



**SMALL-SCALE SUSTAINABLE VEGETABLE-TANNED LEATHER IN RURAL  
SOUTH AFRICA: A COLLECTIVE-EFFICIENCY APPROACH**

**By**

**KENEILWE MUNYAI**

**Thesis submitted in fulfilment of the requirements for the degree:**

**Doctor of Technology: DESIGN**

**In the Faculty of Informatics and Design**

**At the Cape Peninsula University of Technology**

**Supervisor: Prof. Mugendi K. M'Rithaa**

**Co-supervisor: Prof. Sepota M. Moloko**

**Co-supervisor: Dr Pineteh E. Angu**

**Cape Town**

(November 2014)

## DECLARATION

I, Keneilwe Munyai, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

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**Signed**

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**Date**

## **DEDICATION**

This thesis is dedicated to all those who supported and believed in me and my abilities: My late grandmother for believing in me and giving tough love, and late Prof Pieter van Brackel for his wisdom, for being my inspiration, for the support and for being a good friend.

## ACKNOWLEDGEMENTS

There are many people that I would like to acknowledge for the role they played in supporting me in working towards reaching this goal in my life. First, I would like to acknowledge my supervisors for their guidance throughout this research journey. Your guidance and support has helped me complete this research. Prof. Mugendi K. M'Rithaa, you have been a source of support, a mentor and a motivator. Without your guidance this study would have never been possible. Prof Sepota, M. Moloko, thank you for dedicating your time reading through my work and giving guidance. Dr Angu, E. Pineteh, thank you for the guidance and the support that you have given me from the beginning of this study to its completion.

Secondly, I am grateful to Prof. Guiliana. Gemelli for the support during my stay in Italy; to Prof. Andrea Bassi for introducing me to the cooperatives in Italy, and supporting me to make my stay worthwhile. Prof. Maria, G. Muzzarrelli in the department of history of fashion for her support and guidance.

I would also like to acknowledge my Cape Town family for their unwavering support, Danielle Raubenheimer and Nathaniel Raubenheimer. Without the two of you many things in my life would have never been possible. Gabrielle Rademeyer, you have been a wonderful sister, Greg Rademeyer, thank you for your support and lifting my spirits up when I was feeling down and frustrated. Lindy Lloyd thank you so much for supporting me through out my ups and downs.

I also want to thank my friends for their support and dedicating their time to listen to me when I was frustrated and needed an outlet. Thank you to my colleagues for the support during the last stretch of writing my thesis. Thank you to Dr T. Tselepis for being a critical friend, and for all the support and understanding.

Finally, I would like to acknowledge the support of the South African taxpayers whose funding through the National Research Foundation (NRF) made it possible for me to further my studies. I would also like to acknowledge the support of the European taxpayers through the European South Africa Development (EUROSA) Initiative which made it possible for me to conduct research in Europe.



## ABSTRACT

Currently, the South African leather tanning industry is dominated by chromium tanning which has been identified as highly polluting. Vegetable tanning is considered less environmentally hazardous. Yet, there have been no plans to promote it in South Africa. Vegetable tanning process utilises vegetable matter for converting animal skins or hides into pliable material that is known as leather. South Africa has a variety of plants that produce tannins. However, the focus of this study is on the *mimosa* locally known as black wattle (*Arcacia miernsii*). Furthermore, the South African vegetable tanning sector has been left behind in terms of research and development despite the country being endowed with the Mimosa plant that is widely used in the vegetable tanning process. The country is also endowed with surplus labour which can be absorbed by the leather industry which is labour intensive.

This study therefore, looks at the concept of small-scale sustainable leather tanning in rural areas through distributed production based on the concept of decentralisation. Decentralised production processes generally forms clusters of independent servers in close proximity to one another that are interconnected through a dedicated network to work as one. Through a strong culture of networks and collective-efficiency the small-scale vegetable tanners in Italy are able to adapt to changes through cooperating and collective problem solving. The collective-efficiency approach encourages small-scale productions systems that socially embedded and tap into the local resources, skills and local knowledge. Local knowledge is very critical for the development agenda, especially in the context of South Africa where other forms of knowledge have always been marginalised in terms of importance. Moreover, supportive policies to the development and sustainability of small and medium enterprises (SMEs) have created an enabling environment in Italy.

The vegetable tanning process requires skilled craftsmen and no formal training or education. The aspect of education is very important since there is a growing demand for vegetable-tanned leather goods due to consumers becoming aware of the impact certain production processes have on the environment and humans.

Furthermore, the South African government introduced the National Development Plan (NDP), Industrial Policy Action Plan (IPAP) and the National Growth Path (NGP) which are policy frameworks that are meant to drive the economic development in South Africa. However, the

main focus of this study is the IPAP policy framework. This policy framework puts job creation at the centre, and have identified SMEs in South Africa as key to job creation. Leather tanning is a labour intensive process with the ability to create employment opportunities through its value chain.

This research investigated best practices in Italy a country which has a long-standing tradition of small-scale vegetable tanning, and Botswana, which has an artisan vegetable tanning activities. The project was grounded in qualitative methodology, and a constructivist-interpretivist approach was used as the research design. The data was collected using structured and semi-structured interviews and observations. The research used people who are involved in leather tanning as well as government officials in both Italy and Botswana as participants. No participants were interviewed in South Africa due to the chromium-tanning sector being the mainly used process of leather tanning. The vegetable tanning methods in the two countries provided rich insights into the practice of vegetable tanning and its links to local knowledge and cultural practices. Activity theory was used as lens to analyse the process of vegetable tanning and the tools used, rules that govern the processes, the community as well as the objectives of the participants.

This study provides insights into the manufacturing system that is required in order to achieve sustainable production, the role industry should play to contribute towards economic development, the role government and academia should play in support the development of SMEs in the local industries.

## KEYWORDS

- ❖ Botswana
- ❖ Clusters
- ❖ Collective-Efficiency
- ❖ Cultural Historical Activity Theory
- ❖ Decentralised Production
- ❖ Design for Sustainability
- ❖ Development
- ❖ Indigenous Knowledge Systems
- ❖ Italy
- ❖ Knowledge-based Economic Development
- ❖ Leather Tanning
- ❖ Local Knowledge
- ❖ Rural Development
- ❖ Small-scale Production
- ❖ South Africa
- ❖ Sustainable Development
- ❖ Tacit Knowledge
- ❖ Vegetable Tanning

## ABBREVIATIONS

ARPAT	Agenzia Regionale per la Protezione Ambientale della Toscana
COTANCE	Confederation of National Association of Tanners and Dressers of the European Community
CERT	Comitato Etico Regionale Toscana
DAC	Department of Arts and Culture, South Africa
DAFF	Department of Agriculture Forestry and Fisheries
DCCS	Duty Credit Certificate Scheme
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DBSA	Development Bank of Southern Africa
DST	Department of Science and Technology
DTI	Department of Trade and Industry South Africa
EC	European Commission
ECDSD	Eastern Cape Department of Social Development
ECLI	European Confederation of the Leather Industry
EENPACT	Enterprise European Network Paper Chemical and Textile sector
EPA	Environmental Protection Agency
EU	European Union
ERICSE	European Research Institute on Cooperatives and Social Enterprise
FAO	Food and Agriculture Organisation of the United Nations

FAPDA	Food and Agriculture Policy Decision Analysis
FES	Friedrich Ebert Stiftung
GEP	Gauteng Enterprise Propeller
ICDA	International Chromium Development Association
ICT	International Council of Tanners
IDI	Imani Development International Ltd
IPAP	Industrial Policy Action Plan
ITC	International Trade Centre
KEI	Knowledge Economy Index (World Bank)
LLPI	Leather and Leather Products Institute (LLPI)
MESPRD	Ministry of the Environment, Spatial Planning and Regional Development
OECD	Organization of Economic Cooperation and Development
NCR	National Credit Regulator
NESTA	National Endowment for Science, Technology and the Arts
SA8000	Social Accountability International Standards
NPC	National Planning Commission
SACU	South African Customs Union
SADC SAFLEC	Southern African Development Community South African Footwear and Leather, Exports Council
SEDA	Small Enterprise Development Agency
SMEs	Small and Medium Enterprises
STATS SA	Statistics South Africa
SARB	South African Reserve Bank
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation
WHO	World Health Organisation
WTO	World Trade Organisation
WB	World Bank

## Terms/Acronyms

## Definition/Explanations

AGOA	<p><i>Africa's Growth and Opportunity Act</i> was passed as part of the Trade and Development Act 2000. It provides duty free access to the USA market for almost all products exported from more than 40 eligible sub-Saharan African (SSA) countries (DAFF, 2009).</p>
CE	<p><i>Collective-Efficiency</i> refers to joint actions or cooperative effects which bring together the active incidental and consciously pursued effects of clustering (Schmitz, 1997).</p>
CHAT	<p>Historically evolving collective activity system that is used to see network relations to other activity systems. It is taken as a prime unit of analysis against which scripted strings of goal directed action and automatic operation are interpreted (Engeström <i>et.al.</i>, 1990; Engeström, 2000).</p>
COP 17 COMP7	<p><i>Conference of the Parties</i> to the Kyoto Protocol which also adopts decisions, resolutions and meets annually (UNCCC, 2011).</p>
<i>Conceria</i>	<p>Tannery is a place where the conversion of animal hide/skins takes place.</p>
DBSA	<p><i>Development Bank of Southern Africa</i> is a development finance institution in South and Southern Africa; its purpose is to accelerate sustainable socio-economic development by funding physical, social and economic infrastructure to improve the quality of life.</p>
DfS	<p>Design for sustainability infuses methodologies of social practices into design to educate and advocate through sustainable practices. It goes beyond simply green product and attempts to meet consumer needs in a more holistic way (Manzini, Hong, Nguyen, Crul, 2009).</p>

DST	<i>Department of Science and Technology South Africa</i> coordinates national systems of innovation that will bring maximum human capital, sustainable economic growth and improved quality of life.
IK	<i>Indigenous Knowledge (IK)</i> is a cumulative body of knowledge and beliefs handed down generation by cultural transmission. It is about the relationship of living beings with one another and with their environment (Gadgil, Berkes, & Folke, 1993). IK is synonymous with <i>local knowledge (LK)</i> that exists within and developed around the specific conditions of people to particular geographic areas. <i>Tacit Knowledge (TK)</i> is knowledge that is embodied in people and their social networks (Grenier, 1998; Hovarth, 2000; Berkes, 2004).
IKS	<i>Indigenous Knowledge Systems</i> is the cumulative and complex (systems) of know-how, practices and representations that are maintained and developed by peoples with extended histories of interactions with the natural environment. They are part of complex systems that include language, attachment to place, spirituality and world view (UNESCO, 2002).
IPAP	<i>Implementation Program Action Plan</i> – ensures successful execution and completion of strategies and transforms the strategies into a documented program management tool (DTI, 2012).
ISI	Imports substitution industrialisation is a trade policy and economic policy that advocates that countries should try and reduce foreign dependency (Jekede, 2012).
IPP	<i>Industrial Policy Plan</i> is an easy-to-do action to generate a structurally new path of industrialisation (DTI, 2010).
KBE	<i>Knowledge-based Economy</i> is a term used to describe trends in advanced economy towards greater dependence on knowledge, information and high skill (TEDC, 2012).



MIDP	Motor Industry Development Program, South Africa was implemented with effect from 1 <sup>st</sup> September, 1995 to reshape the future direction of the automotive and associated industries. The MIDP expires in 2012 (Cokyane, 2012).
RD	<i>Rural Development</i> is about enabling rural people to take control of their destiny thereby dealing effectively with rural poverty through optimal use and management of natural resources.
Rural	A sparsely-populated area in which people depend on natural resources for survival. The place is usually made of small villages and towns scattered across the area.
SACU	<i>South African Customs Union</i> is an agreement between South Africa, Botswana, Lesotho, Namibia and Swaziland to provide a common external tariff to the common custom area. South Africa is the custodian on all customs and excise collected are paid into South Africa national Revenue Fund, and divided among members according to a revenue-sharing formula (DCI, 2012).
SD	<i>Sustainable Design</i> is a strategy to reduce the environmental impact associated with production processes (Clark, Hong, Nguyen & Crul, 2009).
SD	Sustainable Development is development that meets the present needs without compromising the ability of future generations to meet their own need (WCED, 1987).
UBUNTU	The analysis of literature indicates that Ubuntu is African humanism, a philosophy, an ethic or world view (Gade, 2011).  Ubuntu has many definitions Archbishop Tutu defines it as the essence of being human and that it is part of a gift that Africa will give to the world (Halley, 2008).

UNESCO

United Nations Educational, Scientific and Cultural Organisation.

VT

Vegetable Tanning is the process of treating skins/hides of animals using tannins obtained from bark, wood, and other parts of the plant and trees to produce leather (Jarnagin, 2009).

WCED

World Commission on Environment and Development is currently known as the Brundtland Commission (named after the chairman Gro Harlem Brundtland) whose mission is to united countries to persue sustainable development together (Brundtland Report, 1987).

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>I</b>
<i>DEDICATION</i> .....	<i>II</i>
<i>ACKNOWLEDGEMENTS</i> .....	<i>III</i>
<i>ABSTRACT</i> .....	<i>IV</i>
<i>KEYWORDS</i> .....	<i>VI</i>
<b>ABBREVIATIONS</b> .....	<b>VII</b>
<b>Terms/Acronyms</b> .....	<b>X</b>
<b>Definition/Explanations</b> .....	<b>X</b>
<b>LIST OF TABLES</b> .....	<b>12</b>
<b>CHAPTER ONE</b> .....	<b>13</b>
<i>OVERVIEW OF THE RESEARCH</i> .....	<i>13</i>
1.1 INTRODUCTION.....	13
1.2 IDEA FOR THESIS.....	13
1.3 MOTIVATION FOR CHOOSING THE STUDY.....	15
1.4 AIMS AND OBJECTIVES.....	18
1.5 PURPOSE OF THE STUDY.....	19
1.6 THE RESEARCH PROBLEM.....	19
1.7 STATEMENT OF RESEARCH PROBLEM.....	21
1.7.1 RESEARCH PROBLEM.....	21
1.7.2 RESEARCH QUESTION.....	21
<b>1.7.2.1 RESEARCH SUB-QUESTIONS</b> .....	<b>22</b>
1.8 RESEARCH RATIONALE.....	22
1.9 INDICATION OF RESEARCH DESIGN AND METHODOLOGY.....	23
1.10 CONTRIBUTION TO KNOWLEDGE.....	23
1.11 THEORETICAL FRAMEWORK.....	24
1.12 ECONOMIC DEVELOPMENT.....	24
1.12.1 DECENTRALISATION OF PRODUCTION PROCESSES.....	26
1.12.2 SUSTAINABLE DEVELOPMENT.....	26
1.12.3 DESIGN FOR SUSTAINABILITY AND THE KNOWLEDGE-BASED ECONOMY.....	27
1.12.4 INDIGENOUS KNOWLEDGE.....	28
1.13. DELINEATION OF THE RESEARCH.....	29
1.14. THESIS OUTLINE.....	29
1.15 SUMMARY.....	31
<b>CHAPTER TWO</b> .....	<b>32</b>
<i>THE HISTORY OF TANNING AND THE MODERN METHODS</i> .....	<i>32</i>
2.1 INTRODUCTION.....	32
2.2 LEATHER TANNING.....	32
2.2.1 BRIEF HISTORY OF VEGETABLE LEATHER TANNING.....	33

<b>2.2.1.1 ASIA</b> .....	34
<b>2.2.1.2 EUROPE</b> .....	35
2.2.2 SOURCE OF SKINS AND HIDES FOR TANNING .....	37
2.3 CHROMIUM .....	38
2.3.1 GENERAL OVERVIEW OF CHROMIUM TANNING PROCESS .....	38
2.3.2 HEALTH PROBLEMS ASSOCIATED WITH CHROMIUM TANNING .....	41
2.3.3 EFFECTS OF CHROMIUM FROM THE ATMOSPHERIC SYSTEM ON HUMANS .....	41
2.3.4 OVERVIEW OF STRATEGIES EMPLOYED BY EUROPEAN COUNTRIES TO DEAL WITH CHROMIUM WASTE .....	42
2.3.5 A REVIEW OF STRATEGIES TO MANAGE DIFFERENT WASTES FROM THE LEATHER TANNING PROCESS AND THEIR VARYING COMPLEXITY AND AFFORDABILITY .....	43
2.3.6 CHALLENGES OF ENVIRONMENTAL REGULATIONS IN LEATHER PRODUCTION PROCESSES .....	44
2.3.7 BILATERAL AND MULTILATERAL AGREEMENTS CONTRIBUTE TO INEQUALITIES AND SHIFTING OF HIGHLY POLLUTING PRODUCTION PROCESSES TO DEVELOPING COUNTRIES .....	45
2.3.8 STRATEGIES FOR DEALING WITH ENVIRONMENTAL POLLUTION .....	46
2.4 VEGETABLE TANNING IN CONTEXT .....	47
2.4.1 METHODS OF VEGETABLE TANNING .....	49
2.4.2 TRADITIONAL PIT VEGETABLE TANNING PROCESS .....	49
2.4.3 DRUM VEGETABLE TANNING PROCESS FOR LARGE SCALE TANNING .....	52
<b>2.4.3.1 ADVANTAGES OF USING VEGETABLE TANNINS</b> .....	53
<b>2.4.3.2 DISADVANTAGES OF VEGETABLE-TANNED LEATHER</b> .....	54
2.4.4 LINKING VEGETABLE TANNING TO LOCAL KNOWLEDGE .....	55
2.5 LEATHER CONSUMPTION .....	55
2.5.1 CONSUMPTION OF VEGETABLE-TANNED LEATHER .....	56
2.6 LEATHER MANUFACTURING COMPETITORS .....	56
2.7 SUMMARY .....	57
<b>CHAPTER THREE</b> .....	<b>59</b>
<i>SOUTH AFRICAN LEATHER PRODUCTION AND THE POTENTIAL OF THE IPAP's, NGP's     AND THE NDP's STRATEGIES TO PROMOTE THE ESTABLISHMENT OF SMEs</i> .....	59
3.1 INTRODUCTION .....	59
3.2 THE HISTORY OF THE SOUTH AFRICAN LEATHER TANNING INDUSTRY .....	59
3.3 THE HISTORICAL CHALLENGES FACED BY THE INDUSTRY .....	60
3.4 THE CURRENT SITUATION .....	61
3.4.1 TRADE SYSTEM OF RAW HIDES/SKINS AND PROCESSED LEATHER IN SOUTH AFRICA .....	64
3.5 THE LEATHER SYSTEM VALUE CHAIN .....	65
3.5.1 RELIABLE SUPPLY OF HIDES AND SKINS .....	65
3.6 MANAGEMENT OF CHROMIUM WASTE FROM TANNERIES .....	67
3.6.1 MANAGING CHROMIUM WASTE IN SOUTH AFRICA .....	68

3.7 THE CHALLENGES OF INDUSTRIALISATION RELATIVE TO DEVELOPMENT OF THE LEATHER INDUSTRY FROM AN EMERGING ECONOMY'S PERSPECTIVE.....	69
3.7.1 REMOVAL OF REGIONAL IMBALANCES .....	71
<b>3.7.1.1 NON-TARIFF BARRIERS</b> .....	75
<b>3.7.1.2 ILLEGAL IMPORTS</b> .....	75
<b>3.7.1.3 HUMAN RESOURCES</b> .....	76
<b>3.7.1.4 THE SOUTH AFRICAN ECONOMIC ENVIRONMENT</b> .....	76
<b>3.7.1.5 TECHNOLOGICAL ENVIRONMENT</b> .....	77
<b>3.7.1.6 INTERNATIONAL ENVIRONMENT</b> .....	78
<b>3.7.1.7 CURRENCY STRENGTHENING AND VOLATILITY</b> .....	78
<b>3.7.1.8 LIMITED ECONOMIES OF SCALE IN LEATHER</b> .....	79
<b>3.7.1.9 SOUTH AFRICAN INFRASTRUCTURE</b> .....	79
<b>3.7.1.10 AVAILABILITY OF WATER</b> .....	80
<b>3.7.1.11 FINANCIAL AND FISCAL SECTORS</b> .....	81
3.8 DECENTRALISATION OF PRODUCTION IN SOUTH AFRICA.....	81
3.8.1 PROMOTING SMEs AS A STRATEGY TOWARDS DEVELOPMENT .....	84
3.8.2 SOCIAL ENTREPRENEURSHIP TO ADVANCE THE KNOWLEDGE-ECONOMY AGENDA .....	85
<b>3.8.2.1 TYPES OF SOCIAL ENTREPRENEURS</b> .....	86
<b>3.8.2.2 MOTIVATION FOR SOCIAL ENTREPRENEURS TO EMBARK ON THEIR VENTURES</b> .....	86
3.8.3 REGIONAL DEVELOPMENT AS A POSSIBLE MODEL OF DEVELOPMENT FOR THE LEATHER INDUSTRY.....	89
3.8.4 INDUSTRIAL CLUSTERS TO SUPPORT REGIONAL DEVELOPMENT.....	92
3.8.5 CLUSTERS AS CONTRIBUTORS TO INNOVATION.....	93
3.8.6 PROMOTING LABOUR INTENSIVE KNOWLEDGE-BASED INDUSTRIES IN SOUTH AFRICA THROUGH THE IPAP POLICY .....	95
3.7 INTERCONNECTEDNESS OF CITIES TO RURAL AREAS.....	98
3.8 POTENTIAL CONTRIBUTION OF LEATHER PRODUCTION TO THE ECONOMIC DEVELOPMENT STRATEGIES IN SOUTH AFRICA.....	100
3.8.1 PLANTS THAT ARE AVAILABLE IN SOUTH AFRICA FOR VEGETABLE TANNING AND THE EXTRACTION OF TANNINS.....	101
<b>3.8.1.1 MANGROVE</b> .....	105
<b>3.8.1.2 EUCALYPTUS</b> .....	106
<b>3.8.1.3 EUCALYPTUS CAMALDULENSIS</b> .....	107
<b>3.8.1.4 KARRI EUCALYPTUS DIVERSICOLOR</b> .....	108
<b>3.8.1.5 EUCALYPTUS GRANDIS</b> .....	110
<b>3.8.1.6 EUCALYPTUS LEHMANNII</b> .....	111
<b>3.8.1.7 BLACK WATTLE ACACIA MEARNSII OR ACACIA MOLLISSIMA</b> .....	112
3.9 SUMMARY.....	118
<b>CHAPTER FOUR</b> .....	<b>119</b>
<i>COLLECTIVE EFFICIENCY FOR SMALL-SCALE MANUFACTURING SYSTEMS AND RELATED CONCEPTS</i> .....	119
4.1 INTRODUCTION.....	119

