long-term usability. Moreover, necessary labor input for PROECCO is kept as low as possible through the automatization of data generation, processing and presentation.

Currently, the main focus of PROECCO is to scale the market. In this regard, the thesis focused on earlier stages within the supply chain. *In figure 20*, this includes the steps from quarrying, moulding, firing and sales. These are thoroughly reflected in the monitoring tool.



**Figure 20:** Value chain of the brick industry  
**Source:** Skat Consulting (2016)

Further research will be important for PROECCO to consider the actual utilization of bricks after being sold which is illustrated as the symbol of “building” *in figure 20*. Especially, studying specifically PROECCO's generated impact regarding affordable housing could be the topic for a thesis of another graduate student from University of St.Gallen. Likewise, environmental and social impact regarding working conditions are relevant fields for further research because in these fields changes are typically reflected later than in actual production or business performance figures.

## 6 Conclusive Remarks

The thesis aimed at giving an overview of industry facilitation in theory and practice. Michael Porter's theories were at the center of the first part and in the following the specific case of Skat Consulting's project PROECCO in the African Great Lakes Region was analyzed.

### 6.1 Contributions

Both parts of the thesis highlighted the importance of industry facilitators in transforming sectors into competitive industry clusters. Such actors face a complex challenge and need to review their strategy frequently. Therefore, adjustable internal learning mechanisms are essential that allow implementing organizations to take informed decisions and to create sustainable and long-lasting impact. Especially, the significance of frequent monitoring and evaluation activities were identified to facilitate industries effectively.

In the case of PROECCO, a comprehensive consulting project was conducted in the field of monitoring and evaluation. The contribution reached from theoretical studies and proposals to the actual creation and implementation of three different tools. These tools will greatly support PROECCO with the current main challenge to scale the market and also in the longer term. Through consultations, trainings and an intuitive handling of the tools, it was assured the instruments will actually be applied. To further support this goal, data generation was automatized in cooperation with external experts.

The insights from the monitoring system will provide important indications for PROECCO to steer its activities in the future and to point out weak spots suggesting areas for further research.

### 6.2 Epilogue

*“There's no copy-and- paste system in foreign aid”*

Atifete Jahjaga in Devex (2012)

Strategies of foreign aid have changed over time and became more case-specific. This opinion is supported by the findings of this thesis. Effective industry facilitation may require more will power and resources than conventional development approaches but the additional efforts to provide customized solutions ensure that long-lasting and far-reaching impact is actually achieved.

## Appendix

### Appendix B: History of brick-making

The history of brick-making reflects the story of human settlement and civilization. Permanent settlements were already created far back in history of humankind, earlier than the domestication of animals and plants<sup>120</sup>.

In the Neolithic Period (10,000 - 3,000 BC), civilizations began to settle in the Near and Mid-East while starting to build the first durable constructions in history<sup>121</sup>. Early attempts to ameliorate the quality of accommodation included spreading of clay on meshes of branches to stabilize huts. This technique is widely believed to represent the earliest efforts to build houses with clay and stands for the origin of the subsequent invention of bricks<sup>122</sup>.

Later, bricks were formed through excavation, manual kneading and drying in the sun<sup>123</sup>. The earliest discovered bricks of this type date back to approximately 8000 BC and were found in southeast Anatolia and in Tell Aswad, in the upper Tigris region near Damascus<sup>124</sup>. Presumably, brick construction was taken from there to other areas in the region of Levant such as Jericho. There, archaeologists discovered remains of a large settlement from around 7000 BC<sup>125</sup>. These constructions were made of mud bricks designed as circular homes with a domed roof<sup>126</sup>. Subsequently, bricks rose to the position of being one of the characteristic elements of the first high cultures in Mesopotamia between Euphrates and Tigris<sup>127</sup>.

However, clay and loam, as the necessary raw material for bricks, are available almost everywhere around the world. Therefore, their utilization quickly spread to other regions and was found in ruins of structures throughout Mesopotamia, Crete, India, and Egypt<sup>128</sup>.

---

<sup>120</sup> Roaf, M. (1995). p. 424

<sup>121</sup> Smith, E. (1981). p. 17

<sup>122</sup> Clixado Marketing (2016)

<sup>123</sup> History book of museum

<sup>124</sup> Parsons, I. (2014). p. 237

<sup>125</sup> Khan Academy (2016)

<sup>126</sup> Białowarczuk, M. (2007). p. 593

<sup>127</sup> Khan Academy (2016)

<sup>128</sup> Smith, E. (1981). p. 17



Two millennia later, the production of bricks underwent a major technological innovation through the application of wooden brick molds<sup>129</sup>. Firstly believed to be used around 5500 BC in Mesopotamia, it was utilized extensively by the ancient Egyptians. Preserved examples of wooden molds were found in the area of Luxor where depictions on tomb walls were found that illustrate the process brick production which is used until today<sup>130</sup>. Especially the Theban tomb of Rekhmire (ca. ca. 1479–1400 BC)<sup>131</sup> gave indication of the process.



**Figure 21:** Painting on the tomb of Rekhmire illustrating the production process of bricks with wooden molds

**Source:** Peck, W. (2013). p. 74

Wooden brick molds were designed to mix soil with water, chopped straw and other binding materials to control shrinking and cracking<sup>132</sup>. This simple tool allowed a single brick maker to produce hundreds of identically shaped bricks in one day. Fabrication speed drastically increased, storage and transportation were facilitated and the stability of the bricks itself was increased.

Until today, the Egyptian ways of producing sun-dried mud brick can still be found. Due to its practicability by forming bricks that fit a person's hand as well as an efficient material use, the production progress has only changed very little.

Although the Egyptians ameliorated the production of mud bricks significantly, they did not use fired bricks as a durable building material and instead used the access to rock

---

<sup>129</sup> Campbell, J. & Pryce, W. (2003). p. 28

<sup>130</sup> Peck, W. (2013). p. 74

<sup>131</sup> Rice, M. (1999). p. 171

<sup>132</sup> Peck, W. (2013). p. 74

solid for construction. For instance, the pyramids were mainly built of wrought lime stone. Hence, the general drawback of this simple building block remained. These mud bricks could be deteriorated or destroyed by water and thereby endanger the quality and durability of the entire construction they were used for.

It was in Mesopotamia where the most substantial innovation in brick production is likely to have been made at first since it is the region where the first fired bricks were found. There, earliest troves of fired bricks indicate that a utilization around 3000 BC<sup>133</sup>.

This achievement is considered a milestone since it allowed to construct buildings where it had not been possible before. Nevertheless, production was still very costly and labor-intensive. Around 2000 BC, the price for a fired brick was approximately 30 times higher than for its sun-dried counterpart mainly due to the higher labor-intensiveness and technological challenge<sup>134</sup>. Furthermore, the production of fired bricks is much more complex because they have to be fired at the right temperature to make them a reliable building material. If fired too cold, they will remain soft and crumble to dust. Bricks that are fired too hot will melt together to a lump which is not usable for construction. Due to these challenges, fired bricks were only used for ornate or exposed parts of ceremonial buildings and did not reach large scale production in the Mediterranean area for two millennia<sup>135</sup>.

Independent of the mutual influences in the Near and Middle East, bricks gained increasing attention as construction material in China as well. First burnt clumps of clay were found in the Anhui Province and are believed to date back until approximately 3500 BC in Middle Neolithic China<sup>136</sup>. Earliest red bricks from 1000 BC were discovered in Western Zhou ruins<sup>137</sup>. However, it was the challenge of building the Great Wall in remote and inaccessible areas that drove engineers and architects to use bricks for the construction. During this period within the Qin Dynasty 2000 years ago, more than three million bricks were installed<sup>138,139</sup>. Since then throughout the Chinese history, bricks have had an important role in construction and were also used for art and decoration<sup>140</sup>.

In the Near and Middle East, brick construction came to an end with the fall of the cities in Mesopotamia. It was only the Romans who revived brick firing, introduced innovations and allowed bricks to be exploited to its fullest potential. First used in Sicily

---

<sup>133</sup> Greene, K. & Moore, T. (2010). p. 132

<sup>134</sup> Sauvage, M. (1998). p. 84

<sup>135</sup> Greene, K. & Moore, T. (2010). p. 132

<sup>136</sup> Li et al (2004)

<sup>137</sup> McLoughlin, G. (2012). p. 18

<sup>138</sup> Davis, A. (2016)

<sup>139</sup> Heierli, U. & Maithel, S. (2008). p. 32

<sup>140</sup> Davis, A. (2016)

and southern Italy, the technique spread to other provinces through the Roman conquests<sup>141</sup>. By the first century BC, Romans started to use fired bricks for houses in cities<sup>142</sup>. Towards the end of the first century AD, bricks were widely not only used for minor projects but also likewise for major, heroic architecture such as the Colosseum in Rome. The world's largest amphitheater was constructed between 70 and 80 AD with the use of more than three million bricks<sup>143</sup>.



**Figure 22:** The Colosseum in Rome was made with a high proportion of bricks

**Source:** Caporali, M. (2013)

Furthermore, by adding a fine powder of volcanic ash to lime water a new form of cement was invented that possessed the ability to dry under water<sup>144</sup>. Subsequently, brick buildings could be made in a wet environment or even in direct contact with water. This innovation opened up new opportunities of brick buildings such as harbors or aqueducts.

With the fall of the Roman Empire, the technology of Roman cement was lost but the sun-dried adobe bricks remained predominant in Southern Europe. Bricks continued to be manufactured in Italy throughout the period 600–1000 AD but elsewhere the craft of brick-making had largely disappeared.

Over time during the Middle Ages, particularly religious buildings were built with bricks such as pagodas in China, Buddhist temples in Asia, palaces and mosques in the Middle East and North Africa, as well as Catholic churches and cathedrals in Europe. During Renaissance, bricks were brought from Italy to Northern Europe and turned into a profitable business<sup>145</sup>. More and more large buildings such as castles, city walls and fortifications were built with bricks by then<sup>146</sup>. Later, residential houses were increasingly built with bricks due to its resistance to fire. In 1666, the Great fire of

---

<sup>141</sup> Bender, W. & Handle, F. (1982)

<sup>142</sup> MacWhirr, A. (1979). p. 11-13

<sup>143</sup> Wiley, J. & Sons (2014). p. 79

<sup>144</sup> Moore, D. (1993)

<sup>145</sup> Roccatelli, C. (1925). p. 178

<sup>146</sup> University College London (2016)

London destroyed more than 13.000 houses and 84 churches and 44 company halls<sup>147</sup>. In the aftermath, new regulations for the city center were introduced and determined to rebuild all houses in a fire-proof way. According to the plans of architect Sir Christopher Wren fired bricks were chosen for this purpose<sup>148</sup>. Hence, the industry grew very rapidly throughout the following years and brick constructions were seen in all different housing segments.

In the 19th century, the invention of several new technologies took place in Europe and the USA which paved the way for a scaling-up of the brick industry. Extruders to shape bricks, efficient continuous kilns for firing bricks like the Hoffman or tunnel kilns and artificial dryers facilitated the production<sup>149</sup>. All these inventions opened the path for modern mass production of bricks.

Since the end of the 19th century, the architecture of New York was predominantly defined by bricks. Before that, fire was a great danger to Manhattan until it became illegal to build in wood and brick houses were all over the city. With the beginning of the 20<sup>th</sup> century, the demand for bricks increased beyond production capacity. And New York, the United States of America's first metropolis, was experiencing the greatest growth in population of any city in the world. A growth that fueled the unprecedented demand for bricks and which changed the industry from handicraft into a mechanized production.

After the Second World War, numerous factors caused a change of the brick industry in Europe<sup>150</sup>. A shift to oil and gas due to a shortage of coal, labor scarcity and environmental regulations to control air pollution as well as pressure to improve working conditions have profoundly changed the industry<sup>151</sup>. Furthermore, the industry has been transformed from one of thousands of small brickyards at the beginning of the 20<sup>th</sup> century into one of few, highly mechanized and capital-intensive enterprises.

In contrast, the situation in most developing countries regarding brick-making organization and technology has not undergone improvements during the last decades. Across Asia, Africa Latin America, brick-making is still organized in small family businesses serving the rural markets. In most cases, they produce bricks that are hand-molded, sun-dried and fired in clamps<sup>152</sup>.