4.2 COLLECTIVE EFFICIENCY.....	119
4.2.1 SOCIAL NETWORKS.....	122
4.2.2 THE AFRICAN CONCEPT OF COLLECTIVITY AND RESPONSIBILITY .....	123
4.2.3 THE PHILOSOPHY OF UBUNTU FROM A BUSINESS PERSPECTIVE .....	126
4.3 THE ROLE OF CULTURE IN THE COLLECTIVE ACTION TOWARDS ECONOMIC DEVELOPMENT .....	130
4.3.1 COOPERATIVES: A SOLIDARITY ECONOMY.....	131
4.3.2 LOCAL KNOWLEDGE IN RELATION TO THE COLLECTIVE EFFICIENCY PRODUCTION SYSTEM.....	135
4.3.3 SUSTAINABILITY THROUGH COLLECTIVE EFFICIENCY .....	137
4.4 SUMMARY.....	138
<b>CHAPTER FIVE.....</b>	<b>140</b>
<i>RESEARCH DESIGN AND METHODOLOGY.....</i>	<i>140</i>
5.1 INTRODUCTION.....	140
5.2 INVESTIGATIONAL DESIGN AND SAMPLING TOOLS .....	140
5.2.1 SAMPLING TECHNIQUE .....	141
5.2.2 PHASE ONE OF THE RESEARCH .....	142
5.3 PARTICIPANTS' PROFILE .....	142
<b>5.4 RESEARCH SITE ONE: ITALY .....</b>	<b>143</b>
5.4.1 Location ONE: FLORENCE .....	144
<b>5.4.1.1 Participant 1 .....</b>	<b>145</b>
5.4.2. Location two: Ponte a Egola in SAN MINIATO.....	145
<b>5.4.2.1 Participant 2 .....</b>	<b>146</b>
<b>5.4.2.2 Participant 3 .....</b>	<b>146</b>
5.4.3 Location 3: SANTA CROCE SULL'ARNO.....	147
<b>5.4.3.1 Participant 4 .....</b>	<b>147</b>
<b>5.4.3.2 Participant 5 .....</b>	<b>147</b>
5.4.4 Location 4 VICENZA.....	148
5.5 SITE TWO: BOTSWANA .....	149
<b>5.5.1.3 Participant 3 .....</b>	<b>151</b>
5.5.3 Location three: Kweneng district.....	151
5.5.1.4 Participant 4.....	152
5.5.1.5 Participant 5.....	152
5.5.1.6 Participant 6 .....	152
5.6 DATA COLLECTION.....	152
5.6.1 METHOD OF DATA COLLECTION .....	152
5.7 STRATEGY UTILISED.....	153
<b>5.7.1 STRUCTURED INTERVIEWS .....</b>	<b>154</b>
<b>5.7.2 SEMI-STRUCTURED INTERVIEWS.....</b>	<b>155</b>
<b>5.7.3 OBSERVATIONS .....</b>	<b>155</b>
5.8 DATA ANALYSIS PROCESS.....	155
5.9 THE ROLE OF THE RESEARCHER.....	156
5.10 THEORETICAL PARADIGM .....	156
5.11 ONTOLOGICAL STANDPOINT .....	158

5.12 EPISTEMOLOGICAL STANDPOINT .....	158
5.13 ETHICAL CONSIDERATIONS .....	160
5.13.1 ETHICAL ISSUES RELATED TO THE INFORMANTS .....	160
5.13.2 ETHICAL ISSUES RELATED TO THE RESEARCHER .....	160
5.14 ANALYSIS STRATEGY .....	161
5.14.1 CULTURAL HISTORICAL ACTIVITY THEORY .....	161
5.14.2 ACTIVITY THEORY IN CONTEXT .....	162
5.15 CODING FRAMEWORK .....	164
5.17 CODING VERBAL AND TEXTUAL DATA .....	172
5.18 SUMMARY .....	173
<b>CHAPTER SIX.....</b>	<b>174</b>
<i>DATA ANALYSIS AND INTERPRETATIONS.....</i>	<i>174</i>
SITE ONE .....	174
6.1. INTRODUCTION.....	174
6.2 THE ROLE OF LOCAL KNOWLEDGE IN THE DEVELOPMENT OF VEGETABLE TANNING.....	174
6.2.1 KNOWLEDGE TRANSFER WITHIN THE FAMILY.....	175
6.2.2 GENDER PARTICIPATION IN THE LEATHER TANNING INDUSTRY .....	176
6.4 THE REQUIRED SKILLS FOR VEGETABLE TANNING.....	177
6.5 MOTIVATION FOR USING VEGETABLE TANNING .....	178
6.6 KNOWLEDGE TRANSFER WITHIN FAMILIES .....	179
6.7 IMPORTANCE OF GOOD REPUTATION IN A HIGHLY-COMPETITIVE ENVIRONMENT .....	180
6.8 FAMILY CULTURE AND ITS CONTRIBUTION TO STRONG SOCIAL CAPITAL .....	181
6.9 MANAGEMENT OF FAMILY OWNED-BUSINESSES.....	182
6.9.1 FAMILY RELATIONS .....	183
6.10 LONG STANDING TRADITION OF TANNING.....	183
6.11 VEGETABLE TANNING CONSORTIUM.....	184
6.12 VEGETABLE TANNING LOCAL NETWORKS .....	185
6.13 COMPANY SIZE .....	186
6.14 CULTURE OF SHARING .....	187
6.15 SOCIAL NETWORKS CONTRIBUTE TO THE SUCCESS OF SMEs.....	187
6.16 SME-BASED LEATHER MANUFACTURING SYSTEMS.....	188
6.17 SUPPORT FOR SMALL-SCALE MANUFACTURING SYSTEMS .....	189
6.18 TECHNOLOGICAL INNOVATIONS RELEVANT TO TANNING EQUIPMENT .....	190
6.19 RESILIENCE OF SMESs .....	191
6.20 WASTE MANAGEMENT FOR THE VEGETABLE TANNING INDUSTRY.....	192
6.21 SUMMARY .....	193
<b>CHAPTER SEVEN.....</b>	<b>194</b>
<i>FINDINGS.....</i>	<i>194</i>
<i>VARIOUS FACTORS THAT CONTRIBUTE TO A SUSTAINABLE SYSTEM OF VEGETABLE TANNING IN ITALY AND BOTSWANA .....</i>	<i>194</i>
7.1 INTRODUCTION.....	194

7.2 STRONG FAMILY CULTURE INFLUENCES THE WAY SMALL BUSINESSES ARE RUN .....	194
7.2.1 THE DYNAMICS OF COLLECTIVE NETWORKS .....	195
7.2.2 COLLECTIVE EFFICIENCY AND ITS INFLUENCE ON THE DEVELOPMENT OF POLICIES THAT HELP GROW THE INDUSTRY .....	197
7.2.3 TECHNOLOGICAL INNOVATION IN THE SECTOR .....	197
7.2.4 ACADEMIC INSTITUTION SUPPORT .....	198
7.2.5 SUPPLY OF VEGETABLE TANNINS .....	198
7.3 THE VEGETABLE TANNING PROCESS IN ITALY .....	201
7.3.1 STRICT ENVIRONMENTAL REGULATIONS AND ENFORCEMENT .....	206
7.3.2 TREATMENT OF TANNERY WASTE IN ITALY .....	206
7.3.4 USES FOR VEGETABLE-TANNED LEATHER WASTE .....	208
7.4 LEATHER-DRYING SYSTEM AFTER TANNING .....	210
7.5 DYES USED IN THE LEATHER INDUSTRY .....	212
7.5.1 ANILINE DYES .....	213
7.5.2 ANILINE DYES AND THE ENVIRONMENT .....	214
7.5.3 ANILINE AND ITS EFFECT ON HUMANS .....	214
7.5.4 ACID DYES .....	214
7.6 FINISHING PROCESSES .....	215
7.6.1 FINISHING: LEATHER PRINTING .....	217
7.6.2 FINISHING: HAIR ON DIGITAL PRINTING .....	224
7.6.3 FINISHING: LEATHER PLEATING .....	226
7.6.4 FINISHING: LEATHER WEAVING .....	227
7.6.5 FINISHING: LEATHER EMBOSSING .....	232
7.7 OTHER LEATHER-FINISHING TECHNIQUES .....	234
7.7.1 FINISHING: CUTTING TECHNIQUE .....	235
7.7.2 FINISHING: LASER-CUTTING .....	237
7.7.3 LEATHER FINISHING: EMBROIDERY .....	241
7.8 VARIOUS FACTORS THAT CONTRIBUTE TO A SUSTAINABLE SYSTEM OF VEGETABLE TANNING IN BOTSWANA .....	243
7.8.1 TECHNOLOGICAL INNOVATION .....	243
7.8.2 TANNING EQUIPMENT .....	244
7.8.3 SUPPLY OF VEGETABLE TANNINS .....	246
7.8.4 SUPPLY OF HIDES\SKINS .....	248
7.9 INDIGENOUS TANNING PROCESS .....	248
7.10 INDIGENOUS LEATHER-FINISHING PROCESSES .....	251
7.11 WASTE MANAGEMENT .....	252
7.12 SUMMARY .....	253
<b>CHAPTER EIGHT .....</b>	<b>254</b>
<i>DISCUSSION .....</i>	<i>254</i>
<i>BRINGING TRADITION AND MODERNITY TOGETHER THROUGH LOCAL KNOWLEDGE</i> .....	<i>254</i>
8.1 INTRODUCTION .....	254
8.2 COLLECTIVE EFFICIENCY .....	254



8.2.1 A VEGETABLE-TANNED LEATHER CONSORTIUM TO PROMOTE COLLECTIVE-EFFICIENCY .....	256
8.3.1 FAMILY CULTURE .....	257
8.3.2 STRONG FAMILY CULTURE AND ITS CONTRIBUTION TO SOCIAL CAPITAL	257
8.3.3 THE CULTURE OF NETWORKS .....	259
8.4.2 COLLECTIVE PROBLEM SOLVING .....	261
8.5 IMPORTANCE OF MAINTAINING GOOD REPUTATION WITHIN THE BUSINESS NETWORK .....	262
8.6 APPLYING LOCAL KNOWLEDGE IN A BUSINESS ENVIRONMENT .....	263
8.7 TRADITION AND PASSION FOR THE PROCESS .....	264
8.8 DECENTRALISED SMALL-SCALE PRODUCTION SYSTEMS IN CONTEXT .....	264
8.9 POLICY SUPPORT FOR LEATHER SMEs .....	267
8.10 VALUE-ADDING CHAIN OF VEGETABLE-TANNED LEATHER PRODUCTION .....	269
8.11 SUPPLY OF TANNINS NETWORK .....	270
8.11.2 THE GROWING DEMAND FOR VEGETABLE-TANNED LEATHER GOODS..	270
8.12 SKILLS REQUIRED FOR VEGETABLE TANNING .....	271
8.13 THE SIGNIFICANCE OF TECHNOLOGICAL INNOVATIONS TO SUPPORT VEGETABLE TANNING AND MEET MARKET DEMANDS .....	271
8.14 DESIGN AS A CATALYST FOR INNOVATION .....	276
8.15 SUMMARY .....	277
<b>CHAPTER NINE .....</b>	<b>278</b>
<i>CONCLUSION</i> .....	278
9.1 INTRODUCTION .....	278
9.2 REVISITING THE PURPOSE OF THE STUDY .....	278
9.3 REVISITING THE AIMS AND OBJECTIVES .....	278
9.4 RESEARCH QUESTIONS .....	279
9.5 CONCLUSIONS DRAWN .....	280
9.6 LIMITATIONS OF THE STUDY .....	281
9.7 CONTRIBUTION TO KNOWLEDGE .....	281
9.7.1 CONTRIBUTION TO PRACTICE .....	281
9.7.2 CONTRIBUTION POLICY .....	283
9.7.3 CONTRIBUTION TO THEORY .....	284
9.8 RECOMMENDATIONS .....	285
9.9 PROPOSED STRATEGIES .....	286
9.10 IMPLICATIONS FOR FURTHER RESEARCH .....	287
<b>REFERENCES .....</b>	<b>288</b>
<b>APPENDIX 1 .....</b>	<b>317</b>
<b>APPENDIX 2 .....</b>	<b>320</b>
<b>APPENDIX 3 .....</b>	<b>322</b>
<b>APPENDIX 4 .....</b>	<b>324</b>

## LIST OF FIGURES

FIGURE 1.1: DIFFERENT TYPES OF KNOWLEDGE .....	17
FIGURE 2.2: SCHEMATIC OF CHROMIUM TANNING .....	39
FIGURE 2.3: CHROMIUM TANNING DRUM .....	40
FIGURE 2.4: SOME PLANTS THAT PRODUCE LARGE QUANTITIES OF VEGETABLE TANNINS AND THEIR CLASSIFICATIONS.....	48
FIGURE 2.5: TRADITIONAL VAT TANNING .....	50
FIGURE 2.6: MODERN TANNING VATS.....	50
FIGURE 2.7: TRADITIONAL WOODEN DRUM FOR VEGETABLE TANNING .....	52
FIGURE 2.8: MODERN WOODEN TANNING, LIMING AND DYEING DRUM WITH LARGER CAPACITY .....	53
FIGURE 3.1: TRADITIONAL BRAIN TANNING BY ZULU MEN.....	60
FIGURE 3.2: THE BREAKDOWN OF LEATHER TANNING ACTIVITIES IN SOUTH AFRICA	62
FIGURE 3.3: BREAKDOWN OF LIVESTOCK IN SOUTH AFRICA.....	63
FIGURE 3.4: TRADING SYSTEM OF RAW HIDES AND SKINS IN SOUTH AFRICA .....	65
FIGURE 3.5: THE BREAKDOWN OF VOLUMES HIDES THAT WERE PRODUCED IN SOUTH AFRICA FROM 1990-2010 .....	66
FIGURE 3.6: MODERN BIOLOGICAL TREATMENT UNIT.....	69
FIGURE 3.7: THE BREAKDOWN OF COUNTRIES THAT MAKE UP THE SADC REGION...	72
3.7.2 BREAKDOWN OF LEATHER PRODUCTION BY COUNTRY SADC COUNTRIES AND THEIR LEATHER PRODUCTION CAPACITY .....	72
FIGURE 3.8: MAP OF WATER LEVEL AROUND WORLD.....	80
FIGURE 3.11: ERKATI DEAF ARTISAN GROUP, MARAKESH, MOROCCO.....	88
FIGURE 3.12: HANDMADE VEGETABLE-TANNED LEATHER BAG .....	88
FIGURE 3.9: THE IPAP AND ITS DIFFERENT KEY FOCUS AREAS FOR DEVELOPMENT .	96
FIGURE 3.10: SOUTH AFRICAN POPULATION AND THE BREAKDOWN OF UNEMPLOYMENT PERCENTAGES STATISTICS.....	97
FIGURE 3.11: QUEBRACHO BARK EXTRACTION OF TANNINS .....	101
FIGURE 3.12: VARIOUS TEXTURES OF THE MIMOSA BARK THAT HAS BEEN EXTRACTED AND GRINDED FOR TANNING.....	102
FIGURE 3.13: THE DISTRIBUTION OF THE BABUL TREE IN SOUTH AFRICA.....	103
FIGURE 3.14: BABUL TREE .....	104
FIGURE 3.15: BABUL LEAVES TREE LEAVES .....	104
FIGURE 3.16: MANGROVE PLANT SWAMPS .....	105
FIGURE 3.17: MANGROVE LEAVES .....	105
FIGURE 3.18: MANGROVE PLANT DISTRIBUTION.....	106
FIGURE 3.19: EUCALYPTUS CAMALDULENSIS TREE.....	107
FIGURE 3.20: EUCALYPTUS CAMALDULENSIS LEAVES .....	108
FIGURE 3.23: EUCALYPTUS GRANDIS TREE .....	110
FIGURE 3.24: EUCALYPTUS GRANDIS LEAVES .....	110
FIGURE 3.25: EUCALYPTUS LEHMANNII TREE .....	111
FIGURE 3.26: EUCALYPTUS LEHMANNII LEAVES .....	111

FIGURE 3.27: BLACK WATTLE TREE <i>ARCACIA MEANSII</i> .....	112
FIGURE 3.28: BLACK WATTLE LEAVES.....	113
FIGURE 3.29: BLACK WATTLE BARK THAT HAS BEEN STRIPPED AND CRUSHED.....	114
FIGURE 3.30: BLACK WATTLE TANNIN POWDER.....	114
FIGURE 3.30: AVAILABILITY OF BLACK WATTLE PLANT ACCORDING TO PROVINCES	115
FIGURE 4.1: VENDA WOMEN WORKING AS A COLLECTIVE TO CARRY OUT HOUSE WORK.....	124
FIGURE 4.2: WOMEN WORKING TOGETHER.....	125
FIGURE 4.3: AFRICAN TREE CONCEPT OF <i>UBUNTU</i> .....	128
FIGURE 4.4: KNOWLEDGE SHARING .....	133
FIGURE 5.1: OVERALL RESEARCH DESIGN .....	141
TABLE 5.1: PARTICIPANTS' PROFILE .....	142
FIGURE 5.2: MAP OF ITALY INDICATING WHERE TUSCANY IS LOCATED.....	143
FIGURE 5.3: BREAKDOWN OF MANUFACTURING ACTIVITIES TAKING PLACE IN TUSCANY REGION OF ITALY .....	144
FIGURE 5.4: MAP OF FLORENCE INDICATING THE LOCATION OF THE LEATHER SCHOOL	
FIGURE 5.5: SAN MINIATO WHICH IS ON THE EASTERN SIDE OF THE RIVER ARNO ...	146
FIGURE 5.6: MAP OF SANTA CROCE ON THE WESTERN SIDE OF THE RIVER ARNO ..	147
FIGURE 5.7: MAP OF BOTSWANA.....	149
FIGURE 5.8: MAP OF MOGODISHANE VILLAGE AND ITS SURROUNDINGS.....	151
FIGURE 5.10: BENCHMARKING METHODOLOGY ADAPTED FROM RAYMOND AND ST- PIERRE .....	154
FIGURE 5.10: BURRELL AND MORGAN'S FOUR SOCIAL PARADIGMS ON ORGANISATION THEORY .....	157
FIGURE 5.11: 8 STEPS USED IN BENCHMARKING METHODOLOGY .....	159
FIGURE 5.12: VYGOTSKY'Z BASIC MEDIATED ACTION TRIANGLE (1978) .....	161
FIGURE 5.13: ACTIVITY THEORY MODEL .....	162
FIGURE 5.14: ACITIVITY THEORY MODEL .....	163
FIGURE 7.2: SOCIAL NETWORK AND ITS RELATED LINKAGES IN THE VEGETABLE TANNING INDUSTRY.....	196
FIGURE 7.4: CENTRE OF THE QUEBRACHO TRUNK WHICH IS WHERE THE TANNIS ARE EXTRACTED .....	199
FIGURE 7.5: QUEBRACHO TANNIN POWDER FROM ARGENTINA.....	200
FIGURE 7.6: <i>MIMOSA</i> TANNIN POWDER FROM SOUTH AFRICA.....	200
FIGURE 7.7 MODERN TANNING VATS SUNKEN TO THE SURFACE WITH A DRYING RACK SUSPENDED ABOVE .....	201
FIGURE 7.8: MODERN VAT SUNKEN ON THE GROUND .....	202
FIGURE 7.9: LEATHER TANNING DRUM IN FRONT AND TANNING VATS AT THE BACK OF THE DRUM.....	203
FIGURE 7.10: DIFFERENT SECTIONS THAT THE HIDE IS DIVIDED INTO BEFORE TANNING.....	204
FIGURE 7.11: LEATHER THAT HAS GONE THROUGH THE TANNING CYCLE .....	205
FIGURE 7.12: FRESHLY TANNED LEATHER .....	205

FIGURE 7.13: LEATHER WASTE MANAGEMENT UNIT .....	207
FIGURE 7.14: WASTEWATER RECEIVER AND METER POLLUTION READING UNIT .....	208
FIGURE 7.15: FLESHINGS STORAGE TANK.....	209
FIGURE 7.16: A DIAGRAM OF VEGETABLE-TANNED LEATHER WASTE .....	209
FIGURE 7.17 LARGE SCALE DRYING RACK .....	210
FIGURE 7.18: LARGE SCALE LEATHER DRYING RACK .....	211
FIGURE 7.19: SMALL-SCALE DRYING RACK.....	211
FIGURE 7.20: LEATHER DRYING MACHINE .....	212
FIGURE 7.21: VEGETABLE-TANNED LEATHER THAT HAS BEEN DYED USING ANILINE DYES .....	213
FIGURE 7.22: PRESSING MACHINE HELPS GIVES TEXTURE ONTO SMOOTH SURFACED LEATHERS.....	216
FIGURE 7.23: IRONING MACHINE TO GET RID OF MOISTURE AND TO GIVE LEATHER THE SHINY EFFECT .....	217
FIGURE 7.24: HAND PAINTED LEATHER.....	218
FIGURE 7.25: COW HIDE PRINTED TO RESEMBLE CROCODILE SKIN.....	219
FIGURE 7.26: LEATHER SURFACE PRINTED.....	220
FIGURE 7.27: UNFINISHED BOOT MADE OUT OF PRINTED LEATHER.....	221
FIGURE 7.28: DIFFERENT SURFACE DESIGNS PRINTED ON LEATHER .....	221
FIGURE 7.29: PRINTED LEATHER USED TO MAKE HIGH-END SHOES .....	222
FIGURE 7.30: EXAMPLES OF LEATHER GOODS MADE OUT OF PRINTED LEATHER ...	223
FIGURE 7.31: PRINTS ON LEATHER .....	224
FIGURE 7.32: HAIR ON COW HIDES PRINTED USING A DIGITAL PRINTER .....	225
FIGURE 7.33: HAIR ON DIGITALLY PRINTED PATTERNS ON A COWHIDE .....	226
FIGURE 7.34: SAMPLE OF PLEATED LEATHER .....	227
FIGURE 7.38: LEATHER STRAP CUTTING MACHINE.....	228
FIGURE 7.39: LEATHER CUTTING MACHINE .....	228
FIGURE 7.40: DIFFERENT TYPES OF WOVEN STRAPS.....	229
FIGURE 7.41: DIFFERENT TYPES OF WOVEN LEATHER STRAPS AND TEXTILE THREADS.....	229
FIGURE 7.43: A WOVEN PIECE OF LEATHER USING LEATHER STRIPS THEN DIGITALLY PRINTED .....	231
FIGURE 7.44: LEATHER SKIRT MADE OUT OF WOVEN LEATHER.....	231
FIGURE 7.45: LOW-TECH LEATHER EMBOSSING AND CUTTING TOOLS .....	232
FIGURE 7.46: LEATHER EMBOSSING AND CUTTING TOOLS.....	233
FIGURE 7.47: METALIC-FOLIO FINISH.....	234
FIGURE 7.48: HAND DECORATED VEGETABLE-TANNED LEATHER WITH A CUTTING AND SCRATCHING EFFECT .....	235
FIGURE 7.49: VEGETABLE-TANNED LEATHER HAND DECORATED BY POKING HOLES .....	236
FIGURE 7.51: LASER CUT LEATHER PATTERN .....	237
FIGURE 7.52: LASER-CUT LEATHER PATTERN.....	238
FIGURE 7.53: LASER-CUT LEATHER WHICH USED TO MAKE HIGH-END FOOTWEAR..	238
FIGURE 7.54: LASER CUT LEATHER FOOTWEAR RANGE BY BALDININI.....	239

FIGURE 7.55: HAIR-ON LEATHER LASER-CUT PATTERN.....	240
FIGURE 7.56: HAIR ON LEATHER LASER-CUT PATTERN AFTER DYEING .....	241
FIGURE 7.57: EMBROIDERED LEATHER FOR HIGH-END FASHION WEAR BY CHRISTOPHER KANE .....	242
FIGURE 7.58: LEATHER ARTISANS DEFLESHING THE HIDE TO GET RID OF EXCESS FLESH AND FAT FROM THE FLOOR.....	243
FIGURE 7.59: FLESHING BOARD USED BY SOME ARTISAN TANNERS IN A DEMARCATED TANNING SPACE.....	244
FIGURE 7.60: GARBAGE BIN USED AS A TANNING DRUM.....	245
FIGURE 7.61: THE SLICKER WITH A WOODEN HANDLE .....	246
FIGURE 7.63: <i>MOSITSANE</i> PLANT .....	247
FIGURE 7.64: AIR DRIED <i>MOSITSANE</i> ROOTS .....	247
FIGURE 7.65: THE LIMING PROCESS TO REMOVE HAIR FROM HIDES/SKINS.....	248
FIGURE 7.66: BRAN AND WATER MIXTURE BEING COVERED TO START THE FERMENTATION PROCESS .....	249
FIGURE 7.67: A SKIN BEING FERMENTED IN A WATER AND BRAN MIX TO DE-LIME IT	250
FIGURE 7.68: SKIN BEING SOAKED IN A WATER AND BRAN MIX AFTER BEING LIMED	250
FIGURE 7.69: KUDU HIDE BEING STIRRED TO ENSURE THAT THE VEGETABLE TANNIN IS MIXED .....	251
FIGURE 7.70: FINISHED VEGETABLE-TANNED LEATHER USED TO MAKE LEATHER GOODS FROM BOTSWANA.....	252
FIGURE 8.1: THE COLLECTIVE FRAMEWORK .....	255
FIGURE 8.2: PELLE CONCIATA AL VEGETALE IN TOSCANA TRADEMARK.....	256
FIGURE 8.3: OVERLAP IN THE SOCIAL, CULTURAL AND ECONOMIC DIMENSIONS WITHIN THE VEGETABLE-TANNING SECTOR .....	260
FIGURE 8.8: THE VEGETABLE TANNING VALUE CHAIN .....	269
FIGURE 8.9: WOODEN LEATHER TANNING DRUM .....	272
FIGURE 8.10: THE TRIANGLE OF SUPPORT FOR SUSTAINABLE LEATHER TANNING ..	273
FIGURE 8.11: OUTCOMES OF AN SME CONSULTATIVE FRAMEWORK. ....	274
FIGURE 8.12: SEMI-AUTOMATED TANNING DRUM .....	275
FIGURE 8.13: SEMI-AUTOMATED DRUM.....	275

## LIST OF TABLES

Table 3.1 Breakdown of leather production by country SADC countries and their leather production capacity .....	73
Table 3.2 Some used for black wattle.....	118
Table 5.1 Participant's profile.....	142
Table 5.2 Data collection schedule.....	156
Table 5.3 coding framework: Italy.....	165
Table 5.4 coding framework: Botswana.....	169

# CHAPTER ONE

## OVERVIEW OF THE RESEARCH

### 1.1 INTRODUCTION

This chapter gives the background of the study, the motivation for the research, as well as the questions that the study seeks to investigate. The research overview gives the focus of the research. The chapter also outlines the expected contribution that this research would like to make in the development of a manufacturing system within the leather industry in order to contribute towards the knowledge-based economic development. Finally an outline of the chapters is given which focuses on the contents of the chapters that are contained within the thesis.