---

<sup>147</sup> Geoghegan, T. (2010)

<sup>148</sup> Lambert, D. (1997). p. 14

<sup>149</sup> Heierli, U. & Maithel, S. (2008). p. 29

<sup>150</sup> Kolkmeier, H. (1988). p. 612-620

<sup>151</sup> Heierli, U. & Maithel, S. (2008). p. 29

<sup>152</sup> Mason, K. (2001)

## Appendix B: Questionnaires

The first two figures give indication about the structure and frequency of the survey. Weekly, monthly and quarterly conducted surveys are combined in one table. Thereby, the additional questions compared to the more frequent questionnaire are colored differently.

	Category	Weekly	Monthly	Quarterly
1		How many Modern bricks were molded this week?	How many Modern bricks were molded this week?	How many Modern bricks were molded this week?
2		How many extruders to you have on site?	How many extruders to you have on site?	How many extruders to you have on site?
3		How many traditional bricks were molded this week?	How many traditional bricks were molded this week?	How many traditional bricks were molded this week?
4		How many tiles were molded this week?	How many tiles were molded this week?	How many tiles were molded this week?
5			Did you face technical problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Did you face technical problems this month (yes, no) If yes, how many bricks were not produced due to this reason?
6			Did you face cash problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Did you face cash problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?
7	Production		Did you face labor problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Did you face labor problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?
8			Did you face weather problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Did you face weather problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?
9			Did you face any other problems this month (yes, no) other projects D: Comment E: None	Did you face any other problems this month (yes, no)? A: Illnesses B: Legal C: Focus on other projects D: Comment E: None
10			How many bricks were not produced due to this reason?	How many bricks were not produced due to this reason?
11				How many working hours does your company produce per day? What is your maximum capacity of brick production per hour?
12				What is your maximum capacity of tile production per hour?
13		How many tiles did you fire this week?	How many tiles did you fire this week?	How many tiles did you fire this week?
14		How many traditional bricks did you fire this week?	How many traditional bricks did you fire this week?	How many traditional bricks did you fire this week?
15	Firing	How many Modern Bricks did you load this week?	How many Modern Bricks did you load this week?	How many Modern Bricks did you load this week?
16		How many Modern Bricks broken in the firing process?	How many Modern Bricks broken in the firing process?	How many Modern Bricks broken in the firing process?
17			What is your maximum brick firing capacity per month?	What is your maximum brick firing capacity per month?



18			What is your maximum tile firing capacity per month?	What is your maximum tile firing capacity per month?
19			How many bricks do you currently have in stock?	How many bricks do you currently have in stock?
20	<b>Stock</b>		How many bricks did you put in stock over this month?	How many bricks did you put in stock over this month?
21			How many bricks did you sell/put out of stock this month?	How many bricks did you sell/put out of stock this month?
22	<b>Business</b>		How many tiles did you sell this week?	How many tiles did you sell this week?
23			How many traditional bricks did you sell this week?	How many traditional bricks did you sell this week?
24			How many Modern Bricks did you sell this week?	How many Modern Bricks did you sell this week?
			How many visits from SKAT did receive this month?	How many visits from SKAT did receive this month?
25			What is the production cost per tile?	What is the production cost per tile?
26			What is the production cost per Modern Brick?	What is the production cost per Modern Brick?
27			What is your sales price per tile?	What is your sales price per tile?
28			What is your sales price per Modern Brick?	What is your sales price per Modern Brick?
29			What was your total wage expenditure over the last month?	What was your total wage expenditure over the last month?
31	<b>Social</b>		What is average of working hours per day?	What is average of working hours per day?
32			How many working shifts do you conduct per day?	How many working shifts do you conduct per day?
33			What is the total number of employees at your company?	What is the total number of employees at your company?
34			How many of your staff are permanently employed?	How many of your staff are permanently employed?
35			How many of your staff are casually employed?	How many of your staff are casually employed?
36			How many of your staff are men?	How many of your staff are men?
37			How many of your staff are women?	How many of your staff are women?
38			What is the monthly minimum wage at your company?	What is the monthly minimum wage at your company?
39			What is the monthly maximum wage at your company?	What is the monthly maximum wage at your company?
40			What is the daily salary for casual workers?	What is the daily salary for casual workers?
41			What is the estimated total value of other benefits that your company provides for the workers (e.g. food, drinks, transport, additional savings, bonus)?	What is the estimated total value of other benefits that your company provides for the workers (e.g. food, drinks, transport, additional savings, bonus)?
42			What is the amount for insurance per worker per month?	What is the amount for insurance per worker per month?
43	<b>En-vironmental</b>		What kind of fuel do you use for firing?	What kind of fuel do you use for firing?
44			How many kg of fuel do you use per firing cycle?	How many kg of fuel do you use per firing cycle?

The following figures show that the surveys may be conducted in three different languages. The user can choose in the system which one is preferred.

Category	English	French	Kinyarwanda
1	How many Modern bricks were molded this week?	Combien de briques modernes ont été façonnées cette semaine?	Ni amatafari angaha ya kijyambere yabumbwe iki cyumweru?
2	How many extruders to you have on site?	Combien de machines extrudeuses avez-vous sur votre site?	Ni imashini zingaha zibumba mufite ku ruganda rwanyu?
3	How many traditional bricks were molded this week?	Combien de briques traditionnelles ont été façonnées cette semaine?	Ni matafari angaha ya mpunyu yabumbwe iki cyumweru?
4	How many tiles were molded this week?	Combien de tuiles ont été façonnées cette semaine?	Ni amategura angaha yabumbwe iki cyumweru?
5	Did you face technical problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Avez-vous rencontré des problèmes techniques ce mois-ci (oui, non)? Si oui, Combien de briques n'ont pas été produites pour cette raison?	Mwaba mwarigeze muhura n'ikibazo tekimike uku kwezi?(Yego,Oya) Niba ari yego, ni amatafari angaha atarabumbwe bitewe niki kibazo?
6	Did you face cash problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Avez-vous rencontré des problèmes de financement ce mois-ci (oui, non)? Si oui Combien de briques n'ont pas été produites pour cette raison?	Mwaba mwarigeze muhura n'ikibazo cyo kubura amafanga muri uku kwezi? (Yego,Oya) Niba ari Yego, ni amatafari angaha atarabumbwe kubera iki kibazo?
7	Did you face labor problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Avez-vous eu des problèmes de main-d'œuvre ce mois-ci (oui, non)? Si oui, Combien de briques n'ont pas été produites pour cette raison?	Mwaba mwarigeze muhura n'ikibazo cy'abakozi uku kwezi? (Yego,Oya) Niba ari Yego, ni amatafari angaha atarabumbwe kubera iki kibazo?
8	Did you face weather problems this month (yes, no)? If yes, how many bricks were not produced due to this reason?	Avez-vous rencontré des problèmes climatiques ce mois-ci (oui, non)? Si oui, Combien de briques n'ont pas été produites pour cette raison?	Mwaba mwarigeze muhura n'ikibazo cy'ihindagurika ry'ibihe uku kwezi? (Yego,Oya) Niba ari Yego, ni amatafari angaha atarabumbwe kubera iki kibazo?
9	Did you face any other problems this month (yes, no)? A: Illnesses B: Legal C: Focus on other projects D: Comment E: None how many bricks were not produced due to this reason?	Avez-vous rencontré d'autres problèmes ce mois-ci (oui, non)? A: Maladies B: Juridique C: Concentration sur d'autres projets D: Commentaire E: Aucun )? Si oui, Combien de briques n'ont pas été	Mwaba mwarigeze muhura n'ibindi bibazo uku kwezi? (Yego,Oya) A: Uburwayi B: Amategeko C:Guhugura kuyindi mirimo D: Ibisobanuro E: Ntabwo Niba ari Yego, ni amatafari angaha atarabumbwe kubera iki kibazo?

			produites pour cette raison?	
10	How many working hours does your company produce per day?	Combien d'heures de travail votre entreprise produit-elle par jour?	Ni amasaha angahe uruganda rwanyu rukora ku munsu?	
11	What is your maximum capacity of brick production per hour?	Quelle est votre capacité maximale de production des briques par heure?	Amatafari menshi mushobora gukora ku isaha ni angahe?	
12	What is your maximum capacity of tile production per hour?	Quelle est votre capacité maximale de production de tuiles par heure?	Amategura menshi mushobora gukora ku isaha ni angahe?	
13	How many tiles did you fire this week?	Combien de tuiles avez-vous cuites cette semaine?	Ni amategura angahe mwatwite iki cyumweru?	
14	How many traditional bricks did you fire this week?	Combien de briques traditionnelles avez-vous cuites cette semaine?	Ni amatafari angahe ya mpunyu mwatwite iki cyumweru?	
15	How many Modern Bricks did you load in the kiln this week?	Combien de Briques modernes avez-vous chargées dans le four cette semaine?	Ni amatafari angahe ya kijyambere mwapakiye mu ifuru iki cyumweru?	
16	How many Modern Bricks broken in the firing process?	Combien de briques modernes ont-elles cassé dans le processus de cuisson?	Ni amatafari angahe ya kijyambere yamenekeye mu gutwika?	
17	What is your maximum brick firing capacity per month?	Quelle est votre capacité maximale de cuisson de briques par mois?	Amatafari menshi mushobora gutwika ku kwezi ni angahe?	
18	What is your maximum tile firing capacity per month?	Quelle est votre capacité maximale de cuisson de tuiles par mois?	Amategura menshi mushobora gutwika ku kwezi ni angahe?	
19	How many bricks do you currently have in stock?	Combien de briques avez-vous actuellement en stock?	Ni amatafari angahe mufite mu bubiko kuri ubu?	
20	How many bricks did you put in stock over this month?	Combien de briques avez-vous mises en stock au cours de ce mois?	Ni amatafari angahe mwongeye mu bubiko muri uku kwezi?	
21	How many bricks did you sell/put out of stock this month?	Combien de briques avez-vous vendues / mises hors de stock ce mois-ci?	Ni amatafari angahe mwagurishije/mwasohoye mu bubiko uku kwezi?	



22	How many tiles did you sell this week?	Combien de tuiles avez-vous vendues cette semaine?	Ni amatutura angaha mwagurishije uku kwezi?
23	How many traditional bricks did you sell this week?	Combien de briques traditionnelles avez-vous vendues cette semaine?	Ni amatufari angaha ya mpunyu mwagurishije uku kwezi?
24	How many Modern Bricks did you sell this week?	Combien de briques modernes avez-vous vendues cette semaine?	Ni amatufari angaha ya kijyambere mwagurishije uku kwezi?
	How many visits from SKAT did you receive this month?	Combien de visites de SKAT avez-vous reçues ce mois-ci?	Mwasuwe n' abakozi ba Skat inshuro zingaha uku kwezi?
25	What is the production cost per tile?	Quel est le coût de production par tuile?	Ni amafaranga agaha yakoreshejwe mu gukora itegura?
26	What is the production cost per Modern Brick?	Quel est le coût de production par brique moderne?	Ni amafaranga agaha yakoreshejwe mu gukora itafari rya kijyambere?
27	What is your sales price per tile?	Quel est votre prix de vente par tuile?	Ni ikihe kiguzi cy'itegura rimwe?
28	What is your sales price per Modern Brick?	Quel est votre prix de vente par brique moderne?	Ni ikihe kiguzi cy'itafari rimwe rya kijyambere?
29	What was your total wage expenditure over the last month?	Quelle a été votre dépense salariale totale au cours du dernier mois?	Ni ikihe giteranyo cy' amafaranga y'imishahara mwahembye ukwezi gushize?
31	What is the average of working hours per day?	Quelle est la moyenne d'heures de travail par jour?	Ni amasaha angaha mukora ku muni ku kigereranyo rusange?
32	How many working shifts do you conduct per day?	Combien de rotation de travail effectuez-vous par jour?	Ni inshuro zingaha amatsinda y' abakozi asimburana ku muni?
33	What is the total number of employees at your company?	Quel est le nombre total d'employés de votre entreprise?	Mukoresha abakozi bangahe k'uruganda rwanyu?
34	How many of your staff are permanently employed?	Combien d'employés sont permanents?	Ni abakozi bangahe mukoresha bahoraho?
35	How many of your staff are casually employed?	Combien d'employés occasionnels?	Ni abakozi bangahe muhoresha nyakabyizi?
36	How many of your staff are men?	Combien d'hommes sont employés ici?	Ni abakozi bangahe b' abagabo mukoresha?
37	How many of your staff are women?	Combien de femmes sont employés ici?	Ni abakozi bangahe b' abagore mukoresha?