### 1.2 IDEA FOR THESIS

This research was sparked off by a parallel interest in design for sustainability, manufacturing systems design, economic development, environmental sustainability and prior engagement in sustainable leather production processes and social innovation. The initial proposal was to look at collective-efficiency and its contribution to the value addition strategies within the manufacturing processes, and its relation to the concept of sustainable development, which has now become ubiquitous. The study is framed around the view that collective efficiency puts an emphasis on small-scale production systems, which is linked to endogenous growth models in order to achieve the improvement of production processes. Economic development ought to embed local knowledge, and encourage regional development based on the available local resources and skills. Trading policies have played a role in the neglect of local knowledge in the process of all forms of development.

Strategies are needed to come up with working solutions that are context based and will lead to sustainability of the environment, economic development through job creation and social development in rural communities too. The leather tanning industry is one of the labour intensive industries that could contribute to economic development of rural communities. In order for any form of economic, social or environmental development to succeed, society should

form part of the solution and implementing strategy. Currently in South Africa just over 30% the population lives in rural areas, due to people migrating from rural areas to urban areas in search of better opportunities (Prakash & Stigler, 2012). The legacy of apartheid resulted in the exclusion of the majority of the population who lived in rural areas who were left to find resilient context based solutions to their challenges.

Notably, South Africa is endowed with human resources, large quantities of livestock, and the plants that could be used for vegetable-tanning the large quantities of hides and skins that are a by-product of the agricultural industry. The value-adding process of leather tanning has the potential of creating employment opportunities.

In 2007 the South African government introduced an Industrial Policy Action Plan (IPAP) policy framework which is aimed at dealing with some of the pressing socio-economic problems that include poverty, rural development and trying to revive the local leather industry through decentralisation of production (The DTI, 2013). The policy encourages communities to get involved in the development strategy by rural communities in order to enhance their economic opportunities and standards of living. However, the policy is not yet a plan, it is rather a broad vision for the future, as does not specify how the government plans to implement it. It is a promising vision. There needs to be tax revenue for many of the socio-cultural demands to be met, however, it is not possible when majority of young citizens are not economic active. Government needs new strategies that can assist in enabling context-based development to take place driven by local knowledge.

This study proposed to look at small-scale vegetable-tanned leather production through a collective approach and how it can potentially contribute to the current endeavours of the IPAP policy to promote knowledge-based economic development by encouraging social entrepreneurship.

The study focused on the black wattle (*Acacia mearnsii*) which is a widely available resource in South Africa for vegetable tanning. The tree is currently classified under category two, which according to the Conservation of Agricultural Resources Act, 1993 (Act 43 of 1983) (CARA), is a category of Alien Invasive Species (AIS). These are plants with a proven potential of becoming invasive but they have certain beneficial properties that warrant their continued presence in



certain circumstances. The plant is available in almost all provinces of South Africa as will be discussed in chapter three of this thesis.

Interestingly, many studies have been conducted on the plant. However, they mainly focus on the fact that it is an AIS and the department of environmental affairs has been working on finding ways of eliminating the plant (McGarry, Shackleton, Fourie, Gambiza, Shackleton, & Fabricius 2005; Shackleton McGarry, Fourie, Gambiza, Shackleton, & Fabricius, 2006). The plant can be grown in a controlled environment (Bosch & Borus, 2006; Impson, Kleinjan, Hoffmann & Post, 2008). The plant is currently used for vegetable tanning by artisan tanners in Botswana and Europe, the country produces two thirds of the world's vegetable tannins (Koloka & Moreki, 2011). Botswana and Italy are benchmarked in this study for best practice for vegetable-tanned leather production in order to encourage sustainable development in the South African rural areas.

### **1.3 MOTIVATION FOR CHOOSING THE STUDY**

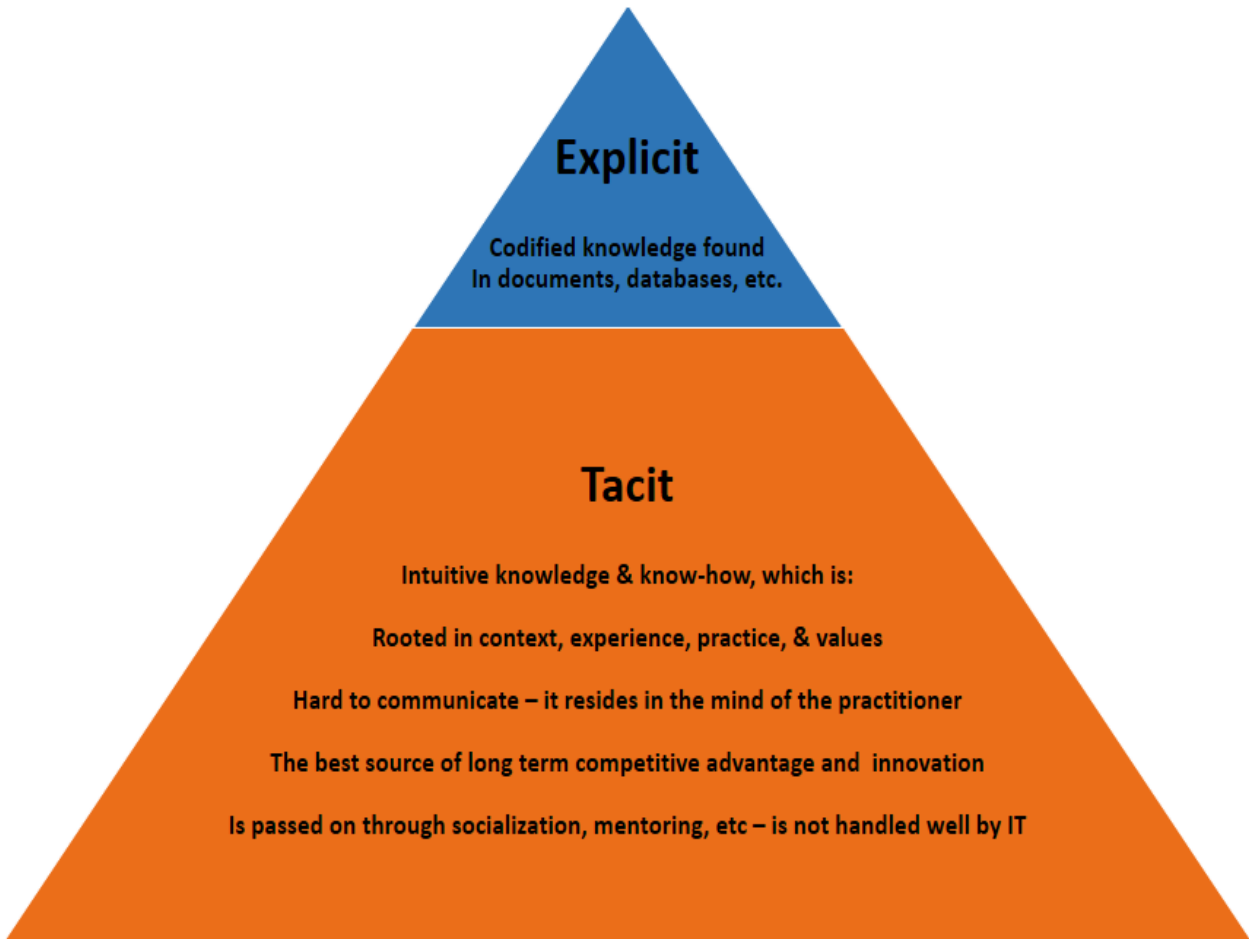
Vegetable tanning is a vocational practice that has been developed over centuries. However, this traditional trade is gradually dying out because of industrialisation and the resultant centralisation of production (Munyai, 2011:3). Vegetable tanning is a labour intensive production process that is not often promoted by governments and the leather industry. Vegetable tanning falls under labour intensive industries with a great potential for growth due to its use of renewable resources (UNIDO, 2003; Munyai & M'Rithaa, 2012). The process of vegetable tanning uses vegetation to prevent putrefaction and to dye leather as a result can be promoted as sustainable (Bosch & Borus, 2006; Jarnagin, 2009; Munyai, 2011:12). The vegetable tanning process is based on skills and techniques that are linked to culture and tradition. Methods, tools, materials and the work environment are often family-based and have been criticised as resulting in low outputs and therefore categorised as informal economic labour activities (Salmi, 2001). However, there is a need for environmental preservation, cultural revival practices, and slower production processes that take into consideration those involved in the process as well as the environment and economic development.

The leather industry is an important aspect of many developing economies; however, the industry needs sustainable production systems design that ensures that it does not continue to

cause environmental hazards, and health hazard in the communities where production takes place.

The IPAP policy framework aims to revive the industry and contribute to a knowledge-based economy. According to Leydesdorff (2010:2) “Knowledge-based economy was first introduced in 1994 by Foray & Lundvall at a workshop on the Organisation of Economic Cooperation and Development (OECD) where Abramowitz and David also introduced the idea of codified knowledge to be made central to analysis as most salient characteristic of recent economic growth”. Becoming reliant upon codified knowledge as basis for development and to conduct economic activities as relevant knowledge base was believed to be key (Frost, 2010). In the context of South Africa, inclusivity will be key to achieving the goal. The country has been through marginalisation of indigenous knowledge which was considered inferior. However, there is a growing realisation that indigenous knowledge and local knowledge has a huge potential to contribute to sustainable economic development.

Furthermore, (Leydesdorff, 2010) argued that post-industrial societies have changed the character of knowledge: to the primacy of theoretical knowledge, and codified knowledge into abstract systems of symbols to illustrate varied areas of experience. However, whatever type of knowledge we might prefer to promote, their foundations are rooted in our tacit knowledge – a concept introduced into philosophy by Micheal Polanyi. Polanyi asserts that “we can know more than we can tell” (Polanyi 1966:4). Tacit knowledge comprises conceptual and sensory information and images that are brought to bear in an attempt to make sense of the world around us, our actions as well as our beliefs (*ibid*). It has also been argued that firms that succeed in effectively managing tacit knowledge which is embedded may enjoy a significant competitive advantage because of the rules, processes, ethics, and conduct that are associated with this kind of knowledge (Frost, 2010). Tacit knowledge continues to play a critical role in effecting individual and organisational competencies and localisation of scientific and technological advances in order to advance the knowledge-base economy (Frost, 2010) (See Figure 1.1).



**Figure 1.1: Different types of knowledge  
(Source: Frost, 2010)**

The pyramid shows much of what we know is rooted in context, in lived experience, practice and values. Indigenous knowledge system is a concept that typically focuses on local knowledge and systems that are used for survival and management of natural resources. The success of the production process of vegetable tanning depends on the skills and knowledge of the local craftsmen. Their knowledge has not been adequately recorded due to favouring of chromium tanning which will be discussed in the next chapter.

The leather tanning industry has a potential to be a major source of employment for many people. The realisation of this potential could bring significant economic gains to South Africa which is grappling with high youth unemployment rate and a manufacturing sector that is shedding jobs (Schmitz 1999; UNIDO, 2003; Munyai & M'Rithaa, 2012). There is a need for strategies to deal with challenges in the manufacturing sector. One of those strategies is home grown social cooperatives in the leather industry which have been receiving attention in recent

years due to their successful and sustainable existence for over 30 years in countries like Brazil, Spain, Italy, Slovenia and many other parts of the world (Desmet, 1999; Schmitz, 1999).

There is a need to revive and improve traditional industries such as vegetable tanning which rely on materials that are locally available and promote cultural heritage. However, this strategy requires commitment from policy makers to promote local knowledge (Creamer, 2012). The National Industrial Policy Framework (NIPF) was adopted in South Africa in 2007 with the long-term objectives to intensify the country's industrialisation process, and move to a knowledge economy while promoting labour-absorbing industrialisation paths with emphasis on tradable goods that catalyse employment creation fits well with this study (DST, 2008; The DTI, 2010:3; DBSA, 2011: 17; UNIDO, 2011; The DTI, 2013).

Viewing the collective-efficiency approach, which is linked to local knowledge, could help us understand the contribution of local knowledge to the development of sustainable small-scale vegetable tanning leather industry, as well as advance the knowledge economy agenda.

#### **1.4 AIMS AND OBJECTIVES**

- To investigate and critically examine the decentralisation of leather production in an industrially developing (or majority world) context.
- To demonstrate the benefits of incorporating local knowledge into methods of production that specifically contribute to the collective-efficiency of small scale leather tanning.
- To investigate the efficacy of indigenous knowledge systems in response to present day challenges.
- To foreground sustainable vegetable tanning within the eco-design discourse.
- To contribute towards informed manufacturing policies with a bias towards sustainable leather production industry.
- To make a specific contribution towards the documentation and dissemination of indigenous knowledge applications in leather production.

## **1.5 PURPOSE OF THE STUDY**

The purpose of this study is to critically examine how vegetable leather tanning in rural South Africa using a collective-efficiency approach can contribute to sustainable development, economic development through social entrepreneurship, basic technology development and preservation of natural resources. The research takes into consideration the function of TK to complement western knowledge by adapting elements of these different knowledges in a unique way for leather production processes. The study benchmark best practices from Botswana, an industrially developing country which has a well established artisan tannery sector, and Italy a global leader in vegetable tanning, to invigorate the local leather industry.

## **1.6 THE RESEARCH PROBLEM**

In 2001, South Africa had 34 tanneries and currently there is only 32, and 98% of them semi-process leather using chromium which is a concern because it is environmentally polluting due to the chemicals employed in the process and has become a concern. Chromium tanning produces large quantities of wastewaters and chemical waste, and relies on equipment and chemicals that are not locally available. Moreover, the process of chromium tanning creates waste that does not biodegrade or easily decompose (Muchie 2000; Ballard 2001; Favazzi, 2002; Ayres & van Lugt, 2011; Munyai, 2011). However, the focus of this study is on vegetable-tanning process and their potential contribution to environmental sustainability and economic development.

Since the late 1980s the South African leather industry shifted from value adding production processes to meet local needs, to focus on export through the Motor Industry Development Programme (MIDP) (Flatters, 2005; Cokyane, 2012). MIDP encouraged export-orientated manufacturing, but also revolutionised the local industry to move away from traditional processes like vegetable tanning to chemical based production (Cokyane, 2012). Over 70% of the leather produced in South Africa is semi-processed and exported to various parts of the world with China and Europe getting the largest share (DAFF, 2011; Cacadu District Municipality, 2012). As a result of producing for exports imports of leather products in South Africa increased to 63.4% in 2008, even though the country is in the top ten list of leather producing countries in Africa (DAFF, 2011).

In 2001 the Africa Growth Act (AGOA) was introduced as a preferential scheme for new export opportunities. The scheme created challenges for the South African leather industry as it eliminated duties on imports from certain countries and encouraged manufacturing companies to focus on producing for export (Kaplinsky, McCormick & Morris 2006). The AGOA preferential scheme ushered in new export opportunities, but created challenges for the local manufacturing industries, particularly leather and textiles as it eliminated duties on imports from certain countries and encouraged the local manufacturing industry to focus on exports. Since then, the Act has resulted in high quality and competitively-priced leathers being hard to find in South Africa, because the industry production is driven by the automotive industry and exports (Turner, 2003). The Duty Credit Certificate (DCC) scheme, which involves the provision of customs duty credit linked to exports, has been ineffective and has instead supported more export programmes of South African Customs Union (SACU) than local firms (GEP, 2010). This has been to the detriment of the local manufacturers resulting in jobs loss.

As a result of the afore-mentioned challenges local manufacturers rely on imported leather to produce leather products (Ballard, 2001). The industry semi-processes leather using chromium with little consideration of the environmental impact or the effects it has on people (Mowat, Antrobus, & Fraser, 1997; Franco & Carvalho, 2004; Munyai, 2011). Therefore, the production process is done at the expense of many citizens with the benefits only enjoyed by the few. Despite the country being one of the highest producers of vegetable tannins, the vegetable tanning sector still remains under developed with only one tannery that produce vegetable tanning which essentially gives it monopoly of the sector.

This study uses aspects of the IPAP policy as a lens to analyse the viability of the vegetable tanning process through social cooperatives with the potential to possibly contribute to rural development. The leather industry has a comparative advantage of being a by-product of the meat industry within the agriculture sector and using renewable resources. Over 90% of tanning done in South Africa is chemical-based and centralised, which makes it inaccessible to smaller manufacturers (Guthrie-Strachan, 2005; Munyai, 2011).

This thesis investigates decentralising production processes to encourage the development of small-scale sustainable vegetable leather production processes in South African rural areas. This stems from the fact that government introduced the IPAP policy, which is trying to

decentralise production in order to develop rural communities so that they can participate in the development of the economy and their communities (The DTI, 2012).

Additionally, in South Africa, the legacy of apartheid of rural exclusion resulted in the underdevelopment and abandonment of rural communities. The post-apartheid government is grappling with socio-economic challenges such as unemployment, poverty, housing, pollution and skills development. It is in this context that the potential role of small-scale sustainable vegetable tanning is investigated based on the belief that decentralising production could contribute to the development of the local industry and the rural community. Sustainability-related concepts offer a potential for government, community, designers and educators to work together to improve lives of those in rural communities.

## **1.7 STATEMENT OF RESEARCH PROBLEM**

Despite wide availability of local resources and local knowledge (LK), vegetable-tanning remains less developed and promoted as a method of leather tanning in South Africa. Vegetable tanning is arguably more sustainable and ecologically friendly than conventional leather tanning methods.

### **1.7.1 RESEARCH PROBLEM**

Despite the widely available local resources and local knowledge, vegetable-tanning remains under-developed and neglected method of leather tanning in South Africa. South Africa is losing the rich socio-cultural knowledge associated with the traditional industries.

### **1.7.2 RESEARCH QUESTION**

What role can local knowledge play in the development of a sustainable leather industry in order to contribute to local knowledge-based economies through collective-efficiency in rural areas?

### **1.7.2.1 RESEARCH SUB-QUESTIONS**

1. How can the decentralisation of leather production contribute to the rural development in an industrially developing and developed context?
2. Why should vegetable tanning be promoted as an ecologically sustainable production process?
3. What role can indigenous knowledge play in the development of sustainable leather production that contributes to a knowledge-based economy?
4. What policies are currently driving production and trading of vegetable-tanned leather in South Africa?
5. How can small-scale production through collective-efficiency be incorporated into vegetable leather production to contribute towards the development of local VT industry?

### **1.8 RESEARCH RATIONALE**

The rationale for carrying out this research is based on the lack of documented evidence of vegetable tanning and its potential contribution to economic development- particularly knowledge-based economic development. Vegetable tanning is considered as the less polluting. Chromium leather tanning activities have been identified as one of the top three highly polluting processes (Blacksmith Institute, 2012). Some plants that produce tannins are classified as alien invasive species which can be used to benefit rural communities. This research hopes to bring to the fore the social, environmental and economics benefits of vegetable tanning, even though it is labour intensive process. In this light, the research findings would help to position vegetable tanning as one of the labour intensive sectors, which the IPAP and the NDP policy are trying to promote. The research findings help to situate vegetable tanning as one of the labour intensive sectors which the IPAP and the NDP policy framework are trying to promote in order to ensure that widely-available resources are value added locally in order to help develop an local industry, while creating employment opportunities within the labour intensive sector (The DTI, 2010).



## **1.9 INDICATION OF RESEARCH DESIGN AND METHODOLOGY**

A descriptive research design was chosen to help provide answers to key research questions of this study. The questions are associated with the use of local knowledge for economic development in the process of leather tanning. The study uses a descriptive approach to analyse vegetable tanning processes from three different countries. This approach was chosen because it could help with ascertain information about the current status of vegetable tanning, its contribution to economic development and social development and help describe what exist (Labaree. 2013). Activity theory was also used to analyse the activity of vegetable tanning, the tools used, the people involved, the rules that govern the actors, the community, how the labour is divided and the objective that those involved in the process are seeking to achieve through production process itself.

## **1.10 CONTRIBUTION TO KNOWLEDGE**

This study emphasises the promotion of small-scale vegetable tanning practices, which are currently under-recognised due to the overwhelming use of chromium-method tanning.

- This study hopes to contribute towards encouraging the use of local resources for economic development of local communities and to encourage independence from government.
- The intention is to make a contribution towards incorporation of LK in promoting production processes that are local context based, promote environmental sustainability, economic development through promoting social entrepreneurship, and innovation to achieve the goal of knowledge-based economy.
- Contribute towards the potential of vegetable tanning to cooperative model of economic development that is based on local knowledge and skills.
- Sustainability is about going back to the roots, while LK is more in line with the ecological concept. This research hopes to interrogate LK visa-a-vis design for sustainability as having the potential to speak to both and bring the local context which is IKS and design for sustainability which is a global concept together. The two are usually treated in isolation and this study create a juxtaposition of the two. Authors like Ballard (2001) suggest that the automotive upholstery industry and globalisation are some of the factors that influence the development and growth of the local vegetable tanning industry.

- The study contributes towards the call for Sustainable Development (DS) to include communities in rural areas by promoting societal influences that are embedded in LK and influence diversity of community-relevant innovations.
- Ultimately the goal of the study is to contribute towards creating the improving existing knowledge of the production process of leather which is a highly-sought after luxury material.

### **1.11 THEORETICAL FRAMEWORK**

This study proposes that the concept of sustainability and economic development should focus on small-scale manufacturing systems and LK in order to achieve knowledge-based economic development, through collective-efficiency, which is about cooperation. Collective-efficiency refers to joint actions or cooperative effects, which brings together the active incidental, and consciously pursued effects of clustering (Schmitz, 1997). It also promotes collaboration and interaction between various key stakeholders (Schumacher, 1973; Schmitz, 1999; Baleiras, 2011). Collective-efficiency is linked to the social capital, which is defined by the norms, and networks that allow people to act collectively through social networks which are in a position to identify opportunities that are linked to local practices which form part of cultural capital to drive change (Rabellotti, 1998; Woolcock & Narayan, 2000).

Economic development needs to focus on LK to enhance the use of resources to form part of the collective-efficiency strategy with the aim of redressing the brutal development cycle faced by developing countries. Collective-efficiency stimulates local, human, social and regional communities to make use of local resources as capital that can be used for development (Schumacher, 1973; Schmitz, 1999; Baleiras, 2011). The following sections are a breakdown of concepts that will be discussed within this thesis in relation to collective efficiency and sustainable small-scale leather production processes.