38	What is the monthly minimum wage at your company?	Quel est le salaire minimum mensuel de votre entreprise?	Ni uwuhe mushahara wo hasi mu ruganda rwanyu?
39	What is the monthly maximum wage at your company?	Quel est le salaire mensuel maximum de votre entreprise?	Ni uwuhe mushahara wo hejuru mu ruganda rwanyu?
40	What is the daily salary for casual workers?	Quel est le salaire journalier pour les travailleurs occasionnels?	Ni amafaranga angaha muhamba umukozi wa nyakabyizi ku munsu?
41	What is the estimated total value of other benefits that your company provides for the workers (e.g. food, drinks, transport, additional savings, bonus)?	Quelle est la valeur totale estimée des autres avantages que votre entreprise offre aux travailleurs (Par exemple, nourriture, boissons, transport, épargnes supplémentaires, bonus)?	Ni akahe gaciro mbumbe k'ibindi bihembo uruganda rwanyu ruha bakozi (urugero: Amafunguro, Ibinyobwa, Amafaranga y'urugendo, ubwizigame, Agahimbazamusyi).
42	What is the amount for insurance per worker per month?	Quel est le montant de l'assurance par travailleur par mois?	Ni amafaranga angaha y'ubwishingizi mu kwivuza ku mukozi ku kwezi?
43	What kind of fuel do you use for firing?	Quel type de combustible utilisez-vous pour la cuisson ?	Ni ubuhe bwoko bw'ibicanwa mukoresha mu gutwika?
44	How many kg of fuel do you use per firing cycle?	Combien de kg de combustible utilisez-vous par cycle de cuisson?	Ni ibiro bingaha by'ibicanwa mukoresha k'umucano umwe?







## Appendix D: Embedded monitoring and evaluation files

For reasons of confidentiality company details not mentioned in the files and the inserted numbers are exemplary.

(The files will be shared with the examiner of this thesis after its submission at University of St.Gallen)

Investment calculation file:



Sales center monitoring file:



Overall monitoring file:



## References

- African Development Bank (2014): Investing in Rwanda, An Overview. *African Development Bank*. 2014. Kigali, Rwanda.
- Alemayehu, M. (2000): Industrializing Africa: Development Options and Challenges for the 21st Century. Africa World Press. Trenton, New Jersey, USA.
- Adekunle, J. (2007): Culture and Customs of Rwanda. *Greenwood Publishing Group*. Santa Barbara, California, California.
- Ansoms, A. & Marysse, S. (2011): Natural Resources and Local Livelihoods in the Great Lakes Region of Africa. *Springer*. Berlin, Germany.
- Białowarczuk, M. (2007): Early Neolithic Wall Construction Techniques in the Light of Ethnographical Observations on the Architecture of the Modern Syrian Village of Qaramel. *Polish Archaeology in the Mediterranean*. Volume 19. University of Warsaw. Warsaw, Poland.
- Breier, M & Visser, M. (2006): The Free Rider Problem in Community- Based Rural Water Supply: A Game Theoretic Analysis. *Southern Africa Labour and Development Research Unit*. Working paper 2006. Cape Town, South Africa.
- Briguglio, L., Bare, T.R., Cordina, G. & Endeley, R.R. (2003): Maximising Malta's Competitiveness Potential, *Islands and Small States Institute and Commonwealth Secretariat*. Valletta, Malta.
- Campbell, J. & Pryce, W. (2003): Backstein. Eine Architekturgeschichte von den Anfängen bis zur Gegenwart. *Knesebeck*. Munich, Germany.
- Centre of Innovation, Imagination and Inspiration (2016): Value Chain. *University of Greenwich Business School*. Greenwich, United Kingdom.
- Chrétien, J.-P. (2003). The Great Lakes of Africa: Two Thousand Years of History. *MIT Press*. Cambridge, Massachusetts, USA.
- Cornish, S. L. (1997): Product Innovation and the Spatial Dynamics of Market Intelligence: Does Proximity to Markets Matter?. *Economic Geography*. Volume: 73, Issue 2. *Clark University*. Worcester, Massachusetts, USA.
- Desai, S. , Nijkamp, P. & Stough, R. R. (2011): New Directions in Regional Economic Development: The Role of Entrepreneurship Theory and Methods, Practice and Policy. *Edward Elgar Publishing*. Cheltenham, United Kingdom.
- Diarra, M. (2010): Better Land Access for Women – Gathering information and sharing lessons. *International Fund for Agricultural Development*. Rome, Italy.
- Fathy, H. (1973): Architecture for the poor. *University of Chicago Press*. Chicago, Illinois, USA.

- Glanville, J. (1992): Fired Bricks (Rwanda) Evaluation Report. International Development Research Centre. University of Manitoba. Winnipeg, Manitoba, Canada.
- Greene, K. & Moore, T. (2010): *Archaeology: An Introduction*. Routledge. London, United Kingdom.
- Hanleybrown, Kania & Kramer (2012): Channeling Change: Making Collective Impact Work. *Stanford Social Innovation Review*. 2012. Stanford University. Stanford, California, USA.
- Haub, C. (2011): How Many People Have Ever Lived on Earth?. *Population Reference Bureau*. Washington, Washington D.C., USA.
- Heierli, U. (2008): Market approaches that work for development. *Employment and Income Division. Swiss Agency for Development and Cooperation (SDC)*. Berne, Switzerland.
- Heierli, U. & Maithel, S. (2008): Brick by brick: the Herculean task of cleaning up the Asian brick industry. *Natural Resources and Environment Division, Swiss Agency for Development and Cooperation (SDC)*. Berne, Switzerland.
- Jefremovas, V. (2002): Brickyards to graveyards. From production to genocide in Rwanda. *State University of New York Press*. Albany, New York, USA.
- Kayser, O. & Budinich, V. (2015). Scaling up. Business Solutions to Social Problems. A Practical Guide for Social and Corporate Entrepreneurs. *Palgrave Macmillan*. New York, New York, USA.
- Kiptum, C. et al. (2014): Physical Properties of Clay and Bricks in Nyagatare, Rwanda. University of Rwanda. *Journal of Mechanical and Civil Engineering*. Volume 11. March 2014. New York, New York, USA.
- Koh, Hegde & Karamchandani (2014): Beyond the pioneer. Getting Inclusive Industries to Scale. *Deloitte Touche Tohmatsu India Private Limited*. Mumbai, India.
- Kolkmeier, H. (1988): Use of energy in the brick and tile industry during the past 40 years. *Ziegelindustrie International*. Gütersloh, Germany.
- Kania, J. & Kramer, M (2011): Collective Impact. *Stanford Social Innovation Review*. Winter 2011. Stanford University. Stanford, California, USA.
- Lambert, D. (1997). Fires and Floods. *Evans Brothers*. London, United Kingdom.
- Li, N., Zhang, J., Mao, Z., Feng, M., and Wang, C., (2004): Earliest ceramic materials for building in China - 'Red burnt clay' excavated from Lingjiatan site. *Journal of Building Materials*. Tongji University. Shanghai, China.
- Lipton, M. (1962): Balanced and Unbalanced Growth in Underdeveloped Countries. *John Wiley & Sons*. Vol 72. Hoboken, New Jersey, USA.