### **1.12 ECONOMIC DEVELOPMENT**

Theory of development promotes progressive improvement of class war and finding ways in which the integument of the capitalist society is disrupted and the expropriators are expropriated (Robbins, 1968:2-4). Between 1980 and 2000 the neoclassical growth model of economic

development, which focused on competition between public representatives and private sector, was imposed on many developing countries (Barreto,1998). The model gave government monopoly over decision-making to manage resources, leaving local communities powerless (*ibid*). Today, governments in developing countries are bound by trade policies that are in favour of Western countries and their citizens under the guise of investment. The neo-classical approach of development focused on the “provision of large-scale infrastructure, the attraction of footloose investments, and the disbursement of transfer payments designed mainly for the effects of industrial restructuring and low growth” (Tomaney, 2010:10).

The neo-classical approach began with the Washington consensus recipe, which encouraged many countries in the 1980s to privatise their resources and deregulate economic activities through market liberalisation (Wade, 2001). This action was presented as a way out strategies of trade protection and high levels of state intervention (Wade, 2001). The strategies came to be known as import substitution industrialisation (ISI) which is viewed as a right by America to force other countries into accepting full-scale free market, bypassing domestic processes (Wade, 2001). ISI is associated with the dependency theory. The ISI result in the inefficient use of resources by cutting out the value-adding processes to focus on exports.

Currently, regional development looks at skills and technological change to reinforce developmental patterns, is promoted as the new economic development model that should be pursued by countries (Desmet, 1999). Regional specialisation is a response to globalisation challenges (Quere & Ravix, 1997; Bénassy-quéré & Coeure, 2000). The new regional development model, also known as the industrial district model, does not only focus on obvious economic hubs. It is more inclusive and helps create economic participation of the formerly marginalised parts of the country focusing on available resources and the importance of place based development (Barca, 2009). Moreover, many areas that are considered traditional like rural areas have been neglected and left undeveloped (Stimson, Stough & Roberts, 2006).

New place-based approach tap into economic potential like local knowledge, which is the strength of many countries, as a means of economic participation, contributing to national development. In other words, regional development encourages that we look at promoting basic methods of production using locally available resources and production systems which encourage local development.

In Slovenia clusters are seen as a new model of regional development, due to more advantages in developing clusters in any part of the country where there are resources available (Chlebíčková & Mráziková, 2009). Small-scale production for knowledge-based economic development has been successful in Italy (Criscuolo, 2002; Favazzi, 2002). This study focuses on decentralised production systems that support growth based on local knowledge and expertise which lead to sustainable development.

### **1.12.1 DECENTRALISATION OF PRODUCTION PROCESSES**

Decentralised manufacturing is an intrinsic element of a more sustainable future, sustainability is associated with self-sufficiency and cooperation through flexible manufacturing systems (Schumacher, 1973). Naturally, a small cluster of manufacturers makes reference to its social dimensions, and assumes the role of social coordination and delimitation of spheres of action in which the clusters depend (Amendola & Gaffard, 1988). The decentralisation is viewed as having the potential to help the local leather industry to upgrade its competitiveness, recapture domestic market share, and contribute to a knowledge-based economic development (The DTI, 2010; 2012-14).

Schumacher (1973:63), as well as Di Tommaso and Dubbini (2000) noted that by exploring small-scale decentralised, labour-intensive industries can help develop rural areas. Creating opportunities where people live requires low costs to set up, employs local expertise and basic technology development and takes into account the historical evolutionary dimensions of a community (Amendola & Gaffard, 1988). The dimensions of culture are critical part of future developments through the sustainable clusters of manufactures distributed in various regions of the country. Sustainable development is a global concept and a goal of many government, businesses and communities and needs to be understood in relation to local knowledge and context.

### **1.12.2 SUSTAINABLE DEVELOPMENT**

The word “sustain comes from a Latin word *sustenare*, meaning to hold up or support, the word has evolved to mean to keep something going or extend its duration, with an overtone of providing support that made extended duration possible” (Sutton, 2004:4). The development

discourse began after WW II as a search for strategies to help countries deal with the after effects of war. The sustainable development discourse superficially has a positive side to it, but its arrival in the wake of colonialism, led to violence which dramatically transformed human lives, futures, and geo-political spheres while depositing some of the world's most intractable political problems and conflicts (Fry, 2009: 93). According to the Brundtland commission (1987) "Sustainable development is about development that meets present needs without compromising the ability of future generations to meet their own needs." Sustainable development is about promoting smart participation (Jarboe, 2001; Olver, 2011; Bapna & Thomas, 2012).

The Brundtland report adopted a global perspective on energy consumption, resources and emphasised the imbalances between the rich and poor parts of the world (Brundland report, 1987). Furthermore, the report also argued for economic growth for as long as it is green growth. However, green growth has been interpreted to mean that it is business as usual just as long as they give a nod in the direction of environmental protection (Madge, 1997).

There are many definitions for the concept of sustainable development, the common non-specialised use is closest to the synonym 'maintain' (Murcott, 1997; Sutton, 2004:1). Sustainability is about continuity and development is about change, curbing excess environmental degradation during production processes and empowering people to use the environment and resources cautiously while in pursuit of economic development. Development was added on the concept of sustainability in order to move away from only focusing on the environment but to include society and the economy (Reboratti, 1999: 207-9). The ethical paradox of sustainability, which refers to the environmental modification, requires deep intervention in nature that reduces the actions that depletes natural resources. In this context sustainability focuses on ecology maintaining the ecosystem's potential for subsisting overtime.

### **1.12.3 DESIGN FOR SUSTAINABILITY AND THE KNOWLEDGE-BASED ECONOMY**

*Design for Sustainability (DfS)* as an element of sustainable development focuses on sustainable production and consumption to deal with some issues of over consumption and wasteful use of resources (Clark Kosoris, Hong, Nguyenm & Crul, 2009; Fry, 2009). DfS encompasses all three pillars of sustainability, which are society, economy and the environment; it also supports sustainable production capacity and processes (Clark et al., 2009).

DfS is about making improvements socially, economically and environmentally to the production process (*ibid*). Sustainable design focuses on how a product is made, used and disposed of, and has resulted in product lifecycle as a conceptual model for evaluating the environmental and social impact of product through all phases of its existence (Fry, 2009:120).

This study will try to unpack the concept of DfS and its contribution to the goal knowledge-based economic development in rural South Africa. The country grapples with dual crisis, the environment and the socio-economic challenges. Dealing with environmentally friendly production processes offers opportunity for economic growth.

However, the notion of living in accordance with nature is not new, the IKS is a long stranding traditions and practices that belong to a certain regional, indigenous or local communities which encompass wisdom, knowledge, and teachings of a particular community and has been orally passed down generations from one person to the next about culture, nature and society (Sillitoe, 1998; Aikenhead & Ogawa, 2007). IKS's view has always been that of not separating the environment from socio-economic issues as the environment is viewed as part of the living beings. This suggests that the indigenous knowledge system's view of society being nested in the environment as oppose to being a separate entity. Moss (2012: 10) argues that "If sustainable development were embedded in a culture it would shape economic and political systems which in turn would strengthen a culture of sustainability". Linking sustainability to local cultures makes sustainability more relevant and easy to understand from a local context and perspective.

#### **1.12.4 INDIGENOUS KNOWLEDGE**

IK is concerned with the essence of collective responsibility, which can be best understood through observations and spending time with the community. The collective responsibly made out social unit, individual unit, LK, culture, social structure and meaning (Dei, 2002). In order to utilise African IK, it is important to interrogate the know-how of those involved in small scale vegetable tanning in relation to its application to contemporary living and peoples' engagement with local knowledge in relation to the context (Dei, 1993). IKS operates from an ethical point of view, and frameworks created outside of IKS context are still applicable.

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Moreover, IKS is often studied within the context of public understanding of science, decision over complex technologies, hazardous materials. In recent years IKS studies have shifted to environmental management involving biodiversity, risk assessment and the role of public participation in sustainable development (Woolcock & Narayan, 2000). Many authors have found that local knowledge-based economic development increase returns driven by knowledge spillages between industries, and communities in which the manufacturing is taking place (Romer, 1987; Grossman,1988; Grossman & Helpman, 1990; Aghion & Howitt, 1992). LK has been instrumental for understanding and promoting, technical, social and economic change in society (UNESCO, 1999; UNESCO, 2002).

### **1.13. DELINEATION OF THE RESEARCH**

This study only focuses on best practice in vegetable-tanning processes in the Kweneng district of Botswana and in Florence, San Miniato, and Santa Croce in Italy. These are sites with communities that have been involved in the production of vegetable tanning for generations. The researcher wanted to also understand why the country that produces the highest number of animal hides/skins, as well as high-quantity of vegetable tannins from black wattle are not benefiting the communities where the resources originate. No data was collected in South Africa as no evidence was found of small-scale vegetable tanning activities.

### **1.14. THESIS OUTLINE**

The table below indicates the thesis structure, method, systems, practice and how they interrelate following the research questions that were raised. In an attempt to answer the questions the answers will be outlined in the following structure.

Chapter one gives the introduction to the study, background to the research problem, outlines the aim, and objectives of the study, theoretical framework, as well as the possible contribution of the study to knowledge. The chapter also gives an overview of the areas of literature that will be covered in the thesis.

Chapter two of this thesis is a review of the historical background of the leather tanning process. the chapter also looks at the environmental concerns that have been raised about the process and their impact on the environment and humans. The chapter also looks at the current state of leather tanning.

Chapter three is a continuation of literature which looks at the South African leather tanning industry. The challenges that face the industry are also outlined. The chapter also looks at the IPAP policy framework and its potentialities in contributing towards sustainable job creations and economic development through decentralisation of production processes in South Africa in relation to vegetable tanning. The chapter concludes by looking at the available resources for vegetable tanning in South Africa.

Chapter four discuss the collective efficiency approach and its relationship to economic development, sustainable development and the concept of local knowledge.

Chapter five looks at the research design and methodology. The method of data collection as well as the analysis and the interpretation is presented.

Chapter six outlines the data analysis process and how the analysed data was interpreted to make sense of it.

Chapter seven present the findings from the analysed and interpreted data.

Chapter eight is a discussion of findings which were presented in the previous chapter.

Chapter nine present the conclusions drawn by the research, revisits the research questions that the study seek to answer, contribution to knowledge and the implications for further research.



## **1.15 SUMMARY**

This chapter focused on introducing the research topic, the motivation for conducting the research as well as the research problem and the questions that the study seeks to investigate. The chapter also gives a brief overview of the literature that led to the pursuit of the topic. Finally the chapter also gives an outline of the content of the following chapters.

## **CHAPTER TWO**

### **THE HISTORY OF TANNING AND THE MODERN METHODS**

#### **2.1 INTRODUCTION**

This chapter presents a review of literature on the historical background to leather production with the focus on the development of the leather tanning industry. An overview of the tanning industry from different regions focusing on one country per region is given. However, it should be noted that this study's main focus is on vegetable tanning and its possible contribution to environmentally sustainable processes of tanning due to its use of natural renewable materials and the possible revival of labour-intensive industries. However, vegetable tanning has been less recorded compared to chromium-tanning which has been widely researched. Since Italy is the main focus of this study more emphasis will be placed on the development of the Italian leather industry. The chapter also looks at the relevance of the leather industry and the role it plays and continues to play with respect to related value-chain sectors including the agricultural red meat industry and the waste, which is a by-product of the meat industry.

#### **2.2 LEATHER TANNING**

Leather tanning is one of the old professions in the world (Clarkson, 1960; Sreeram & Ramasami, 2003; Hooghiemstra, 2005). The process of tanning removes non-structured protein and fat creating a pure collagen matrix on the hide or skin of an animal resulting in a soft pliable material known as leather (UNEP, 1996; EUC 2009).

“The term tannin first came into use at the end of eighteenth century to define organic substances present in water-soluble extracts of plants which effect the transformations of animal hide/skin into leather” (Mole & Waterman, 1987:137). According to Watt (1906:5) “the art of converting skins and hides into leather is very ancient and is widely diffused”. The methods included simply sun drying of skin or hides, or smoke curing. This leather would have been used for items such as blankets, shoes, containers for carrying liquids.

The leather tannins used to convert hide/skins into leather are made of inorganic or organic materials capable of converting a putrescible animal hide/skin into a stable product known as

leather. Tannin is the active ingredient found in various materials such as plants and minerals that is responsible for transforming the skin/hide into a compact and durable material (Basaraba, 1964; Madhan, Muralidharan & Jayakumar, 2002). Hides/skins absorb the tannic acid and other tanning substances that prevent them from decaying. The tanning process helps treat the animal hides/skins so that they become less susceptible to decomposition, even when kept wet (Mahdi, Palmina, Gurshi & Covington, 2008).

The process of leather tanning deals with waste from the agricultural industry as hides/skins are a by-product of the meat industry (FAO, 2008; ICT, 2009). Tanneries play an ecological role by utilising the meat by-product which, in the absence of the leather industry, would simply be discarded (ECLI, 2012), therefore the process could also be viewed as recycling.

### **2.2.1 BRIEF HISTORY OF VEGETABLE LEATHER TANNING**

Vegetable leather tanning is an old practice, if not the first one of human civilisation (Romer, Underwood, Senekal, Bonnet, Duer, Reid, & van der Westhuizen, 2011; Munyai, 2013). “The leather industry has always been useful for the agricultural sector through the production of saddles and harnesses as well as providing armour and scabbards for military purposes” (Cherry, 1991: 295 quoted by Burns, 2012). Leather tanning for centuries followed environmentally ethical processes. It was regarded as an important process, in many towns and villages around the world people performed certain aspects of the production process (Clarkson, 1966). However, the tanning results were achieved through trial and error.

The principles of tanning only became better understood after many attempts in the 1800s by scientists to fasten the conversion process. “The first of these was Francis Pillsbury who took out a patent in 1823 for a process which forced liquor through the skin by hydrostatic pressure (Watt, 1906: 109). In 1831 William Drake modified the process by sewing two skins together forming a watertight bag in which tanning liquor was introduced by means of a funnel, with the liquid being constantly filled and kept in the condition until the tanning process was complete” (ibid). Watt (1906:206) “In 1826 Messrs Knowllys and Duesbury produced a patent for hastening the impregnation of the skin with tanning liquor through suspending the skins closer to the vessel from which the air could be exhausted by means of an air pump”. The process is said to have accelerated the conversion process immensely (Watt, 1906). However, in the 1800s with the introduction of the industrial revolution, the industry slowly shifted to chromium

tanning (ICDA, 2011). 'Primitive' societies in Europe, Asia, America and Africa all developed tanning techniques by trial and error, using things such as smoke, grease and bark extracts were used (Unioncamere, 2013). The art of tanning was a closely-guarded secret that was passed down family generations.

Many regions specialised in the production of leather and leather craft became an important occupation in the seventeenth and eighteenth century (*ibid*). In the following sections the development of leather tanning in three different regions is discussed, with a focus on one country in each region.

### **2.2.1.1 ASIA**

In India the barks and pods of certain trees that are available in the region were traditionally used for tanning. During the 18<sup>th</sup> century the industry was made up of what is known as the cottage industry mostly situated in rural areas (Edward, Bhadwar & Dhey, 1952) However, early British intervention in the Indian leather industry led to its urbanisation, and to social mobility for the communities involved in the process of vegetable leather tanning (Roy, 1994 in Sujatha, 2002). The 19<sup>th</sup> century census records showed that there were more than 150 000 artisans who were engaged in leather tanning and production process.

The country moved from producing finished leather to exporting raw hides/skins. There was also the growing challenge of rural-urban migration which affected the native cottage industries. These are some of the effects of rapid industrialisation, which are discussed later in this chapter. Foreign competition doubled, drawing out of India its own stock of raw hides and skins causing the price of the little leather that was left in the country to skyrocket. The country become a manufacturing zone for leather items, which were exported to the UK at moderate prices of the indigenous skills (Chandra, 1975). After prolonged discussions on what was to be done to reclaim the local industry from the foreign control, the country resorted to chromium tanning in the 1930s in order to accelerate the production process (Sujatha, 2002). To date India is still battling the consequences of its rapid industrialisation.

### 2.2.1.2 EUROPE

As civilisations developed in Europe, leather tanners and traders united to form the guilds of the Middle Ages, as did craftsmen in other fields (Clarkson, 1960). Licences were issued permitting people to practice the art of leather tanning. Brain tanning was used as recently as 19<sup>th</sup> and early 20<sup>th</sup> century in Germany and England (*ibid*). The leather industry provided employment for an assortment of people, in some cases leather crafts formed part of an important occupation, based on the locally available resources (Clarkson, 1960). The entire process relied on skilled craftsmanship to provide tools, patience, labour and knowledge of the process.

The process of leather tanning consisted of two stages; the first stage was the pre-tanning which consisted of soaking skin/hides in a lime solution to help loosen hair, which was scraped off with a blunt knife (Clarkson, 1960). The lime also helped separate the fibres of the hide/skin to enable the tanning solution to penetrate thoroughly. The liming stage was vital for the crafters to decide the correct amount of time for the hide/skins to be left in the liming solution (*ibid*).

The hides were then carefully bated by soaking them in an infusion dog or bird droppings, which helped soften the hide/skin, and prepared them for tanning (Clarkson, 1960). The second stage included soaking the hides/skins in a solution of bark and water for a lengthy amount of time varying from six months to two years (*ibid*). The tanning solutions were contained in pits or vats located near a water stream and the hides/skins would be immersed in a series of tanning solutions of increasing strength (Mann, 1960; Clarkson, 1960). In between the hides/skins would be removed and left exposed to the air for a few hours. The process of tanning was labour-intensive and required great skill and care in judging the amount of time the hides/skins required to soak in each solution (Clarkson, 1960; COTANCE, 2002).

In Italy, up to the seventh century BC the Roman leather-tanning industry was organised into corporations before its decline. During this time primitive methods such as smoke tanning, sun drying, alum, and lubrication with natural mineral oils gradually progressed to vegetable tanning. (Unioncamere, 2013). Things picked up again after 1000A.D. The development of quicklime with depilatory effects later led to the expansion of the industry with more tanneries being established. Italy's first tanning locations were established in cities such as Pisa, Genoa, and Venice. Subsequently, in the thirteenth century, Bologna, Florence, Milan, Turin, Naples,

Ferrara, Vercelli and Ivrea, developed good working relations between the *beccarri* (butcheries) and *caligarii* (leather tanners) which constituted the largest industrial sector (Unioncamere, 2013).

Up to the eighteenth century leather tanners were men of small means, who were generally dispersed throughout the country with no assistance from any form of technology and worked without any knowledge of chemical principles (Watt, 1906). Between 1850 and 1870 the creation and the continuation of the tanning industry was attributed to the development of commercial traffic due to the effects of third war for independence which raised the demand for leather, cheap labour and decentralisation of leather production (Unioncamere, 2013).

In Italy in the nineteenth century leather tanning became a seasonal activity for the inhabitants of Tuscany who alternated between agriculture, and forestry. When the tanning season was over the inhabitants of Tuscany would work on the farm fields and plantations fields where they processed bark, which was used in the tanning process (Watt, 1906).

After world war I, tanneries multiplied due to the self-sufficient policies of the Fascist period. In the early twentieth century there were further developments due to the introduction of combustion engines and the transition from bark tanning which had created a solid value chain. The industry experienced some difficulties in 1932 due to the Wall Street crash. During World War II many tanneries were destroyed and subjected to theft by the Germans (Unioncamere, 2013).

While going through the reconstruction process post war until the 1950s foundations were laid for development models of economic systems that centered on the leather tanning industry which in turn led to the economic boom in Italy (Unioncamere, 2013). Contemporary leather tanning is made up of four phases namely the pre-tanning phase, which consist of cleaning of the hide/skin in preparation for tanning, the tanning phase which is the process of stabilising the collagen, the post-tanning phase, for adding functional properties to the hide/skin, and the finishing phase for adding aesthetics such as colour.



**Figure 2.1 different phases of leather tanning**  
 (Source: Author's construct, 2013)

Other tanning processes available for tanning include: synthetic tannins where aluminium used as the primary tannin although it is not resistant to water and perspiration. Aluminium has been used in the form of alum for thawing skins and fur. Added in a mixture of flour, egg yolk and salt, the mixture helped in the preservation of skins and hides and could be washed out of the skin (Mahdi, Palmina & Covington, 2009). Currently, there are two widely commercially used methods of leather tanning which involve the use of tannins which are an extract found in the bark, leaves, roots or stems of various trees and vegetables, as well as chromium salts (Guthrie-Strachan, 2005; Munyai, 2011). This will be elaborated on in the following sections.

Presently, in countries with good environmental regulations, waste from the tannery-related production is reprocessed using high quality scientific techniques and reused. Leather tanning process can use up to 3000 types of chemicals; therefore, the wastewater from the process is highly toxic. In the developed countries the liquid waste is treated in a centralised wastewater treatment plant. According to Gombault and Begeer (2013:33),

The European tanning industry is distinguishing itself by reducing the amount of waste and by changing waste into useful products. The products include glue, feed/pet food made from gelatine, and slow release fertilisers made from animal hair. The hair and wool are also recovered to serve as wool textiles or filling materials.

The waste processing becomes part of an important value-chain within the leather tanning industry. Another aspect of the value-chain is the sourcing of materials.

### **2.2.2 SOURCE OF SKINS AND HIDES FOR TANNING**

Hides/skins used in the tanning process are derived from both domestic and wild animals such as cattle, buffaloes, horses, elephants, sheep, goats, pigs, impala, rabbits, springbok, deer, and mink are examples of such mammals (FAO, 2008; DAFF, 2010). Some reptiles such as snakes and crocodiles also provide skins (DAFF, 2010). Amphibians such as frogs can have their skins

converted into leather. Some birds are suitable for leather production such as ostrich, whilst certain fish, like sharks have skins which are practicable (FAO, 2008).

In addition, there are wild animals such as deer, mink, rabbits, springboks, impala, zebras and snakes, which are hunted for meat and their skin or hides. However, there are no statistics available about this (DAFF, 2010). Trends in finished leather production indicate a general increase in all types of production (FAO, 2008; ICT, 2009). As already indicated in chapter one, 90% of these animal skins and hides are processed using chromium tanning.

## **2.3 CHROMIUM**

Chromium is produced from sodium dichromate ( $\text{Na}_2 \text{Cr}_2 \text{O}_7 \cdot 7\text{H}_2\text{O}$ ) (CPI, 2005; McCartor & Becker, 2010). Chromium tanning has the fastest turnaround time and absorbs synthetic dyes, which produce bright colours, very well. The chromium tanning process employs drums and chrome tanning salts. Once the acidified hide is added to a solution of chromium sulphate, sodium bicarbonate is added to increase the pH to help fix the chromium sulphate to the collagen fibres of the hide (Guthrie-Strachan, 2005; Munyai, 2011; Romer, et.al., 2011). The process produces large quantities of wastewater due to the different stages and chemicals that are required for the process.