- Lundequist, P. & Power, D. (2001): Putting Porter into Practice? Practices of Regional Cluster Building: Evidence from Sweden. *Taylor & Francis: European Planning Studies*. Vol 10. 2002. London, United Kingdom.
- Mason, K. (2001): Brick by Brick. Participatory Technology Development in Brickmaking. *ITDG Publishing*. Bradford, United Kingdom.
- MacWhirr, A. (1979): Roman brick and tile. Studies in manufacture, distribution, and use in the Western Empire. *British Archaeological Reports*. Oxford, United Kingdom.
- Mamdani, M. (2002). When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda. *Princeton University Press*. Princeton, New Jersey, USA.
- McLoughlin, G. (2012): Survival of the Fittest - Bricks may be an ancient technology but they still have lots to say in the 21st century. *Design Mag*. Volume 1. Brickworks Building Products. Wollert, Victoria, Australia.
- McPherson, Botes & Lane (2015): Localisation in Africa's oil and gas industry. *Deloitte*. Johannesburg, South Africa.
- Moore, D. (1993): The Riddle of Ancient Roman Concrete. The Spillway Newsletter. US Department of the Interior, Bureau of Reclamation. Salt Lake City, Utah, USA.
- Morgan, N. (2012): Marketing and Business Performance. *Journal of the Academy of Marketing Science*, Vol. 40, 102-119. St. Petersburg, Florida, USA.
- Muro, M. & Katz, B. (2010): The New 'Cluster Moment': How Regional Innovation Clusters Can Foster The Next Economy. *Brookings*. Washington D.C., USA.
- Murray, J., Gao, G., & Kotabe, M. (2011): Market Orientation and Performance of Export Ventures: The Process Through Marketing Capabilities and Competitive Advantages. *Journal of the Academy of Marketing Science*, Vol.39, p. 252-269. St. Petersburg, Florida, USA.
- National Institute of Statistics in Rwanda (2011): EICV3 Thematic Report – Environment and Natural Resources. *National Institute of Statistics in Rwanda*. Kigali, Rwanda.
- National Institute of Statistics in Rwanda (2014): EICV4 Thematic Report – Environment and Natural Resources. *National Institute of Statistics in Rwanda*. Kigali, Rwanda.
- Newbury, C. (1988): The Cohesion of Oppression: clientship and ethnicity in Rwanda, 1860-1960. *Columbia University Press*. New York, New York, USA.
- Nowak, W. (2014): The Evolution of Development Assistance. *Journal of US-China Public Administration*. May, 2014, Volume 11. Ipswich, Massachusetts, USA.

- Osunkunle, A. & Ogwuche Audu, H. (2014): *Harnessing Local Building Materials in Building Construction for Sustainable Development in the 21<sup>st</sup> Century*. School of Environmental Technology. Federal Polytechnic. Bauchi, Nigeria.
- Parsons, I. (2014): Friendly Brick. *Elements Magazine*. Washington State University Tri-Cities. June 2014. Richland, Washington, USA.
- Peck, W. (2013): *The Material World of Ancient Egypt*. Cambridge University Press. Cambridge, United Kingdom.
- Pietrobelli, C. & Rabellotti, R. (2004): *Upgrading in Clusters and Value Chains in Latin America*. Inter-American Development Bank. Washington D.C., USA.
- Porter, M. E. (1980): *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press. New York, New York, USA.
- Porter, M. E. (1990): *The Competitive Advantage of Nations*. Free Press. New York, New York, USA.
- Porter, M. E. (1998): *Clusters and the New Economics of Competition*. Harvard Business Review. Volume 6. 1998. Cambridge, Massachusetts, USA.
- Porter, M. E. (1998b): *Clusters and competition, New Agendas for Companies, Governments, and Institutions*. Harvard Business School Press. Cambridge, Massachusetts, USA
- Porter, M. E. (2000a): *Location, competition, and economic development: local clusters in a global economy*. Economic Development Quarterly. 14, pp. 15–35. Cleveland, Ohio, USA.
- Porter, M. E. (2007): *Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition*. Harvard Business School. ISC White Paper November 2007. Cambridge, Massachusetts, USA.
- Porter, M. E. (2015): *US-EU Workshop, Cluster Mapping and Cluster-Based Economic Development*. Harvard Business School. 17<sup>th</sup> November 2015. Cambridge, Massachusetts, USA.
- Porter, M. E, Argyres, N. & McGahan, A. M. (2002): *An Interview with Michael Porter*. Academy of Management. Vol. 16, May, 2002. Briarcliff Manor, New York, USA.
- Porter, M. E. & Caves, R. (1977): *From Entry Barriers to Mobility Barriers: Conjectural Decisions and Contrived Deterrence to New Competition*. Quarterly Journal of Economics. Harvard University. Cambridge, Massachusetts, USA.
- Prunier, G. (1995): *The Rwanda Crisis, 1959–1994: History of a Genocide*. C. Hurst & Co. Publishers. London, United Kingdom.
- Republic of Burundi (2015): *Intended Nationally Determined Contribution (Indc) / Burundi*. September 2015. Republic of Burundi.
- Rice. M. (1999): *Who's Who in Ancient Egypt*. Routledge. London, United Kingdom.

- Roaf, M. (1995): Palaces and temples in Ancient Mesopotamia. *Civilizations of the Ancient Near East*. Vol. I: p. 423-441. New York, USA.
- Rocatelli, C. (1925): Renaissance and Baroque. Brickwork in Italy. A brief review from ancient to modern times. Chicago, USA.
- Sauvage, M. (1998): La brique et sa mise en œuvre en Mésopotamie, des origines à l'époque achéménide. *Éditions recherche sur les civilisations*. Paris. France.
- Skat Consulting (2016): Project Document. *Skat Consulting*. March 2016. St. Gallen, Switzerland.
- Skat Consulting Rwanda (2015): Forest Area in Rwanda. *Geography department, Skat Consulting Rwanda*. Kigali, Rwanda.
- Smith, E. (1981): Adobe brick production in Mexico. *New Mexico Geology*. Volume 3. May 1981. Socorro, New Mexico, USA.
- Tiemessen, A. (2004): After Arusha: Gacaca Justice in Post-Genocide Rwanda. *African Studies Quarterly at University of Florida*. Volume 8. Gainesville, Florida, USA.
- United Nations Department of Economic and Social Affairs (2015): World Population Prospects: The 2015 Revision Population Division, *United Nations Department of Economic and Social Affairs*. July, 2015, New York, New York, USA
- United Nations Department of Economic and Social Affairs (2016): National information on South Africa - Agriculture and Rural Development. *United Nations Department of Economic and Social Affairs*. New York, New York, USA.
- United Nations Development Programme (2015): Human Development Report 2015: Rwanda. *United Nations Development Programme*. New York, New York, USA.
- United Nations Industrial Development Organisation (2002) Industrial Development Report 2002-03. *United Nations Industrial Development Organisation*. Vienna, Austria.
- Wignaraja, G. (2002): Creating Value: From Comparative to Competitive Advantage. *Maxwell Stamp PLC*. London, United Kingdom.

## Internet References

- Bizimungu, J. & Kyanga, S. (2016): Rwanda Home Expo set for next week. *New Times Rwanda*. Retrieved on 14 December 2016 from: <http://www.newtimes.co.rw/section/article/2016-11-22/205586/>
- Bock, H. (2016): 3 Ways to Create an Ownership Mentality Within Your Team. Retrieved on 12 November 2016 from: <https://www.themuse.com/advice/3-ways-to-create-an-ownership-mentality-within-your-team>
- Caporali, M. (2013): The Colosseum: a complete tour. *Italy travels*. Retrieved on 11 June 2016 from: <http://www.ticketsflorence.com/en/contact-us>
- Central Intelligence Agency (2016): The World Factbook, Area. *Central Intelligence Agency*. Retrieved on 06 June 2016 from: <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2147rank.html>
- Central Intelligence Agency (2016b): The World Factbook, Age structure. *Central Intelligence Agency*. Retrieved on 06 June 2016 from: <https://www.cia.gov/library/publications/the-world-factbook/fields/2010.html>
- Clixado Marketing (2016): Geschichte des Lehms. *Clixado Marketing Vienna*. Retrieved on 12 December 2016 from: <http://www.lehmhaus.net/lehm-geschichte.html>
- Construction Review Online (2016): Construction sector in Rwanda booms as demand for housing surges. *Construction Review Online*. Retrieved on 05 October 2016 from: <http://constructionreviewonline.com/2016/02/32858/>
- Davis, A. (2016): A History of Brick-Making. Home Advisor. Retrieved on 18 May 2016 from: <http://www.homeadvisor.com/article.show.A-History-of-Brick-Making.17364.html>
- Devex (2016): Top Devex Quotables of 2012. *Devex - The media platform for the global development community*. Retrieved on 20 November 2016 from: <https://www.devex.com/news/top-devex-quotables-of-2012-79987>
- Edwards, S. (2014): Economic development and the effectiveness of foreign aid: A historical perspective. *Centre for Economic Policy Research*. Retrieved on 11 October 2016 from: <http://voxeu.org/article/development-and-foreign-aid-historical-perspective>
- Ehrenfeld, D. (2004): Foreign Aid Effectiveness, Political Rights and Bilateral Distribution. *The Journal of Humanitarian Assistance*. Tufts University. Medford, Massachusetts, USA. Retrieved on 11 October 2016 from: <https://sites.tufts.edu/jha/archives/75>

- Gahigi, M. (2016): Imports edge out Rwandan made building materials. *The East Africa*. Retrieved on 01 October 2016 from: <http://www.theeastafrican.co.ke/Rwanda/Business/Imports-edge-out-Rwandan-made-building-materials--/1433224-3182266-1b3dmsz/index.html>
- Geoghegan, T. (2010): The untold story of the Great Fire of London. *BBC News Magazine*. Retrieved on 24 May 2016 from: <http://news.bbc.co.uk/2/hi/8772583.stm>
- Hanna, J. (2010): The Hard Work of Measuring Social Impact. *Harvard Business School Alumni Bulletin*. 14 June 2010. Retrieved on 30 August 2016 from: <http://hbswk.hbs.edu/item/the-hard-work-of-measuring-social-impact>
- Harvard Business School (2016): U.S. Cluster Mapping Project: Metalworking Technology. *Institute for Strategy and Competitiveness, Harvard Business School*. Retrieved on 22 December 2016 from: [https://www.clustermapping.us/cluster/metalworking\\_technology/subclusters](https://www.clustermapping.us/cluster/metalworking_technology/subclusters)
- Haub, C. (2012): Fact Sheet: World Population Trends 2012. *Population Reference Bureau*. Retrieved on 01 October 2016 from: <http://www.prb.org/publications/Datasheets/2012/world-population-data-sheet/fact-sheet-world-population.aspx>
- Holodny, E. (2015): The 13 fastest-growing economies in the world. *The World Economic Forum*. Retrieved on 03 June 2016 from: <https://www.weforum.org/agenda/2015/06/the-13-fastest-growing-economies-in-the-world/>
- Hutt, R. (2016): 5 things to know about Rwanda's economy. *World Economic Forum*. Retrieved on 02 October 2016 from: <https://www.weforum.org/agenda/2016/04/5-things-to-know-about-rwanda-s-economy/>
- Investopia (2016): Porter Diamond. *Investopia - IAC Publishing*. Retrieved on 03 November 2016 from: <http://www.investopedia.com/terms/p/porter-diamond.asp>
- Khan Academy (2016): A natural oasis. *Khan Academy*. Retrieved on 17 August 2016 from: <https://www.khanacademy.org/humanities/prehistoric-art/neolithic-art/a/jericho>
- Le Hou rou, P. (2017): How creating new markets can change the future of development finance. *World Economic Forum*. Retrieved on 13 January 2017 from: <https://www.weforum.org/agenda/2017/01/how-creating-new-markets-can-change-the-future-of-development-finance/>
- McGreal, C. (2008): Rwanda to switch from French to English in schools. *The Guardian*. Retrieved on 08 June 2016 from: <http://www.theguardian.com/world/2008/oct/14/rwanda-france>
- Munyaneza, E. (2011): Rwanda to achieve 30% forest cover by 2020. *New Times Rwanda*. Retrieved on 30 September 2016 from: <http://www.newtimes.co.rw/section/article/2011-11-07/36560/>