### **2.3.1 GENERAL OVERVIEW OF CHROMIUM TANNING PROCESS**

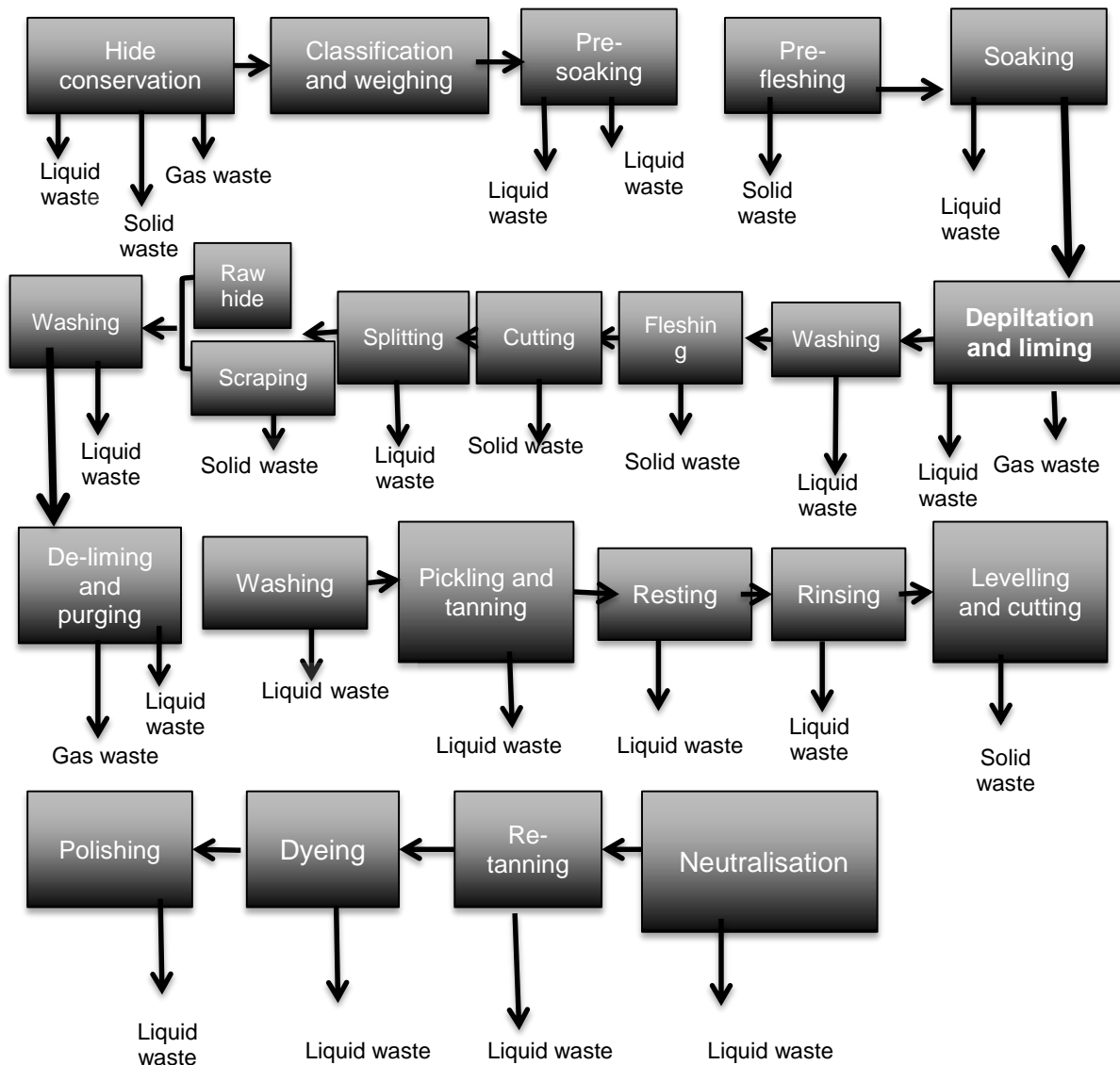
The process follows a chain of 21 stages in order for the hides/skins to become pliable leather (See Figure: 2.2). The first step in the chrome tanning process is the soaking of the skins/hides in water to return some of the moisture, which has been lost during the preservation process before the hides got to the tannery.

Salting of hides as a method of preservation means they need to be rehydrated and washed before any tanning can be done and, this process produces effluents (Leach & Wilson, 2009). The next step is the removal of fatty substances adhering to the flesh surface of the hide/skin. The third step is the soaking of hides/skins in a lime and sulphide solution, which loosens and dissolves the hair and discharge into the wastewater stream. The fourth step is when the hides are placed in a rotating drum for a process known as bating with an enzyme solution. The



process is followed by the pickling process, which involves a salt-acid solution in preparation for the tanning process.

The hides/skins become blue when chromium salts are added (See Figure 2.3). The name wet blue is used to refer to hides/skins that are free of hair and have been tanned but are wet. The leather still needs to be further processed to produce several types of products such as shoe uppers, car seat cover, upholstery, wallets and garments (CBI, 2005).



**Figure 2.2: Schematic of chromium tanning**  
(Source: Singh, 2009)

The process is fast, while the end product has superior characteristics like flexibility, elasticity, and increased resistance to heat. The chromium sulphate solution is then added after discharging the pickling solution; chrome solution is then mixed with the hides/skins for 24 hours. However, there are risks involved in using chrome in leather tanning.



**Figure.2.3: Chromium tanning drum**  
(Source: Tannery industries of Botswana, 2013)

The contemporary process of leather tanning has come under the spotlight due to its highly polluting chemicals and wastewaters. The nature of leather production has fundamentally changed in the past 100 years, the former craftsman workshops have become gigantic, extensively mechanised and automated industrial operations (Singh, 2010). The leather tanned with chromium does not resist perspiration or organic acids well and it is difficult to emboss and waste generated from the process creates health problems for those affected (CBI, 2005).

The general set up of leather tanneries that are involved in chromium tanning is highly industrialised. Many of the stages and processes require technology in order to slow down the risk of high exposure to the different chemicals that are used in the process of tanning.

Puig, Notarnicola & Raggi's study published in (2007) looked at the leather system but focused on the chromium tanning system which is designed to be competitive based on the systems that are mainly localised, with the exception of chrome ore which is supplied by South Africa, and Russia (Puig, Notarnicola & Raggi, 2007). The Italian system has a waste treatment system for

all the waste produced in the leather tanning and animal slaughtering systems. The system also uses less water than any other leather production system due to its well established water recycling system (ibid). However, in countries where there are no established measures to deal with the tannery waste there are serious implications which will be discussed in the following sections.

### **2.3.2 HEALTH PROBLEMS ASSOCIATED WITH CHROMIUM TANNING**

Chromium tanning produces a large quantity of wastewater and chemical waste that does not biodegrade or decompose (Mwinyihija, 2011). The heavy metal from the waste effluents of the tanneries, operations is highly toxic and highly polluting, extremely soluble and mobile in water and classified as a *human carcinogen* (Mwinyihija, 2010; Escuer, 2012).

It can be transfused through two routes namely inhalation route which can cause respiratory problems and the oral route via drinking water which may lead to gastrointestinal effects, damage in the immunological system and the reproductive and developmental problems (McCarroll, Keshava, Chen, Akerman, Kligerman & Rinde 2010; McCartor & Becker, 2010; Mills-knapp, Traore, Ericson, Keith, Hanrahan, & Caravanos, 2012). These are some of the biggest health related problems faced by many in developing nations; and through adopting cleaner production and consumption strategies some of these challenges could be addressed. Pollution caused by production related processes could be reduced by looking at alternative methods of production which will be further elaborated on in the following chapter.

Dealing with chromium waste needs to be prioritised in the industrially developing countries which are currently battling with pollution related problems. Health problems as well as socio-economic challenges are exacerbated by environmental pollution which affect a lot of poor people.

### **2.3.3 EFFECTS OF CHROMIUM FROM THE ATMOSPHERIC SYSTEM ON HUMANS**

According to the WHO (2000:1), “chromium in the air in countries where chromate is mined as well as tannery operations constitutes a major source of airborne chromium absorption by inhalation”. The absorption occurs rapidly for chromium in tannery wastewater. Exposure to the

chromium can be absorbed within few hours. Since chromium is retained in the lungs it becomes the greatest cause of lung cancers. Chrome ulcers, corrosive reactions on the nasal septum, acute irrelative dermatitis and allergies are some of the effects that have been recorded from people who are exposed to chromium (DSEWPC Astralia, 2008; Mills-knapp, et.al., 2012.).

Due to bad planning in many countries chromium waste is disposed in landfills and near running waters. Pollutants leach into the groundwater and get absorbed by the soil (Mills-knapp, et.al., 2012). Some identified pathways for human exposure to pollutants from tanneries are ingestion of contaminated food and water (Mills-knapp, et.al., 2012; Gombault & Begeer, 2013). In developing countries the industrial waste ends up in the landfills or open dumpsites (*ibid*). In countries such as Germany the chemicals used and the waste generated from chromium tanning is classified as dangerous (Singh, 2010; Harris et al., 2011).

#### **2.3.4 OVERVIEW OF STRATEGIES EMPLOYED BY EUROPEAN COUNTRIES TO DEAL WITH CHROMIUM WASTE**

Due to environmental pressures the leather tanning industry is subjected to increased environmental requirements. As a result a lot of research is undertaken in various parts of the world with regards to chromium waste. This shows that there is no desire to stop chromium tanning. There has been many research and development initiatives trying to find a solution to the hazardous waste produced in the tanning process. The research has now shifted towards finding uses for the waste instead of it being dumped in the landfills (Mylott, 2009).

European countries have taken precautionary measures in dealing with the dangerous waste from the tanning process. According to Puig, Argelich, Sole, Bautista, Riba, Fullana, Gazulla, and Calvet (2007:173) "In many European countries dumping of damp waste and waste containing organic matter is no longer permitted, hence the development of biogas plants which allows mineralisation of organic matter and assist in the treatment of sludge, and other organic waste". Biogas plants are a renewable source of energy for both heat, and electricity. The matter that does not leave the plant as biogas remains as a high-quality fertiliser that is distributed to farmers at a low cost (*ibid*). Having systems in place for dealing with tannery waste contributes to a closed-loop production system which helps ensure that toxic waste is dealt with accordingly. This manufacturing system requires research and innovation strategies.

### **2.3.5 A REVIEW OF STRATEGIES TO MANAGE DIFFERENT WASTES FROM THE LEATHER TANNING PROCESS AND THEIR VARYING COMPLEXITY AND AFFORDABILITY**

In countries such as Denmark, Norway, Sweden and France excess salt from hides/skins is dusted and used for de-icing the roads during the winter season, while an aerobic digestion system is used for sludges at a very high cost. The flashings are used as alternative source of energy. They are mixed with pig dung for biogas generation and electricity generation (Shanmugam & Horan, 2009; Ravindranath, 2012).

In Italy, which is the number one leather producing country in Europe, there are major units for converting flesh into animal feeds and fertilisers. Leather trimmings and shavings from both chromium tanning and vegetable tanning are used to make leather boards. While the sludge is sent to an aerobic digestion water treatment plant. Aerobic digestion oxidises and decomposes organic parts of the sludge using micro organisms that are present in oxygen (Durai & Rajasimman, 2011). Moreover, there is a waste treatment system for all the waste produced in the leather tanning and animal slaughtering system, that also takes measures to reduce water usage in the leather production system (Puig, Notarnicola, & Raggi, 2007). The system also includes the waste recovery and purification system which is centralised and belongs to the district consortium. The waste treatment plants are made up by a mechanical treatment which separates the solid part of different waste releases, and homogenise waste release to separate chemical-physical treatment which coagulate and precipitate biological treatment which biodegrade aerobically the organic matter (ibid).

From a developing country's point of view, in China researchers discovered that chromium leather waste contains collagen protein, chromium and various salts and this makes it a good source for preparing chromium-enriched brewer's yeast (Liu & Yang, 2006). China has also discovered that the solid waste from the tannery process could also be used in the process of brick-making. Moreover, researchers have also discovered that the tannery waste could be useful for creating flexible composite sheets. The process is highly scientific and requires the use of other chemicals (Ashokkumar, Thanikaivelan, Krishnaraj, & Chandrasekaran, 2011). The above listed strategies are efforts used to deal with waste from the tanning process in order to curb environmental pollution. However, some of them could only be a pipe dream for many developing countries unless policy makers start considering environmental concerns and prioritising their citizens' health.

### **2.3.6 CHALLENGES OF ENVIRONMENTAL REGULATIONS IN LEATHER PRODUCTION PROCESSES**

Market liberalisation or export promotion has affected local industries. Since 1990s the local leather tanning industry shifted from producing for local needs to focusing on producing for exports (Pieterse, 2006). The earliest empirical research on the impact of globalisation on the environment focused on the reverse questioning, of “how do environmental regulations impact trade?” This was based on a prevailing belief that if trade had an impact on the environment, it is due to environmental regulation, which affects trade flows (Levinson, 1997). Globalisation became a business model in the 1980s, it was seen as an entity that could have more than economic impact in transforming many African economies which have relied on agriculture, to develop other manufacturing processes (Jeffrey, 2002; UNIDO, 2011).

According to McCartor and Becker (2010: 41), “between the 1970 and 1995 the percentage of low to middle income countries that contributed to the global production of leather increased from 35% to 56% and from 26 to 56% for heavy leather materials”. Many of these affected industrially developing countries are concentrated in Africa, Nepal, Bangladesh, India, South East Asia and South America (McCartor & Becker, 2010). Due to relatively inexpensive costs of labour and materials, over half of the world’s most polluting part of tanning activities occur in low-middle income countries (Harris, Fuller & Ericson, 2011). The understanding of trade worsening environmental impact is dealt with by shifting pollution intensive production to low-regulation and low-income countries (Jeffrey, 2002; Byers, 2003; Jenkins, 2003). In some cases the trade in leather is based on the neoclassical growth model which gave governments monopoly over decision making when it comes to management of resources leaving local communities powerless (Barreto, 1998).

Globalisation can be seen as facilitating the relocation of dirty industry to developing countries known as the Pollution Haven Hypothesis (PHH) (Jeffrey, 2002). A study conducted by Blackman lists a number of researchers who have tried to prove that big multinational corporations operating in developing countries were not environmentally polluting. He identified that most of the studies claims cannot be verified (Blackman, 2009). While Jenkins (2003:93), recognised that “tanneries from the developed countries were choosing to outsource wet-blue leather because it being the most polluting stage of leather tanning with less value, thus supporting the notion of pollution transfer”. African countries are no exception to the leather

industry transfer as most countries act as a supplier of wet-blue leather due to their less stringent environmental regulations (Roy, 2012). Nahman and Antrobus (2005: 812) found that the Southern African customs union countries which are made up of five countries which include Botswana, Lesotho, Namibia, South Africa and Swaziland were used as pollution haven by the United States and the United Kingdom during the period of 1981-2002. This is particularly the case in leather and wood production.

Free trade has played a crucial role in the leather supply chain. However, the trade is not always free between countries; tariff barriers are often used to protect domestic producer's markets. Developed countries have been accused of raising tariffs to protect their domestic sectors that are labour intensive such as leather (Gombault & Begeer, 2013). Non-tariff barriers are in the form of strict or adherence to stringent certification measures which often have larger impact on the flow of goods. In the case of developing countries they find themselves bound by the laws that favour the markets that they trade with, as opposed to the needs of their citizens, leading to the reduction of tariff rates on manufactured goods.

### **2.3.7 BILATERAL AND MULTILATERAL AGREEMENTS CONTRIBUTE TO INEQUALITIES AND SHIFTING OF HIGHLY POLLUTING PRODUCTION PROCESSES TO DEVELOPING COUNTRIES**

Today there are binding agreements on trade relations between countries all around the world. Countries cash in on each other's weaknesses based on power and resource gains. Bilateral and multilateral agreements between countries have contributed to the reduction of average tariff rates on manufactured goods sold to high-income countries (Jeffrey, 2002; McAusland, 2008). This means the countries continue squandering resources to satisfy the export market. This is more evident in the leather tanning industry where many tanneries in the developing countries are foreign-owned and operate under Foreign Direct Investments (FDIs) which are often exempted from paying tax and often do not abide by the countries' environmental laws (ICDA, 2011). FDIs result in the lowering of barriers to international investments (McAusland, 2008; Gombault & Begeer, 2013).

There is no doubt that government often finds it hard to enforce laws because the companies will leave people without employment. However, the amount of employment opportunities created by the companies is often very low due to the companies either bringing their own

labour force or bringing automated manufacturing systems, which do not require people. Tax rebates do not assist in the case of a developing country like South Africa where a lot of people depend on the social welfare for survival. Since there are not enough jobs created government needs tax income from the companies that are depleting local resources.

The FDIs do not develop technologies for production in the industrially developing countries, but bring equipment that has been developed in their countries of origin (Franco & Quadros, 2004). Dependence on FDIs, imported equipment for manufacturing, and exports for income generation does not add value to developing countries and contribute towards the exploitation of local resources at the loss of local communities.

FDIs do not necessarily contribute to skills transfer but rather contribute to the loss of local knowledge and skills, which is the same thing perpetuated by that the apartheid government of South Africa (Jaja, 2012). FDIs encouraged many in developing countries to depend not on their own intelligence but instead to work in the production environment where there is no knowledge transfer, and when the companies close down the employees are left with no skills or knowledge that they can use to survive as a result of globalisation policies (*ibid*). There is a belief that globalisation and free trade in the developing world is the best way to deal with poverty (Byers, 2003). In retrospect, globalisation opened as many doors for labour as it closed (Jaja, 2012; Munck, 2012). In reference to the above, since there is no clear line as to the contribution of globalisation, what is clear is the challenges and changes that it brought, including large-scale production systems with no contingency plan for the resultant consequences.

Pollution is a global phenomenon resulting from production processes; leather tanning is one of the polluting processes. Industrialisation in the emerging economies has resulted in problems associated with production systems due to a lack of understanding of their entire manufacturing system, instead focusing on the investment.

### **2.3.8 STRATEGIES FOR DEALING WITH ENVIRONMENTAL POLLUTION**

Both developed and developing countries have been trying to establish a common purpose to deal with the impact of globalisation, hence the establishment of the Millennium Development Goals (MDG). MDG goal number seven is about ensuring environmental sustainability and has



become a binding resolution for countries to work towards (StatsSA, 2010; UNIDO, 2011). However, trying to establish a common global approach to dealing with environmental, social and economic issues linked to sustainable development has proven to be a difficult task in the past 40 years (Byers, 2003; Olver, 2011). First there is a lack of understanding that the world is still highly polarised and unequal, and as a result binding resolutions that are often taken in conferences and unions do not apply to all nations equally, and the more powerful nations will always win over the less powerful ones (Olver, 2011).

Moreover, the binding resolutions depend on social and economic priorities, which remain fragmented. After 40 years of global environmental governance countries have invested in talks and treaties, which so far have created never-ending negotiations systems (Olver, 2011). There is no doubt that powerful nations decide what is good for their countries at the expense of others through moving highly polluting production processes to developing countries with less stricter environmental laws. Industrially developing countries depend on the international community which pledged in the Copenhagen Accord of December 2009 to provide resources amounting to \$30 billion for the period 2010-2012 to help developing countries speed up their implementation of MDG number 7 (MDGRSA, 2010).

However, these countries also need to please investors from the developed world who have established industrially polluting manufacturing systems that have been banned from their own countries. Therefore, implementing the strategies to meet the MDGs will always be a challenge because the Industrially developing nations are at the mercy of developed countries and therefore are bound by policies that are developed elsewhere and often contradict the reality (Byers, 2003).

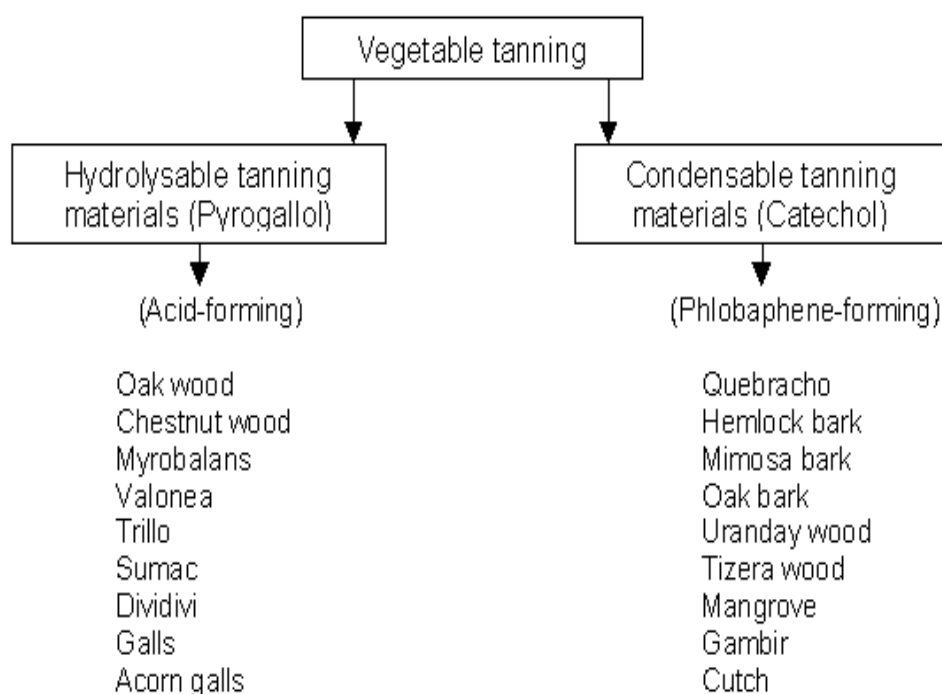
Moreover, it must also be noted that most of the above-mentioned strategies are not implementable in some developing countries due to the cost involved in setting up waste treatment centres for the leather industry. Hence this study proposes looking at the tried and tested traditional method such as vegetable tanning as a more sustainable tanning process.

## **2.4 VEGETABLE TANNING IN CONTEXT**

Vegetable tanning is a generic term to cover the process of converting animal hides and skins into leather using tannins obtained from natural vegetation. The vegetable tanning process

employs various plants extract for tanning. According to Madhan, Muralidharan & Jayakumar, (2002: 2841) “vegetable tannins are polyphenolic compounds that are present in the plant extracts from bark, wood, leaves and other parts of plants and trees”.

The polyphenolic compounds are secondary metabolites that possess a diverse range of properties that have multiple biological activities such as antioxidants, anti-carcinogenic, antiviral and anti-inflammatory properties (Madhan, Muralidharan & Jayakumar, 2002). Vegetable tannins are divided into two categories. The plants permanently alter the protein structure of skin and hides making them more pliable and durable (See Figure 2.4).



**Figure 2.4: Some plants that produce large quantities of vegetable tannins and their classifications**  
 (Source: Funatogawa, Hayashi, Shimomura, Yoshida, Hatano, Ito & Hirai, 2004)

The history of the chemistry of vegetable tanning is not well known. However, there is strong indication that the Egyptians might have been the first to introduce vegetable tanning. Watts (1906:7) states that “even though the Romans only acquired the knowledge of tanning later, they pursued it with great success, to the point of even introducing hides being tanned with bark such as gall nuts, sumac and lotus bark, reviving the Egyptian tradition of vegetable leather tanning”. In 1300 AD embossed leather was produced for tapestry and some of these items are

still preserved in old mansions around Europe.

Until 1858, the process of vegetable tanning and other indigenous methods, which were discovered by accident in an attempt to make the unique material pliable, were the only methods used to convert animal hides or skins into leather (ICDA, 2011).

#### **2.4.1 METHODS OF VEGETABLE TANNING**

There are two types of vegetable tanning, pit or vat tanning and drum tanning. Today the process of vegetable tanning is often mentioned as a better alternative to chromium. However, Singh (2010:3) argues, “the production of vegetable tanning agents on the worldwide scale required would probably represent a greater interference with nature [...]. On the contrary, this is not the case in South Africa as the department of environmental affairs is already trying to destroy the alien invasive specie (IS) which will be discussed in the following sections (Working for Water, n.d.). Moreover, the black wattle plant has many other uses that will be discussed further in the following sections. Furthermore, any production process poses a threat of interfering with nature if there is no proper planning or considerations of the entire production system.

#### **2.4.2 TRADITIONAL PIT VEGETABLE TANNING PROCESS**

In the pre-industrialisation time, after slaughtering, the animal hides/skins were washed to remove impurities in a stream or river (Burns, 2012). The hides/skin was then soaked in clean water until it was ready for further processing (*ibid*). The actual tanning process took place in a number of vats containing the mixture of liming solution, water and pounded tannins (Clarkson, 1960). The vats were made out of earthen wear sunk into to the ground to help contain or retain water supplied for the process as illustrated in Figure 2.5 (Mann, 1960; Thomson 1981; Burns, 2012).