- Ngarambe, A. (2015): High construction imports but investors still needed in Rwanda. *The East African*. Retrieved on 01 October 2016 from: <http://www.theestafrican.co.ke/Rwanda/Business/High-construction-imports-but-investors-still-needed-in-Rwanda/-/1433224/2850114/-/2uxen6/-/index.html>
- Nsengimana, T. (2014): 30 million trees to be planted. *New Times Rwanda*. Retrieved on 30 September 2016 from: <http://www.newtimes.co.rw/section/article/2014-11-19/183203/>
- Philips, K. (2013): The history of foreign aid. *Australian Broadcasting Corporation*. Retrieved on 11 October 2016 from: <http://www.abc.net.au/radionational/programs/rearvision/the-history-of-foreign-aid/5162100>
- Piller, T. (2012): Das Kolosseum wird renoviert. *Frankfurter Allgemeine Zeitung*. Retrieved on 17 June 2016 from: <http://www.faz.net/aktuell/gesellschaft/rom-das-kolosseum-wird-renoviert-11839371.html>
- Porter, M. E. (1979): How Competitive Forces Shape Strategy. *Harvard Business Review*. Retrieved on 11 December 2016 from: <https://hbr.org/1979/03/how-competitive-forces-shape-strategy>
- Porter, M. E. (2016): What Are Clusters?. *Harvard Business School. Institute for Strategy & Competitiveness*. Retrieved on 22 November 2016 from: <http://www.isc.hbs.edu/competitiveness-economic-development/frameworks-and-key-concepts/pages/clusters.aspx>
- Powell, C. (2002): Making Sustainable Development Work: Governance, Finance, and Public-Private Cooperation. *US Department of State*. Retrieved on 23 October 2016 from: <https://2001-2009.state.gov/secretary/former/powell/remarks/2002/11822.htm>
- Ruliba (2016): About us. *Ruliba Clays Ltd*. Retrieved on 19 June 2016 from: <http://www.ruliba.com/index.php/about-us/about-us>
- Santa Fe Community Foundation (2016): Santa Fe Birth to Career Collaboration (SF B2C). *Santa Fe Community Foundation*. Retrieved on 11 December 2016 from: <https://www.santafecf.org/birth-to-career>
- Schwab Foundation for Social Entrepreneurship (2015): About Us. *Schwab Foundation for Social Entrepreneurship*. Retrieved on 12 October 2016 from: <http://www.schwabfound.org/content/about-us-0>
- Sedge, T. (2014): How do you Create Ownership?. *Ambitious Manager*. Retrieved on 12 November 2016 from: <http://www.ambitiousmanager.com/create-ownership/>
- Skat Consulting (2016b): About Skat. *Skat Consulting*. Retrieved on 14 November 2016 from: <http://www.skat.ch/about/prarticle.2005-09-20.2320653418/prarticle.2005-09-26.7020013018>

- Skat Consulting (2016c): The PROECCO Programme. *Skat Consulting*. Retrieved on 22 July 2016 from: <http://www.skat.ch/regional-offices/great-lakes/prarticle.2013-04-04.9077224044>
- Tanner, W. (2016): How to Help Employees Take Ownership Over Their Work. *SoapBox Innovations*. Retrieved on 21 November 2016 from: <https://soapboxhq.com/contact/>
- United Nations (2017): Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all. *United Nations Sustainable Development Goals*. Retrieved on 04 January 2017 from: <http://www.un.org/sustainabledevelopment/economic-growth/>
- United Nations Secretariat (2016): Rwanda is assigned to Germany as part of German East Africa. *United Nations Secretariat*. Retrieved on 23 September 2016 from: <http://www.un.org/en/preventgenocide/rwanda/timeline.shtml>
- United Nations Secretariat (2016b): Outreach Programme on the Rwanda Genocide and the United Nations. *United Nations Secretariat*. New York, New York, USA.
- University College London (2016): Brick. *University College London*. Retrieved on 24 May 2016 from: <https://www.ucl.ac.uk/earth-sciences/impact/geology/london/ucl/materials/brick>
- USAID (2016): Facilitation. *United States Agency for International Development*. Retrieved on 21 November 2016 from: <https://www.microlinks.org/good-practice-center/value-chain-wiki/facilitation>
- World Bank (2016): Population growth. *The World Bank*. Retrieved on 30 September 2016 from: <http://data.worldbank.org/indicator/SP.POP.GROW>
- World Bank (2016b): Population, total. *The World Bank*. Retrieved on 03 June 2016 from: <http://data.worldbank.org/indicator/SP.POP.TOTL>
- World Bank (2016c): GDP at market prices. *The World Bank*. Retrieved on 03 June 2016 from: <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>

## Declaration of Authorship and Academic Honesty

“I hereby declare that I have written this thesis without any help from others and without the use of documents and aids other than those stated in the references, that I have mentioned all the sources used and that I have cited them correctly according to established academic citation rules, that the topic or parts of it are not already the object of any work or examination of another course unless this explicitly stated, that I am aware that my work can be electronically checked for plagiarism and that I hereby grant the University of St.Gallen copyright as far as this is required for this administrative action.”

Surname: Markert

Name: Silas

Student number: 14-616-346

Course of study: Master of Arts (HSG) in International Affairs and Governance

---

Place and date of the issue

---

Signature, Silas Markert



## Declaration of Discretion

The Undersigned

hereby undertakes and warrants to treat any information obtained by the Skat Consulting Ltd. concerned in strict confidence. In particular, he shall only permit people other than the referees to inspect his written work with the express consent of all the parties that have provided information.

The Undersigned hereby takes cognizance of the fact that the University of St.Gallen may check his work for any plagiarism with the help of a plagiarism software and that the undersigned shall have to notify Skat Consulting Ltd. surveyed accordingly.

Surname: Markert

Name: Silas

Student number: 14-616-346

Course of study: Master of Arts (HSG) in International Affairs and Governance

---

Place and date of the issue

---

Signature, Silas Markert