**Figure 2.5: Traditional vat tanning**  
(Source: Mann, 1960; Munyai, 2011)

The first vat contained the liming solution, which was obtained from limestone or shells (Burns, 2012). Hides/skins would be left in the solution to soak with the hair side down and the solution caused some hair to fall off (Clarkson, 1960; Cherry, 2003). Today the vats are still used in the process of vegetable tanning in a more protected environment.

In regions like Europe, where it is very cold and snowy, tanning vats were generally indoors and in a protected environment for the workers (See Figure 2.6).



**Figure 2.6: Modern tanning vats**  
(Source: Graebin, 2011)

The hides/skins were then removed and the excess fat, flesh and hair-lime residue was scraped off. The hides/skins were then returned to the liming vats that contained large quantities of decaying organic matter full of bacteria, which aided the process of hair and connective tissue removal (Thomson, 1981). By the end of the process the remaining hair is easily removed without harming the hide (Cherry, 2003; Burns, 2012).

Cherry (2003: 296) suggests an alternative to liming “as a means to loosen the hair so that it could be easily scraped off, the hide could be folded hair side in and placed in a warm atmosphere to encourage the rotting of the hair follicles, with perhaps the encouragement of a sprinkling of urine”. When sufficiently loosened, the hair would be removed by use of a single-edged blunt knife, and the flesh by means of a double-edged sharper knife (Clarkson, 1960).

The hides/skins had to be de-limed by submerging them in dog dung or bird droppings, or could be drenched in a solution made with barley or rye and stale beer or urine. The de-liming process helped soften the hides/skins. Burns (2012:2) explains the next phase of leather tanning:

The next phase was soaking in a tannic acid, which is a mixture of tannins from plants mixed with water. The mixture did not only help with preservation of hides/skins but also imparted colour. The hides were moved around the pits continuously to ensure an even spread of tannins. The hides/skins go through alternative layering with ground bark with the pit filled with weaker tannin solution.

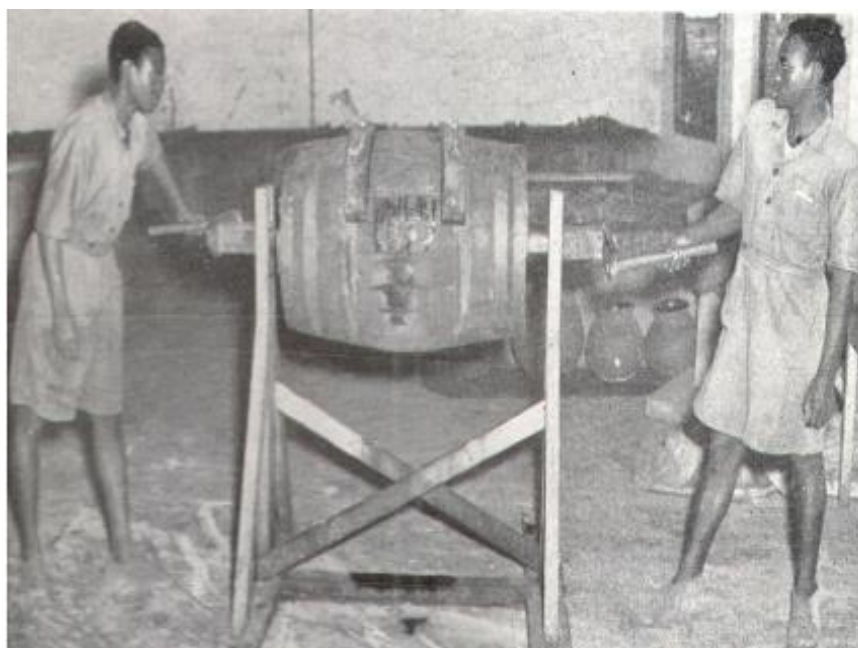
Tanners were well trained within their industry and had pride in their work and so it should be noted that to become a tanner required knowledge and skill (Cherry, 2003 in Burns, 2012).

After tanning the hides/skins would be rinsed and smoothed using a two handled setting pin before being dried slowly at a controlled rate, in a dark shed (Cherry, 2003; Burns, 2012). Generally the leather would then be in ready condition to be stretched and split to make it supple by the application of greases (Steane, 1985: 248). The process has improved over time, particularly in the developed countries, where new technologies have been developed to improve the process while not neglecting unique aspects of the vegetable tanning process. As a result high quality soft leathers that are also light in weight that can be refined in different ways for different uses are attainable with vegetable tanning, and different colours that are light-fast and waterproof are possible.

### 2.4.3 DRUM VEGETABLE TANNING PROCESS FOR LARGE SCALE TANNING

With large scalable drums raw hides/skins that have been preserved with salt are cleaned with water to remove impurities could be tanned in large quantities. Hair could be removed during the soaking and liming process, which took place in large wooden drums. Alternatively, hides/skins were seated for de-hairing through suspending them in a humid air chamber at a constant temperature, which also contributed to the destruction of basal columnar cells.

The tanning agent was extracted (and pounded) and mixed with water. Each of the plants that were used gave a different finish to the leather. The hides/skins were soaked for several days in slow tanning drums. Scudding was the process of removing hair from the animal hide/skin with a blunt object (CPI, 2005).



**Figure 2.7: Traditional wooden drum for vegetable tanning  
(Source: Mann, 1960; Munyai,2011)**

The liming and de-liming process used bran (fermented mixture of wheat bran and water with salt) or acetic acid (which is water and vinegar). The liming process also helped remove all traces of flesh and grease from hides/skins. The de-liming process also takes place in the wooden drums to rinse them to lower their pH level in preparation of vegetable tanning; the drum's capacity differs (See Figure 2.8).



**Figure 2.8: Modern wooden tanning, liming and dyeing drum with larger capacity  
(Source: Google images, 2013)**

As with the traditional method, the modern drum tanning process is followed by the dyeing process which takes place in the wooden drum. Different plants give different warm colours that are soft, resistant and the leather has a unique scent that is part of the distinguishing factors of vegetable-tanned leather. The hides/skins are then air dried to remove excess moisture and residual moisture. The hide/skins are then staked to give them flexibility and softness.

#### **2.4.3.1 ADVANTAGES OF USING VEGETABLE TANNINS**

The vegetable tannins have special properties such as the ability to precipitate alkaloids and proteins (Farrukh, 2005). Vegetable tanning has properties that cannot be matched by any other leather tanning process. The process is less environmentally hazardous compared to mineral-based tannins such as chromium and aluminum (Gujrathi & Babu, 2007; Mahdi, Palmina & Covington, 2009; Munyai, 2013).

Vegetable-tanned leather is natural, supple, durable, and environmentally friendly and when coupled with good design and artisanship makes it a sought-after commodity. Some of the known properties of vegetable tanning are that the leather is:

- Breathable, visco-elastic and has good pore size distribution. These properties have not been matched and this make vegetable-tanned leather a unique material.
- Vegetable-tanned leather goods change their appearance over time to look even better. The leather becomes older without being ruined and the ageing process does not compromise its resistance which gives it a vintage look.
- Reduces pollution problems associated with tanning industry which include treatment of sewage, disposal of old leather and access waste (Sreeram & Ramasami, 2003; Koloka & Moreki, 2011).
- Leather goods made out of vegetable-tanned leather can be recycled at the end of their life.
- The process uses organic material and the waste generated from the process is less harmful to the environment (Gombault & Begeer, 2013).
- The vegetable tanning agents use renewable resources when managed properly. Some of the plants also produce dyeing agents, which are free from heavy metals.
- The process produces rich and warm colours.
- Vegetable-tanned leather goods are more valuable and therefore sold at a higher price.

#### **2.4.3.2 DISADVANTAGES OF VEGETABLE-TANNED LEATHER**

- The average process time may take up to 60 days.
- Leather goods made out of vegetable-tanned leather are more expensive
- Tanning with vegetable tannins requires skill.
- The colours produced that one can produce are limited.
- Water consumption.

The process of vegetable tanning offers more advantages than disadvantages and due to its long-standing tradition and its linkages to social cultures can be viewed as a more sustainable process.



Water consumption is one of the challenges for some of the labour intensive industries. However, due to continuous innovation and developments in the industry wastewater recycling has become a norm for Italian tanneries.

#### **2.4.4 LINKING VEGETABLE TANNING TO LOCAL KNOWLEDGE**

The VT process requires skills, which are often linked to local knowledge, expertise and local resources. However, the process has also been criticised as being time consuming and producing only heavy duty leathers that can only be used for specific products. Conversely, a lot of development has taken place in the industry resulting in softer vegetable-tanned leather (CBI, 2005). It is the intention of this study to uncover those developments and bring them to the fore, and they will be discussed in the following chapters. The vegetable tanning process is environmentally friendly and is currently scarcely used in developing countries like South Africa, despite the availability of resources (*ibid*).

The tan liquor prior to soaking has medicinal value for certain cattle diseases. Vegetable-tanned leather has been recognised to have medicinal value such as making footwear for cracked feet, making pillow covers out of sheepskin stuffed with medicinal herbs to provide relief from headaches and sleeplessness (Sujatha, 2002). Vegetable tanning is also considered by archaeologists to be the only process in the past to impede decay in animal skin and had the ability to restore the necessary suppleness, and produce permanent and irreversible changes in the skin structure which is resistant to water (Sykes, 1991). According to Sujatha (2002), effluents from vegetable tanning are re-usable, while the non-usable effluents are biodegradable. The leftover tan liquor is evaporated and the sediments of the matter with vegetable proteins secreted from the hides/skins is highly valued manure for the agricultural industry and is often sold at a good price.

#### **2.5 LEATHER CONSUMPTION**

There is a growing demand for protein products in the developed nations resulting in more animals being slaughtered to meet the demand (Prakash, & Stigler, 2012b). Europe and North America are the largest consumers of leather products (Qattous & Mccallin, 2009). Asia dominates the global leather production, with China leading as the largest leather tanning

country in the world and also the largest importer of leather (CGP, 2011). India is still trying to establish itself as a leader in the global leather market, while Latin America is the fastest-growing market. Krauss and Pinto (2012:19) suggest that countries such as Brazil, India, South Africa and South East Asia are still untapped emerging markets in terms of luxury goods. Leather goods are considered an absolute over-performer with regards to the economy. It is therefore important that countries that are endowed with livestock start taking steps towards taking advantage of the market opportunities presented by the leather goods industry. Craftsmanship has been identified to be the key in the performance of the leather industry. South Africa has surplus labour that could contribute to the development of this growing sector.

### **2.5.1 CONSUMPTION OF VEGETABLE-TANNED LEATHER**

According to Aslan (2013: 26-27) “as the environmental and human health consciousness of today’s consumers increases, the demand for leathers that are produced using vegetable tannins and natural polymers increases”. Consumers are slowly taking interest in how goods that they consume are produced and the awareness of environmentally polluting production processes is prompting consumers to seek alternative products regardless of the cost. However, in order to meet this growing demand it is important to establish innovative, sustainable and environmentally tanning system for vegetable tanning.

### **2.6 LEATHER MANUFACTURING COMPETITORS**

Competitiveness is described “as a comparative ability and performance of a firm, subsector or country to sell and supply goods and services in a given market” (DAFF 2011:2). To date China’s leather industry comprises of 16 000 companies that employ over two million people. China’s success is reflected in global exports statistics (TIPS & AUSIAid, 2006; CGP, 2011). However, China does not have a good record in terms of pollution and waste minimisation.

While the EU countries have 18 790 tanneries which employ 28 117 people with a turnover of € 7 464 427. The EU tanneries’ success is based on their mixing of tradition and innovation to keep alive a number of artisanal processing skills to ensure sustainability of the leather industry particularly in Italy (ECLI, 2012). European tanneries are forerunners in leather tanning education and training, technology development, efficient chemical auxiliaries, process

automisation and rationalisation state-of-the-art environmental protection, and pioneering social responsibility. These are all strategies that are geared towards sustainable development (ECLI, 2012).

According to Puig, Notarnicola and Raggi, (2007:32) "Italy is leading in the leather sector in Europe and the world. Italy accounts for 65% of EU production and 13% of the world production". Italy from the EU point of view has 5 million cattle, and nearly 10 million sheep, and produces an estimated 135 042 tons of hides and 14 941 tons of skins (Prakash & Stigler, 2012; Gombault & Begeer, 2013). This means that the rest of the leather that is tanned in Italy is either imported as raw hides/skins or is semi-processed. Furthermore, According to (Milella, Burali, Quaggiato, Degan, Spinazzola & Villani 2006), Italy has 3 608 tanneries that employ 36 000 people. Vicenza district consist of 720 tanneries that operated from start to finished leather and employ 11 610 employees. Sixty seven tanneries operate a complete tanning cycle, 56 produced wet-blue segment, 90 only focus on finishing, while 176 concentrate on other tanning operations. Currently, these tanneries contribute to the formal international trade in leather and leather goods that is estimated at over US\$ 50 billion a year (about ZAR 446 billion) and the market is far from saturated (FAO, 2010). These are tanneries that are mainly made up of SMEs and family businesses with long tradition of leather production (Gombault & Begeer, 2013).

However, despite its significance as a livestock producer, Africa accounts for only 8% of world production of cattle hides and about 14% of goat and sheepskins (Prakash & Stigler, 2012). African countries often rank the agro-processing industry as of high importance as an export commodity, leather and leather products generally account for less than 4% of total exports (DAFF, 2011). This is largely due to the leather industry in most African countries being an unorganised sector and globalisation has not helped the industry (McCator & Becker, 2010; Prakash & Stigler, 2012). According to the international council of tanners (FAO, 2008) South Africa's share of this industry is estimated at only US\$ 2.5 billion (ZAR 21 25 billion). This is because South Africa mainly exports semi-processed leather, as is the case with many leather-producing countries in Africa.

## **2.7 SUMMARY**

This chapter examined the literature that has been written on the leather tanning process. It gave a historical overview of leather tanning, its development in different regions. The chapter

also looked at the current status of the leather tanning industry, identified strategies that have been used by various countries to deal with waste from tanning activities. A lot of research has been conducted on chromium tanning to develop new strategies for dealing with waste from the production process.

The following chapter looks at the South African context of leather tanning industry using the Industrial Policy Action Plan to analyse the current status and identify opportunities for small scale vegetable tanning processes in South Africa.

## **CHAPTER THREE**

### **SOUTH AFRICAN LEATHER PRODUCTION AND THE POTENTIAL OF THE IPAP's, NGP's AND THE NDP's STRATEGIES TO PROMOTE THE ESTABLISHMENT OF SMEs**

#### **3.1 INTRODUCTION**

This chapter gives a historical background to the South African leather tanning industry, the current status and the challenges that are faced by the sector and the government's strategies to address the challenges. One of the strategies proposed by the South African government is the IPAP, NGP and the NDP. This chapter analyses at the IPAP, NGP and the NDP policy frameworks in relation to the tackling the challenges that face the leather industry in South Africa. The IPAP policy framework is meant to promote the development of SMEs with a special focus on labour-intensive manufacturing as well as value adding production systems. Since this study's focus is on the leather sector, this chapter will critically analyse the IPAP in relation to the leather industry. This is a policy that is meant to redress the effects of globalisation, in terms of employment creation and the development of industries and rural areas, which have been neglected.

#### **3.2 THE HISTORY OF THE SOUTH AFRICAN LEATHER TANNING INDUSTRY**

The tanning industry in South Africa can be traced back to the days of the Dutch settlement at the Cape in the 1600s which is coincidentally also the beginning of the formal economy in South Africa. At that time vegetable tanning was the prominent method of leather tanning (Shuttleworth,1983; Slabbert, 1992). The industry was closely linked to the footwear industry. Methods such as bag tanning, which is a process that requires less equipment and includes sewing the hide into a bag filled with tanning liquid with the bag suspended from a beam in this process leaching and tanning are combined into one operation (Mann, 1960; Munyai 2011).

Traditionally, there were highly skilled crafters whose craft was to produce leather for the king and community at large. These crafters possessed knowledge and skills that were passed down generations. An example of one type of knowledge or skill was brain-tanning which is process that included soaking the hides in small portions of the brains of an animal for some time, then stretching the hides until they were soft (Ibid) (See Figure 3.1).



**Figure 3.1: Traditional brain tanning by Zulu men**  
(Source: Google images, 2013)

Oil tanning is also known as *rieme* in South Africa. This process included rubbing oils or animal fats onto the rawhide and twisting and undoing it until the hide was soft. Rawhide tanning is also one of the documented leather tanning methods (Mann, 1960 in Munyai, 2011).

The traditional leather tanning methods used local knowledge, skills and locally available resources. The discovery of chromium in South Africa in 1865 did not influence the local industry until 1942 during World War II when there was an increase in leather demand. This meant changing production systems to industrialised production systems and using chromium, which has a fast turnaround time. However, with industrialisation many developing countries started shifting to dependency on imported chemicals for leather tanning (CBI, 2005; ICDA 2011).

### **3.3 THE HISTORICAL CHALLENGES FACED BY THE INDUSTRY**

The South African leather industry's troubles began when the importing of leather from other countries started in 1904. After the Anglo Boer War Argentina had a tight grip on the market as it was selling leather at dumped prices, bringing the local industry to a standstill (Shuttleworth,

1983:12; Slabbert, 1992; Mowat, 1996). The importing of cheaper leather by local manufacturers persisted after the war due to a shortage of local materials. By the 1920s local manufacturers were once again in support of the local tanning industry. The symbiotic relationship between the tanning industry and footwear industry resulted in the development of a well-equipped industry that could produce and meet the county's demands during World War II as discussed in the previous section (Shuttleworth, 1983; Mowat, 1996).

In the 1950s Custom tariffs and hides-utilisation incentives, also allowed the local industry to replace higher grade leather, which was exported after being semi-processed, and fully processed leather with imports. Up until the 1980s the local tanning industry was still relying on the footwear industry, which was rapidly growing to meet population demands as well as living standards (Slabbert, 1992; Mowat, 1996). The method of producing leather using vegetable tannins declined after the introduction of chromium tanning.

By the 1980s new market opportunities through the upholstery industry and the motor industry opened up and this meant shifting from the long-time main focus, which had been the footwear industry. By the 1990s chromium tanning became the main focus of the industry due to increase demand for leather in other countries, and European companies started investing in leather production facilities locally (Mowat 1996; ICDA, 2011).

### **3.4 THE CURRENT SITUATION**

Currently 38 tanneries are registered as tannery businesses in South Africa, only one tannery producing vegetable-tanned leather (See Figure 3.2). The tanneries have the capacity to produce 2 million hides per annum and 600 000 skins per annum at 60% capacity. Seventy percent of local hides are produced for the international market. The industry mainly focuses on the automotive industry and wet-blue with 400 000 hides and 300 000 skins produced per annum.

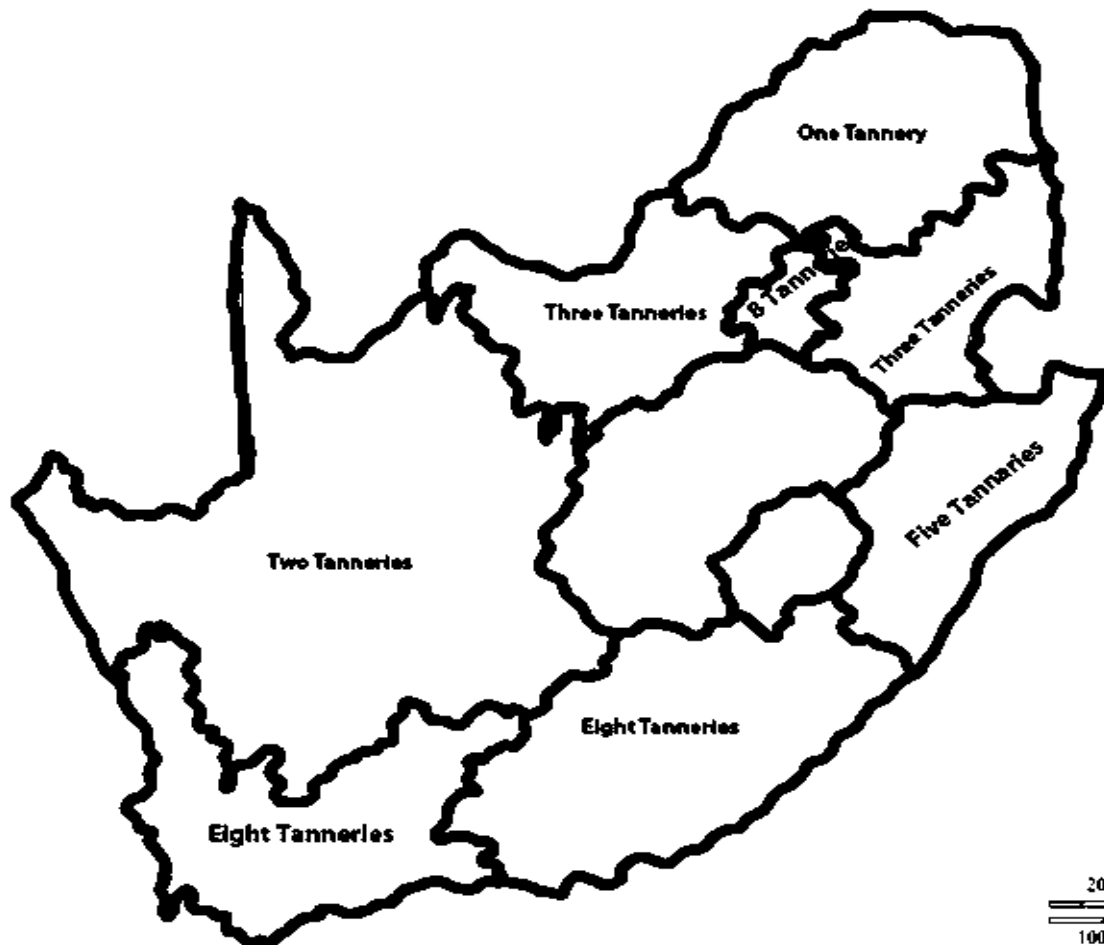


Figure 3.2: The breakdown of leather tanning activities in South Africa  
 (Source: Authors' construct, 2014)

Finished leather is at 800 000 hides, 10 000 skins per annum, the rest of hides/skins are exported raw. The industry employs 6681 people with an export value of \$USD 2,5 billion (about ZAR 21 billion) with major exporting markets being Italy, China, Turkey and India (ITC, 2009; ITC, 2011; DAFF, 2011). Seventy percent of local leather industry is exported as raw hides and skins, or semi-processed. Exporting of hides has peaked in 2010, South Africa exported 86 970 tonnes of raw hides (ibid). Leather is used in many products such as car seat covers, furniture, clothing, and footwear and fashion accessories, this makes it a valuable commodity. The automotive seats and trims make up the majority of the total leather usage, contributing over 87% of the 30% that is for the local market in South Africa (Pieterse 2006; ITC, 2011). Chromium is one of the major pollutants in South Africa due to its use in industries such as leather tanning (Zvinowanda, Okonkwo & Agyei, 2009). In South Africa there is a widespread chromium pollution of underground water and the environment, which dates back to 1942



(Opperman & van Heerden, 2006; Keevy, & Easterhuize, 2011). The practice still continues in many developing countries.

The remaining leather is processed mainly for the automotive industry. The automotive industry is known for its usage of chromium-tanned leather for its interiors, with the exception of Audi that has adopted chrome-free leather for its interiors. The Eastern Cape supplies the highest number of hides/skins for export, it also has the highest number of livestock compared to other provinces (See Figure 3.3). Adding value through leather tanning has the potential of creating employment opportunities (ECDSD n.d.; StatsSA Census, 2011).

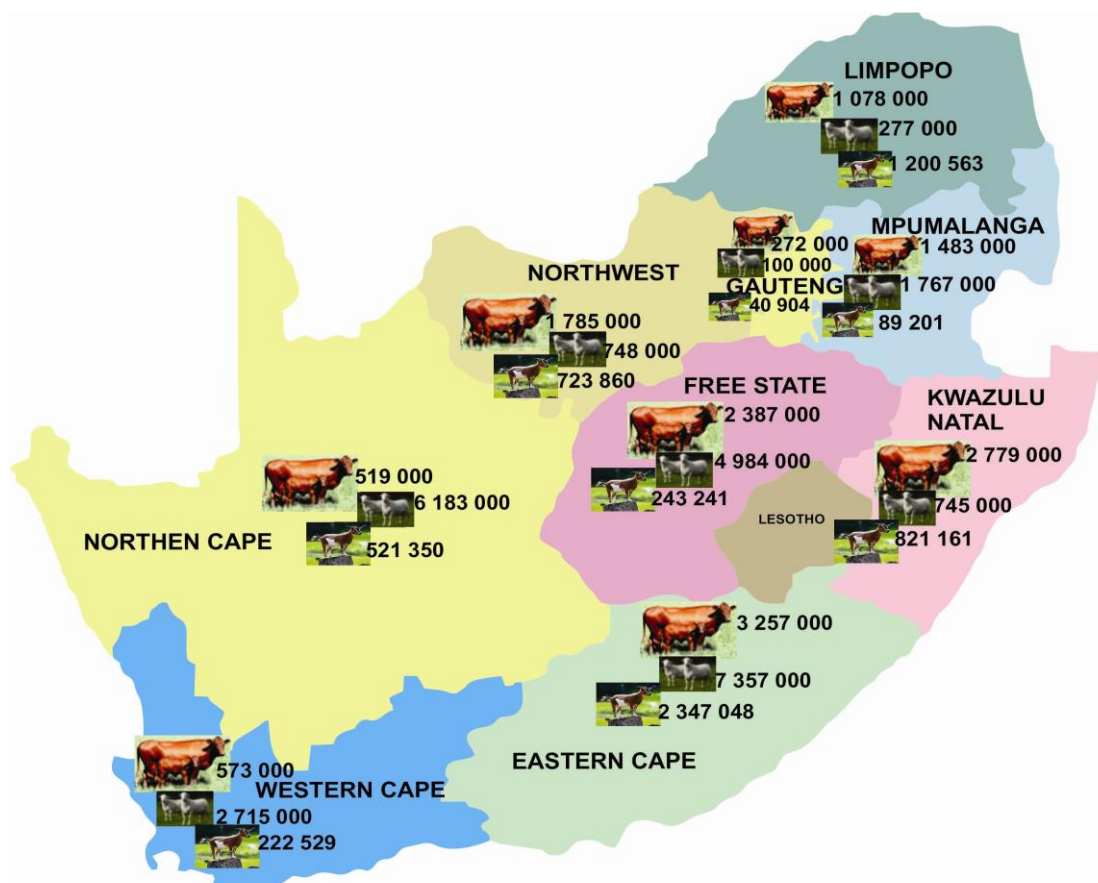


Figure 3.3: Breakdown of livestock in South Africa (Source: DAFF, 2012)

The leather industry falls under the agro-processing sector which one of the top six manufacturing sectors in South Africa, with the value-chain of the sector contributing 40% to the South African economy (Gebrehiwet, 2012; Munyai, 2013). The leather industry contributes 1% to the economic activities and employs a total of 6 681 people which constitutes 1.1% of the

total employment in South Africa by 2010 (Gebrehiwet, 2012; Munyai 2013). Despite being one of the top 10 hides, skins and leather producing countries in Africa (Prakash & Stigler, 2012). According to Prakash& Stigler's report (2012), South Africa produced 86 970 tons of hides and 19 955 sheepskins in 2010. However, the country relies on imported leather to meet local demands.

### **3.4.1 TRADE SYSTEM OF RAW HIDES/SKINS AND PROCESSED LEATHER IN SOUTH AFRICA**

The trading systems begin with the collection of hides/skins from the abattoirs, who in turn sell to merchants, who sell to the tanneries and exporters. According to FAO (2010) between 2007 and 2009 the price of raw hides plummeted to less than a dollar for one hide and this was attributed to the 2008 economic meltdown. Currently, unprocessed animal skins cost ZAR 5 (\$USD 0,60c) while the cow hides are currently estimated at ZAR 70 (US\$ 8,43) (DAFF, 2011).

Since processing raw hides and skins to add value increases the price. Value adding could result in more employment. Currently, wet blue or semi-processed hides are valued at ZAR 204.40 (\$USD 28) per hide (FAO, 2010). This figure could even be higher with value-addition (DAFF, 2011). Lack of value-addition by the local leather industry, which is an essential part of economic development, makes the industry less valuable (Bologna, 2008). Dependence of the African continent on exports of primary commodities, poor economic diversification, constraint in value-adding, poor sustainability frameworks, limited capacity to support climate-change adaptation strategies, and the lack of investment in human resources makes the continent's resources of little or no value or benefit to its citizens (*Ibid*).

South Africa produces crust leather. Crust leather is before the hide undergoes finishing processes like dyeing (Hooghiemstra, 2005). Crust-tanning process requires tanning and re-tanning which leads to the generation of large quantities of wastewater effluent, and tanning sludge (*ibid*). South African tanneries export 90% of the finished leather they produce to Europe and East Asia, where it is used for various leather goods, with the remaining 10% is used by local manufacturers for a wide range of leather goods.

### 3.5 THE LEATHER SYSTEM VALUE CHAIN

The leather system functions include production of agriculture, breeding, slaughter houses, storage which include waste water treatment and solid waste management, tannery, and finally leather (See Figure 3.4) (Puig, Notarnicola & Raggi, 2007). Leather tanning businesses draws input, materials, energy and information from their surroundings. In order for a business system to operate at its optimal level it needs to consider different elements that make up the micro environment. Those are suppliers, customers, markets, competitors, economic environment, political environment, socio cultural environment, natural environment, technological environment as well as the international environment (Manavazhagan, 2008). Inclusivity is another key aspect of the European and Indian leather-tanning sector. Inclusivity underpins the social dimension of sustainability, the sector is also a leader in terms of gender balance and age distribution which is important in ensuring that there is continuity (ECLI, 2012).

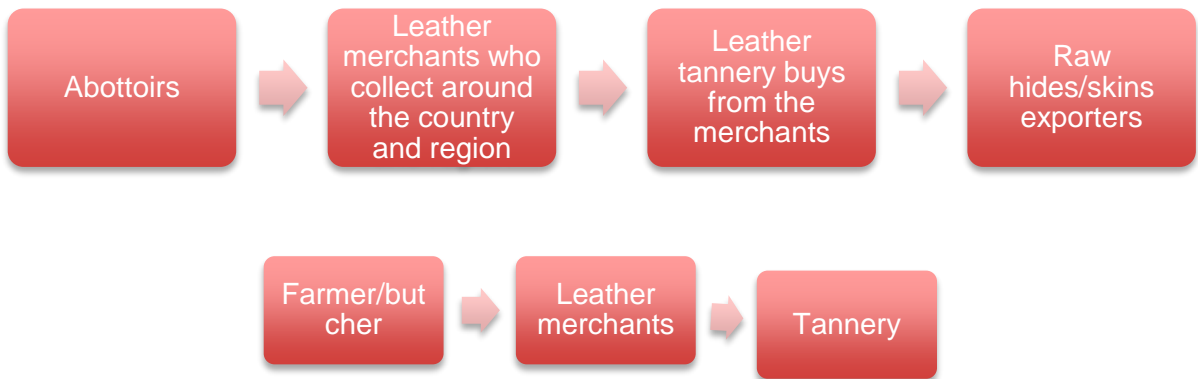


Figure 3.4: Trading system of raw hides and skins in South Africa  
(Source: Owner's construct)

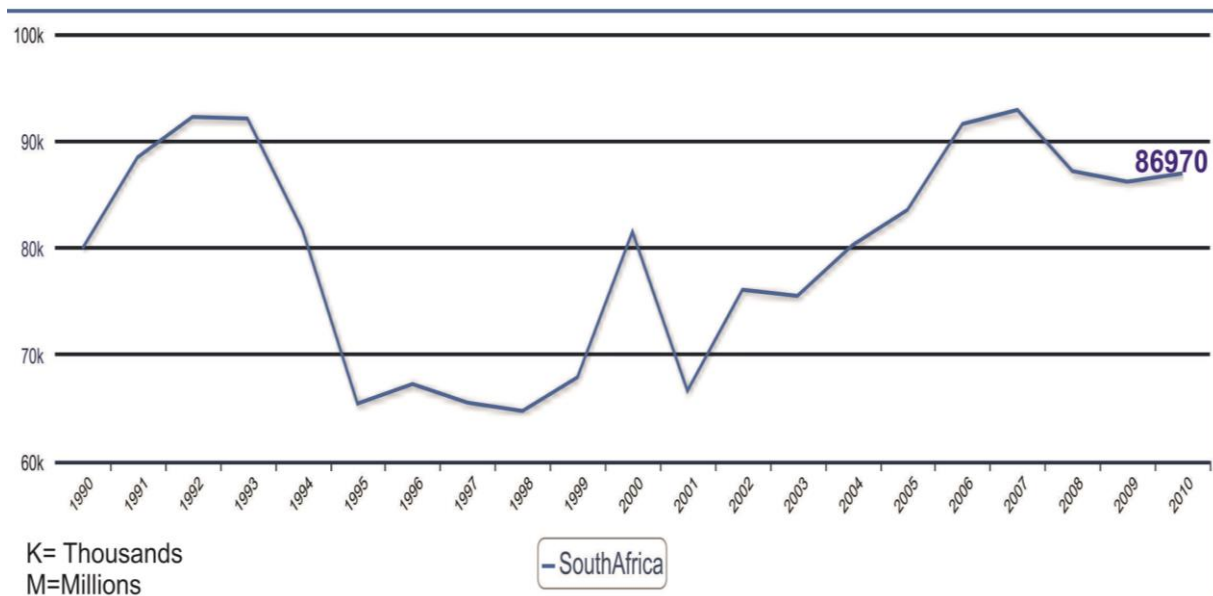
#### 3.5.1 RELIABLE SUPPLY OF HIDES AND SKINS

Currently, there is a very high demand for meat products due to population growth resulting in hides/skins, which are a by-product of meat, that need to be processed in order to add value (Prakash & Stigler, 2012a). According to Prakash & Stigler (2012b) "livestock occupy 30% of the land surface area are a significant global asset valued at \$1.4 trillion (ZAR 13.3 trillion) and employs 1.3 billion people and contributes 33% to protein consumption globally and leads to the production of meat-by-product such as hides/skins".

The leather industry in total produces about 18 billion square feet of leather a year, and the total value of this is estimated at about US\$40 billion (ICT, 2009). Developing countries now produce over 60% of the world's leather, and this proportion is growing (*ibid*). About 65% of the world production of leather is estimated to go into leather footwear and the global production of footwear is estimated at around 11 billion pairs worth an estimated US\$150 billion at wholesale prices (ICT, 2009). The value of leather products for automobiles and aircraft is substantially greater than a proportion of the footwear value calculated at US\$1.350 million (ZAR11 billion) internationally (ICT, 2009; Thornton, 2010).

South Africa is now one of the countries that semi-process leather for further production in many regions such as Europe. Over 30 tons of semi-processed leather was exported to Italy in 2010. Just under 10 tons of leather was exported to Oceania focusing on Australia and New Zealand in 2010. Exports of leather for further processing to various African countries was just above 10 tons in 2010 (DAFF, 2011; Prakash & Stigler, 2012).

South Africa also exports raw hides and skins to Asian countries such as China, Hong Kong, India and Thailand (See Figure 3.5).



**Figure 3.5: The breakdown of volumes hides that were produced in South Africa from 1990-2010 (Source: Fao, 2012)**

Figure 3.5 shows an increase in volumes of hides that were produced in South Africa in 2010 indicating that the country has no scarcity of raw materials.

### **3.6 MANAGEMENT OF CHROMIUM WASTE FROM TANNERIES**

Chromium waste has been identified as a crucial problem in South Africa. Its heavy metal pollution results in non-biodegradable products which accumulate above lethal concentration levels due to the wide range of chemicals used in the process of leather tanning (Mkhonta, 2010; Munyai, 2013). In South Africa waste from the tanning process is currently classified as class 6 which refers to toxic waste due to presence of small cyanide (CN) and hexavalent chromium (Cr (VI) and is therefore assigned the hazardous rating (extreme risk) (Hooghiemstra, 2005; Munyai, 2013). The Department of Environmental Affairs has permitted hazardous waste to be disposed in dedicated landfill sites.

However, the designated landfill site does not offer a long term solution because the waste is highly water soluble at all pH values, particularly the physiological and environmental pH levels (UNIDO, 2012; Escuer, 2012). Chromium waste is also very mobile in the environment and readily moves through soil contaminating groundwater supplies (Hooghiemstra, 2005; Munyai, 2011; Munyai, 2013). Globally, waste from the leather tanning activities have been rated as in the top 3 most toxic in the world (Black Smith Institute, 2010).

Strategies that are less environmentally polluting are required, however, this might prove a challenge as, currently, South African companies continue disposing the effluents of the tanning process with general waste in the landfills (STATSSA, 2012; Harris, Fuller & Ericson, 2011). According to Bezuidenhout (2012), most large tanneries in South Africa are close to the cities, where grey water and sewage systems are available for the disposal of waste water.

Radical change in the industry and development of production policies that are local context relevant needs to be encouraged. Very few tanneries have recycling systems in place, which means toxic chromium waste is discarded in municipal dumps or on the company's land or with general waste in the landfills (Harris, Fuller & Ericson, 2011).

### 3.6.1 MANAGING CHROMIUM WASTE IN SOUTH AFRICA

Chromium waste easily oxidizes and becomes carcinogenic hexavalent chromium upon disposal in solid waste such as in the landfills, the conversion happens due to heat and oxygen (Mwinyihija, 2010; Munyai, 2013). In tannery wastewater the conversion takes place once the chromium comes into contact with other minerals (Mwinyihija, 2010). New techniques for improving chromium-tanning process's impact on environment through recycling are not available in some industrially developing countries. Chromium tanning is still the most commercially used method of tanning in South Africa. The country produces approximately 7 020 tons of tannery waste per annum (Mkhonta, 2010). The Eastern cape was identified as having the largest number of tanneries concentrated in close proximity that produce 3 120 tons of waste just in the Markman industrial area alone (*ibid*).

In most African countries there are no contingency plans to deal with chromium waste from tanneries (Muchie, 2000; Ayres & van Lugt, 2011; Munyai, 2011). Due to strict environmental laws in many developed countries the first stages of tanning process take place in developing countries which are most polluting stages of tanning hence they export semi-processed leather (CBI, 2005). The waste in some cases is illegally dumped on the streets or dumped with normal waste on the landfills (Harris et al. 2011). Regions impacted by chromium pollution from the tanneries are South Asia, Central America, South America and Africa (Blacksmith Institute, 2011). These are industrially developing that produce high volumes of skins/hides per annum.

Leather producing countries from the developed world use wastewater treatment plant (see Figure 3.6) use an equalisation basin, which is followed by a coagulation (around 1000 mg of PAFC and anionic polyelectrolyte as flocculent), flocculation process and biological nitrification to remove chromium from the water. The pH is then adjusted to over 8.5 using Ca (OH)<sub>2</sub> to remove effectively chromium (Lofrano, Belgiorno, Raimo, & Meric, 2006).



**Figure 3.6: Modern biological treatment unit**  
(Source: Bader, 2012; TIB, 2013)

However, most advanced technologies in the tanning industry are still inaccessible in some developing countries. As a result the effects of chromium waste from the atmospheric system on human health has been realised. Finding effective alternatives to chromium tanning that are cost effective, locally available, easy, safe to use and naturally abundant resources is imperative (Haroun et al., 2008). According to Gombault and Begeer (2013: 36) “in developing countries uncontrolled discharge of effluents into the environment is common practice”.

Furthermore, they suggest that there is no eco alternative available to chromium tanning as synthetic and aldehydes also have negative effects on the environment. However, vegetable tanning is considered to be less environmentally hazardous than chromium. The counter argument to vegetable tanning is that it is too labour intensive and time consuming as it will be discussed further in the following sections.

### **3.7 THE CHALLENGES OF INDUSTRIALISATION RELATIVE TO DEVELOPMENT OF THE LEATHER INDUSTRY FROM AN EMERGING ECONOMY’S PERSPECTIVE**

Globalisation processes replaced domestic economic life and local economies became heavily influenced and controlled overseas. The globalised economic mode and process can be viewed as a surrender of power to cooperation as well as keeping poorer nations in their place (Jeffrey, 2002; UNIDO,2011). The new plan of decentralisation in South Africa offers an opportunity to revisit the traditional methods with a proven tradition and that is being promoted in some

developed and developing countries. Revisiting the traditional methods calls on people to revert back to the practices that promoted more positive behaviour and relations with others, and the environment, which are in line with the global concept of sustainable development that will be discussed in the following chapters. This is also in line with the IPAP policy which seeks to deepen support programmes in the manufacturing sector, including leather and footwear. The policy also aims to give support to the green industries which, in the case of this study is vegetable tanning which uses renewable resources (The DTI, 2010; 2013).

Sustainable development is a concept that is meant to help countries redress the ills brought about by globalisation and the other exploitative trade systems such as the Washington Consensus which fortified the prevalence of low-paid workers, selling off state owned industries to qualify for IMF and World Bank loans and the increasing dominance of developed countries' corporate culture across the globe (Scrase, 2003; Bender, 2006). According to Mahatma Gandhi (in Coutinho, 2007), industrialisation is based on the division of labour and limits man's self-expression. "It starts by snapping the navel chord of man which binds him with soil and corrosive and all-enveloping shadow of giant machineries". Industrialisation requires huge capital accumulation through large-scale industries in developing countries. It promotes foreign ownership and dependence. Industrialisation can be viewed as some form of colonialism as it creates the legacy of dependence which is the same thing colonialism did (Twalo, 2009).

Gandhi's thinking was based on the keen insight into political, social and the cultural ills, which are often brought about by large-scale industrialisation (Coutinho, 2007). Industrialisation is currently argued to be the most powerful welfare-generation mechanism which the SADC region has to address development challenges (Vickers & Motsamai, 2011). However, this study argues that addressing development challenges requires the participation of the citizens so that they can be able to take ownership of the process and the results.

There is a great need for Africa to tap into its unexploited potential to redefine the role of state, which is fostering domestic investment and local demand, promoting regional markets, and deepening structural reforms to assist in increasing domestic resource mobilisation to improve business climate (FES, 2011; Lopez, 2013). This is more evident in the South African manufacturing sector where the industries shifted focus to export semi-processed or raw materials instead of investing on value adding processes which will result in more employment opportunities for many young people who are unemployed. However, the IPAP policy has



identified challenges that affect the development and growth of the manufacturing sector which includes leather and footwear industry. The key areas includes: building competitive manufacturing with strong growth and employment multipliers; in terms of trade policy, clamping down on illegal/substandard imports and creating a strategic tariff regime; leveraging state infrastructure spend through localisation programme and designations; resource beneficiation to grow upstream/downstream value chains; and clamp down on collusion and price fixing (The DTI, 2010; 2012; 2013). However, there are other challenges which are discussed in the following sections which will need to be addressed in order for development to truly be realised.

### **3.7.1 REMOVAL OF REGIONAL IMBALANCES**

Regional economic integration is an integral part of South Africa's development strategy to address inequalities and create access to opportunities that were denied by apartheid government (The DTI, 2012). Regional economic integration is viewed as a means to achieve sustainable economic growth (Soko, 2007). State driven regional integration is aimed at directing social change. The IPAP policy framework aims to "contribute towards industrial development in Africa with a strong emphasis on building the continents productive capacity and deeper economic integration" (The DTI, 2013: 11). However, there are imbalances that need to be addressed starting at a country level.

The Southern Africa Development Community (SADC) region is made up of fifteen member states that is Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Madagascar, Mozambique, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe (See Figure 6.7) (Mzumara, Chingarande & Karambakuwa, 2012). It is a mixture of diversified economies with South Africa as the leading economy (Osman, 2010).



Figure 3.7: The breakdown of countries that make up the SADC region  
(Source: Google maps, 2014)

Table 3.1: breakdown of leather production by country SADC countries and their leather production capacity (FAO, 2011).

Member state	Leather production within the country per annum	Raw hides wet & salted	Sheep skins	Goat skins & kidskin	Current operational Tanneries & their capacity	Major Export markets
Angola	0.5 million pieces	8.2 thousand tonnes	0.3 million pieces	-	-	-
<b>Botswana</b>	<b>240,000</b>	<b>163,484</b>	<b>42,034</b>	-	<b>1 tannery that employs 41 people &amp; several artisan tanneries.</b>	<b>Regionally: South Africa Internationally: European Union</b>
DRC	-	1.1 million pieces	0.3 million pieces	-	-	-
Lesotho	-	-	-	-	-	-
Madagascar	-	-	-	-	-	-

<b>Malawi</b>	1.2 million pieces	-	0.1 million pieces		1 tannery employs 60 people	Regionally: Tanzania, South Africa, Zambia, & Zimbabwe Internationally: China, Hong Kong, Italy, Greece & Portugal
<b>Namibia</b>	-	-	-	-	-	-
<b>Mauritius</b>	0.2 million pieces	-	-	-	-	-
<b>Mozambique</b>	0.1 million pieces	-	-	-	-	-
<b>South Africa</b>	3 million pieces	57.7 thousand tons	9.1 million pieces	11.9 thousand tons	32 tanneries 17500 employees	Italy, Far East, China, Turkey, Europe & India
<b>Swaziland</b>	No data available	-	-	-	-	-
<b>Seychelles</b>	No data available	-	-	-	-	-
<b>Tanzania</b>	2.3 million pieces	23 thousand tons	-	3.2 million pieces	2 tanneries employs 60 people	India, Pakistan, China & Hong Kong
<b>Zambia</b>	0.4 million pieces	6 thousand tons	0	100,000	4 tanneries 420 employees	China & Europe
<b>Zimbabwe</b>	0.5 million pieces	11.7 thousand tons	90,000	123,000	11 tanneries that employ 249 people	Export of raw hides is banned. Finished product is sold locally, the rest is exported to COMESA countries

Africa is home to 240 million heads of cattle, which equals 16% of the global population (Prakash & Stigler, 2012). The SADC region is home to 64 million cattle, 39 million sheep, 38 million goats, 7 million pigs, 1 million equines and 380 million poultry. Seventy five percent of this livestock population is kept under smallholder traditional systems (SADC, 2012; Prakash & Stigler, 2012). African Elephant (*Loxodonta africanus*) has an estimated population of between 470 000 and 690 000 and the numbers are increasing (WWF, 2009; Prakash & Stigler, 2012).

South Africa is the largest member of SADC countries in terms of animal agriculture, which is dominated by meat and meat by-products. Botswana's agricultural industry accounts for 90% of total animal agriculture output (WTO, 2005). Primary processing of leather in Botswana is dominated by survivalist and micro artisan tanners who are mostly engaged in vegetable tanning (Anon, 2006; Koloka & Moreki, 2011; ITC, 2011). For example, Namibian tanneries only have capacity to semi-process goat and sheepskin up to the pickled stage. The Namibian government introduced an export levy of 15% for both raw and semi-processed hides/skins

hides/skins (IDI, 2007). Eighty percent of hides/skins in Malawi are exported regionally to South Africa, Zambia, Zimbabwe and Tanzania, and internationally to China, Hong Kong, Italy, Greece and Portugal (Comesa.org, 2009; LLPI, 2010).

Tanzania is facing the same predicament as other leather producing countries because practically all their raw materials are exported (Mrindoko, 2012). Consequently, Tanzania has not availed the profit of value adding by processing and exporting finished leather goods (ibid). There is also low investment in value addition which has denied the nation earnings, as nearly 90% of exports are raw hides/skin (Ibid). This is not to suggest that the above mentioned statistics indicate the true nature of the industry in those countries, as most of the SADC countries only focus on reporting on the large tanneries. In most SADC countries there are no studies that have been conducted on small-scale leather tanning activities and their contribution to the economy or the industry (ITC, 2011; Mrindoko, 2012). It is hoped that this study in some way will contribute towards addressing this lack of information.

Large-scale industrial development in the SADC region generally depends on Foreign Direct Investment (FDI). There has been a remarkable increase in FDIs in Africa and the increase in import substitution (IS) related activities to extractive industries has spread to various economic sectors (Jaja, 2012). Statistics on trade indicate that the SADC leather producing countries export a large portion of raw hides and semi-processed leather to countries such as Italy, China, US and other parts of the world (Prakash & Stigler, 2012).

South Africa is facing the same challenges that have been mentioned above. The tanning as well as leather product industry has exceeded the meat industry in terms of value within the agricultural commodities sector (LLPI, 2010).

ISI encouraged substituting locally produced goods as a means of development based on external demand and the point of it is to produce for international trade. Many policy makers in the developing world adopted these strategies. Government as the protector of these policies through import tariffs, quotas and via exchange rates have caused bureaucracy and destroyed local industries (Edwards, 1993). There is no arguing that government intervention is required to support and grow local industries and protect its citizens' interests. However, in developing countries such as South Africa import substitution and export promotion has been to the detriment of local industries (Mehdi & Juan, 2008). This is particularly the case within the

clothing and textile, footwear and leather goods sector are considered together. Existing literature identifies the following projects as some of initiatives which have been taken by some countries to advance economic development. In discussing these projects, the ensuing section also looks at barriers that have been identified in the literature as preventing the growth of the local industry in sections 3.7.2.1 to 3.7.2.12 are the measures some countries have taken to advance economic development are articulated.

### **3.7.1.1 NON-TARIFF BARRIERS**

Non-tariff Measures (NTMs) include diverse array of policies that are applied to imported on exported goods. NTMs are employed as instruments of commercial polices. Export of hides and leather from South Africa receive preferential treatment by EU countries, US, Hong Kong and Singapore under the Pacific Countries Trade Agreement (ACP). Africa Growth and Opportunity Act (AGOA) is for exports to the US and Generalised System of Preference (GSP) to Turkey. In China and India high tariffs have been used to protect their domestic production (as discussed in section 3.4). None Tariff Barriers are determined by developed countries and take the form of strict measures or adherence to stringent certification measure such as 1SO 9000 certification (DAFF, 2011a).

The measures span products lifecycle, raw material, where the product is made, and the manner of production, management of production process, labelling standards and packaging requirements (DAFF, 2011). Developed countries have argued that they use Non Tariff Barriers to ensure that imported products satisfy environmental, consumer health, consumer safety and social concerns. Non-Tariff Barriers including the use of anti-dumping laws are considered to undercut free flow of goods and services (The DTI, 2011). South African laws are considered to be non-transparent and therefore hinder foreign investment (The heritage foundation, 2013). However, Kalaba & Kirsten, (2012:1) indicated that “there is a decline in trade protection in the SADC region and this has not resulted in an improvement in trade performance”.

### **3.7.1.2 ILLEGAL IMPORTS**

Illegal imports have proven to be a big challenge for the South African government to tackle (The DTI, 2010; 2013). Companies manage to find loopholes and ways of bringing in goods that

are not declared. Under-invoicing leads to negating of tariffs in place of imports. Under-invoicing gives importers a competitive advantage over local manufactures (The DTI, 2012). Under-invoicing is often done to avoid paying duties. This essentially deprives government the tax revenues and this becomes a huge cost to the domestic industry in terms of job creation. In this case importers paying no duties on their products (Davies, 2011).

### **3.7.1.3 HUMAN RESOURCES**

South Africa has abundant physical and human resources but has failed to capitalise on this (The *Economist*, 2010). This makes the country one of the few to have failed to capitalise on its biggest, readily-available resource. The IPAP policy seeks to address the issue by promoting industrialisation and “increasing the participation of historically disadvantaged people and marginalised regions in the economy” (The DTI, 2010; 2013). Labour intensive sectors such as leather tanning could benefit from the human resource. Skills and competitiveness deficits were identified in the IPAP policy framework as one of the key factors affecting the manufacturing sector. However, skills according to Kraak (2005:60), refer to those in the formal economy. He also noted that “their jobs and security lie in an expanded manufacturing sector and informal sector. The economic activity and livelihood is a continuation and expansion of past forms of economic institutions”. The informal sector plays an important role in the development of the economy. However, currently unemployment is notably high for the 20 to 24 age group. Over 50% of young people who have less than matric in South Africa are unemployed, while possessing a matric certificate has also been noted to not result in improved labour market outcomes (HRDSA, 2013). South Africa’s unemployment rate (in terms of both the official and the expanded rate) is very high and constitutes a key challenge for the country’s development agenda(Stats SA. 2011).

### **3.7.1.4 THE SOUTH AFRICAN ECONOMIC ENVIRONMENT**

Economic environment refers to economic factors that have a direct bearing on the functioning of the business that also affects both the inputs as well as the selling of finished goods (Panaino & Mayrhofer, 2009). Factors in the economic system include: South Africa is considered to have two economies which are a dynamic first world economy and a rural and urban economy where

socio-economic inequalities are still rife (The DTI, 2012). In trying to redress the imbalances the government came with the IPAP, NDP and the NGP policy frameworks (Panaino & Mayrhofer, 2009). South Africa has also in recent years seen a rise in non-resident investors taking ownership of a wide range of sectors (SACU, 2011).

Socio-cultural environment is a collection of social factors affecting a business and includes facilitating trust between firms, employers, workers, social traditions, values, beliefs, levels of literacy and education, ethical standards of society, social stratification, and cohesiveness (Schmitz & Musyck, 1994; Oommen, 2004). Socio-cultural environment consists of human relationships, social attitudes and cultural values and norms of society which also contribute and determine how individuals and organisations should relate to each other.

Moreover, family structure and family values contribute towards the way people behave. Educational levels as well as awareness and consciousness of rights and work ethics are also an important factor. The socio cultural environment is elaborated further in Chapter Four.

### **3.7.1.5 TECHNOLOGICAL ENVIRONMENT**

Investment in technology referring to upgrading of production to automated production systems, have proven to be a challenge for countries like South Africa due to the costs involved and the reliance on the imported equipment. When the equipment breaks down there have to be an interruption to the production while companies wait for the replacement parts to be shipped in (Munyai, 2011). However, having difficult access to the required technologies also offers an opportunity for context-relevant technology development for the continent's leather producers. This means there is enough scope for innovation, particularly in the leather production technology.

On this issue Schumacher (1973:18) suggested that "methods and equipment which are cheap enough so that they are accessible to virtually everyone are needed in production. Secondly, equipment that is suitable for small-scale application and compatible with man's need for creativity is required". He further suggests that "methods and equipment should leave ample room for human creativity if the process of production takes away from work any kind of humanity making it merely mechanised activity, the worker himself is turned into a perversion of

free being” (Schumacher 1973: 18). Basic technology or tools are required to help enhance the leather production process in order for it to be able to compete and meet international standards. This is an opportunity for countries to find alternatives to high-tech production equipment that is not easily accessible to many developing countries.

#### **3.7.1.6 INTERNATIONAL ENVIRONMENT**

Eighteen billion feet<sup>2</sup> of leather is produced worldwide that equals the total estimated value of US\$ 40 billion (about ZAR 357 billion) of plain leather. Leather tanning is a big industry that is projected in Europe alone to reach US\$ 29.5 billion (about ZAR 263 billion) by 2015 (New Market Research Report on Leather Tanning global Industry Analysis, 2010).

Furthermore, the number of people employed in the tanning industry worldwide is estimated at well over 5 million and the numbers of people employed in downstream manufacturing sectors has not been established (ICT, 2009). The importance of the leather sector in international trade terms is much bigger than meat and other commonly recognised commodities (ICT, 2009; CGP, 2011).

It is crucial that leather-producing countries come up with strategies that are context relevant, and environmentally ethical in dealing with the meat by-product in the process of creating employment opportunities. Environmental ethics are also embodied in various well-established cultural traditions. Environmental ethics is a global issue, which is dealt with differently at personal, local, national, regional, multinational and global levels (Todorovic & Ma, 2010). However, global politics and globalisation of production have greatly contributed to the environmental depletion. In sections 3.7.1.8 to 3.7.1.11 some of the challenges that have been identified to affect the leather industry in South Africa and many African countries are discussed.

#### **3.7.1.7 CURRENCY STRENGTHENING AND VOLATILITY**

The rand volatility can be attributed to South Africa’s dependence on commodities whose prices with highly-variable prices. Importing of goods continues to outpace the export due to demand of capital goods (SACU, 2011). According to Arezki, Freytag & Quintyn, (2011) “Commodity



exporting countries like South Africa face long terms of trade fluctuations, which render the exchange rate volatile”. Because the leather industry in South Africa is export driven, it is affected by the Rand as it experienced more frequent episodes of nominal and real exchange rate volatility (Arezki, Freytag & Quintyn, 2011).

### **3.7.1.8 LIMITED ECONOMIES OF SCALE IN LEATHER**

There are limited economies of scale in parts of the subsectors of the leather industry (The DTI, 2013). Economies of scale refer to the cost advantage that rises with the increase in product output. In essence economies of scale is about the relationship in quantity produced and per unit fixed cost (Pride & Ferrell, 2010).

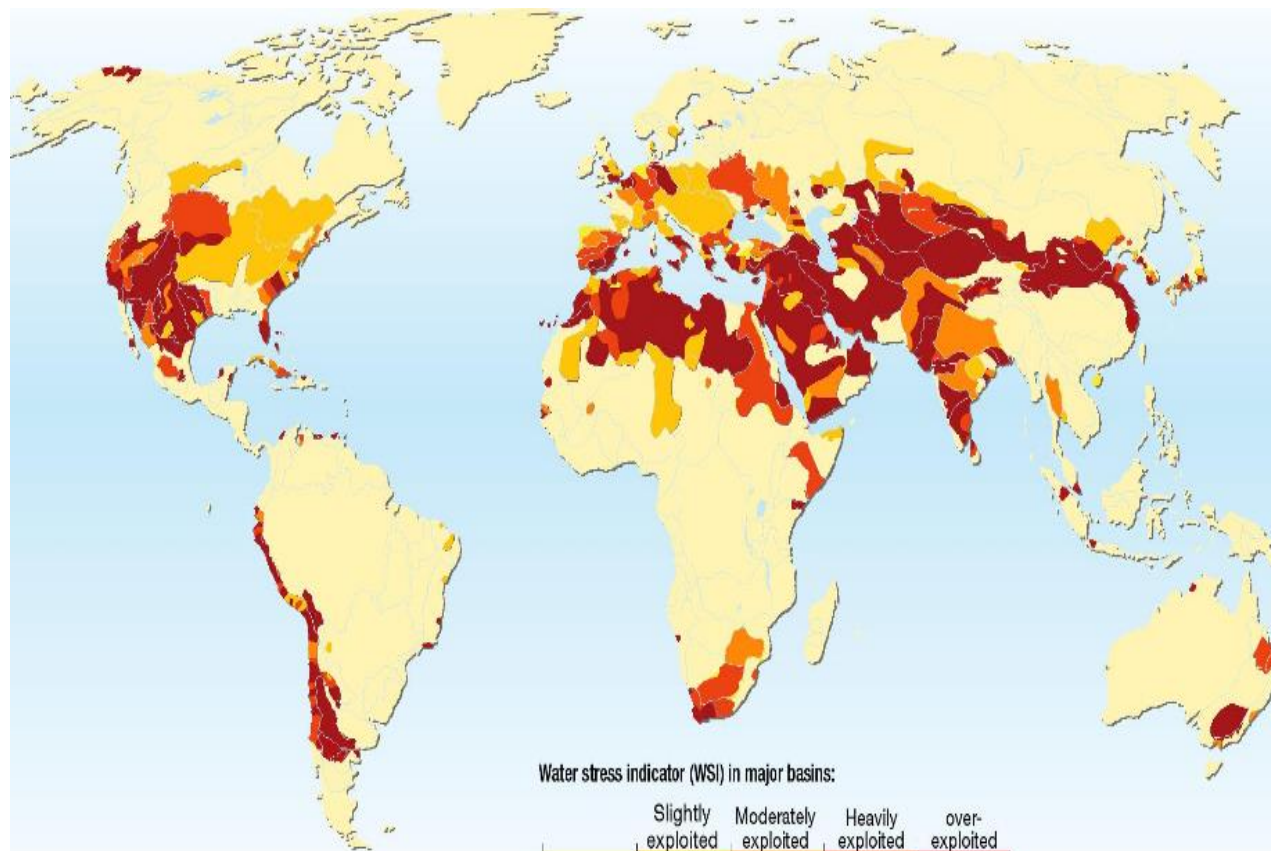
However, the leather industry can improve its economies of scale due to the growth of footwear, furniture and other sub-sectors. The industry has the ability to benefit from the economies of scale through good use of local resources and infrastructure. Cooperation and collaboration can create economies of scale within the SME sector (Quattos and Mccallin, 2009). It is necessary to produce at minimum cost using lean manufacturing to counter economies of scale (Manavazhagan, 2008).

### **3.7.1.9 SOUTH AFRICAN INFRASTRUCTURE**

According to government, infrastructure lies at the heart of the stimulatory fiscal package and is considered pivotal in the NGP (DPDDBSA, 2012; The DTI, 2012). For the first fifteen years of independence the government’s mission has been to address basic needs such as rolling out social infrastructure. From the mid-1990s the government increased capital spending. For the next ten years the government intends to redress economic infrastructure backlogs and inadequacies, which have been identified as a constraint to economic growth (The DTI, 2012). Investing in infrastructure is linked to the notion of infrastructure being the final good providing service to consumers, which may include water, and electricity, while transport is considered an intermediate input for raising productivity. In the Industrial Policy Action Plan government is looking at infrastructure as one of the nine key points which to invest in (The DTI, 2012).

### 3.7.1.10 AVAILABILITY OF WATER

South Africa is a water-scarce country. This makes the call for wastewater treatment centres in all the areas where leather tanning takes place is critical. Despite being endowed with hide/skins as well as the plants needed for vegetable tanning, water is not always abundant in South Africa. Below is a map that indicates the ranking of different countries in terms of water scarcity. The water stress indicator varies from slightly exploited, moderately exploited, heavily exploited to over exploited (See Figure 3.8). South Africa falls between heavily exploited and over exploited. Botswana is not indicated as facing the same challenge. Furthermore, Italy falls under moderately and heavily exploited (UNEP, 2008).



**Figure 3.8: Map of water level around world  
(Source: UNEP, 2008)**

The water stress indicators suggests that countries that are involved in heavy production process require strategies that will ensure that water is used wisely in closed loop production processes. This means that companies need to set waste-water treatment units to ensure water

reuse which, in the long run could help reduce production costs as well as save the environment.

### **3.7.1.11 FINANCIAL AND FISCAL SECTORS**

Prior to 2008, through the GEAR policy, government reduced the country's debt by running a tight ship of fiscal discipline from 50% -22% (SACU, 2011). However, things have since changed. The ratio has increased to 40% of the GDP (Ramos, 2013). This puts South Africa in the same risk as the developed nations which have been obliged to follow severe fiscal austerities in order to reduce public debt. South Africa needs the economy to grow faster and generate higher tax revenue in order to avoid severe austerities. However, for that to happen, good planning in terms of job creation is required.

Decentralisation of production puts emphasis on the importance of culture for economic growth, a dimension that is often ignored by policy makers. Some authors have however, realised that the social foundation of economic development have become critical. Traditional ways of cluster development based on small-scale collective-efficiency approach need to be supplemented with socially embedded drivers as well as a national and local policy environment that supports smaller producers (Parrilli, 2009). Industrially developing countries need to understand that traditional knowledge can help industries transition from low-tech to successful innovation clusters, because local knowledge unlike western knowledge, is open to new forms of knowledge. Some developed countries have strengthened their traditional industries and then made the transition through innovation into powerful sectors that have become leaders in the world.

## **3.8 DECENTRALISATION OF PRODUCTION IN SOUTH AFRICA**

Another key factor that the policy wants to tackle is the issue of decentralisation (The DTI, 2010; 2012). Industry Decentralisation (ID) began in the 1930s in South Africa but it was only in the late 1950s that a system of decentralisation to growth points in border areas was established (Wellings & Black, 1986). According to Berry (1980), globally action on decentralisation began in the 1970s and became known as counter urbanisation which is linked to regional theory. However, South Africa's first attempt at decentralisation was motivated by the apartheid

governments need to keep the majority of the working blacks out of the metropolitan areas (Wellings & Black, 1986). Decentralisation today is an opportunity to extend economic participation to all corners of the country through the establishment of small-scale manufacturing systems which could cooperate to meet demand. Small-scale leather tanning activities remain under-developed and unrecorded as contributors to economic activities.

Wellings and Black (1986:146) criticised the study by Cobbet's et.al. (1985) in relation to the development of the regions during the apartheid government as "an ideological function, because the regions cross-cut or by-pass existing highly politicised spatial units. The units were created primarily to disguise the economic and political realities of capitalism under apartheid. The regions were used as propaganda to suggest that development planning and the development process will transcend the political realities, which separated Bantustans from white South Africa". Decentralisation then was only meant to benefit the few. Decentralisation now is about ensuring wider participation in economic activities and thus bridging the urban rural divide.

Weaver (1985) states that decentralisation is not only about big structured firms, but also about regions or networks of skilled labour that are combined through subcontracting arrangements between smaller firms in an area (Saito, 2001;Barca, 2009). The call for decentralisation of production as a concept is attributed to Mahatma Gandhi, he suggested that decentralisation was key to equally developing even in those parts of the country that are rural and would allow the equal responsibility and for sharing of resources (Prasad, 1955; Mehta, 2012). In an article published in 1980s Murray investigated the importance of decentralisation in order to establish small-scale resilient industries in the Italian manufacturing sector as opposed to the automated centralised production (Murray, 1983; Botella-rodríguez, 2010). The study found that small-scale manufacturers played a significant role in employment creation which was fuelled by decentralisation and vertical disintegration of large companies Loveman & Sengenberger, 1991; Botella-rodríguez 2010). Decentralised production is considered to be a form of flexible manufacturing, which represent locational flexibility and organisational flexibility (Scherer & Weik, 1996; Vaithegi, 2007).

Gandhi encouraged decentralisation and regional self-reliance through small-scale and cottage industries. He believed that small-scale industries created employment opportunities for people living in rural areas through the utilisation of local knowledge and skills (Mehta, 2012: 181).

Decentralisation is often used in the political context to refer to the policy of delegating decision making and the dispersing of power to the lower levels. However, in this study decentralisation of manufacturing is seen as an intrinsic element of a sustainable future because of its association with self-sufficiency (Schumacher, 1973; Loveman & Sengenberger, 1991).

Decentralised structures are often based on the idea of flexibility, better response to customers and on promoting entrepreneurial spirit (Salmi et al., 2001; MESPRD, 2007). Small and Medium Enterprises (SMEs) have been identified as an important vehicle to drive job creation, address economic growth and social equity in South Africa (Paas & Voora, 2012).

Small manufacturing systems require less capital, and make use of local resources (*Ibid*). SMEs also fit in within the strategy of government to build a strong competitive manufacturing industry and employment opportunities (DTI, 2013). At the centre of government's National Development Plan (NDP) is job creation, and the leather industry has the potential of absorbing more labour due to its labour intensiveness and the availability of resources and the natural materials for tanning such as the black wattle as discussed in the next section.

Decentralised firms have access to the informal crafters and other businesses to supply for their production (Schumacher, 1973; Bellandi 1997; Mirata et al., 2005). While volumes required can be met through the networks of regionally organised cooperatives and clusters, this paradigm has the potential to be spread geographically to new regions. New industrial sectors may well provide new economic bases for development and promote means of transforming the work process (Weaver, 1985; Thörnqvist, 2007; Tomaney, 2010). Skerrat, (2013: 238) indicate that localism or decentralisation is a shift in the way that voluntarism brings benefits and empower individuals, and communities. He further suggests that it can help address place-based challenges by establishing good systems that will help with the production process within industries.

Moreover, "in a decentralised environment collaboration is needed to achieve manufacturing excellence, and is complicated due to a wide range of markets, sub-cultures and industries" (Kennedy, 2001:2). Decentralised structures are often based on the idea of flexibility, better response to customers and on promoting entrepreneurial spirit (Salmi et al., 2001; MESPRD, 2007). Small Medium and Micro Enterprises (SMMEs) have been identified as an important

vehicle to drive job creation, and address economic growth and social equity in South Africa (Paas & Voora, 2012).

### **3.8.1 PROMOTING SMEs AS A STRATEGY TOWARDS DEVELOPMENT**

SMEs play an important role in the development of the economy through creating employment (NCR 2011; Munyai & M'Rithaa, 2013). Governments in many developed countries have realised the value of SMEs in job creation and economic development and are constantly trying to come up with policies and strategies that ensures they are properly supported and continue to grow.

SMEs were established in developed countries through decentralisation of production system by breaking it down into smaller companies that were used as a strategy to avoid trade union power in Great Britain, while in Italy in the 1970s SMEs formed part of adjusting production capacity (Munyai, 2013). Most decentralised SMEs in Italy were originally set up to escape the trade unions regulations, this allowed companies not to be bound by the standard wage and social benefits due to the fact that they employed less than fifteen people (Manfra, 2002)

According to Morgan (2012:3) and Munyai & M'Rithaa (2013), SMEs in South Africa are classified by the National Business Act as enterprises that are micro and are often survivalist and lifestyle businesses. These businesses still face challenges which include finance, market access, skills, enabling environment lack of support for the bureaucratic application process for financial support. The above statements indicate the need for policies that foster high-growth. The government seem to recognise that it needs small businesses but has not yet realised that the small businesses have needs (Stam & Wennberg 2009; Morgan 2012; Neneh & van Zyl, 2011' Munyai, 2013). However, government has, since the beginning of 2014, established a Ministry of Small Businesses, which is meant to help accelerate the growth of small businesses. The policy is significant for decentralisation, rural development and the development and promotion of labour intensive industries, to which the leather production activities fall under creating a supportive environment for social entrepreneurship to thrive.

### **3.8.2 SOCIAL ENTREPRENEURSHIP TO ADVANCE THE KNOWLEDGE-ECONOMY AGENDA**

Business has a role to play in addressing societal issues has become part of a discourse on social entrepreneurship (Urban, 2008). The term social entrepreneurship originally referred to someone with the passion of an entrepreneur in tackling a social challenge (Roper & Cheney, 2005; Wurttemberg & Valley, 2011; The young foundation, 2012). These are entrepreneurs with a social mission that is explicit and central to everything they do.

The term lends itself to several interpretations including, but not limited to social interventions with distinctly business like characteristics as well as businesses themselves (Liang, 2002; Urban, 2008; Wurttemberg & Valley, 2011). Social entrepreneurship has also been associated with non-profit organisation (Dees, 1998). Today the term is used to identify venturesome individuals who stimulated economic progress through finding better ways of doing things (Dees, 1998). Another aspect of the social entrepreneurial movement is that of approaching social change with business rigour and analytical tools (Urban, 2008).

Social entrepreneurship comprises a particular subset of entrepreneurial activity where products and services attempt to address social problems (Miller, Grimes, McMullen & Vogus, 2012). Social entrepreneurs are keenly interested in understanding the impact of their product to effect systematic social change (Urban, 2008; Bugg-Levine & Emerson, 2011). Social entrepreneurs are usually less politically motivated, and rather come up with local interventions to economic challenges through using local knowledge. The term is also used synonymously with social innovation, and social enterprise (The Young Foundation, 2012).

According to Dees (1998:1) The term “entrepreneur” was coined by a French economist Jean-Baptiste Say in the early 17<sup>th</sup> century. He saw an entrepreneur as one who shifts economic resources out of an area of lower and into an area of higher productivity and yield and created value (Martin & Osberg, 2007). This is particularly important for the establishment of value-adding manufacturing industries in South Africa.

Social entrepreneurs look for more effective ways of serving social missions (Dees, 1998; Darabi, 2012). Social entrepreneurship signals the imperative to drive social change and has the potential to contribute to the transformation of society (Martin & Osberg, 2007). According to

Urban (2012) “Social entrepreneurship includes innovative not-for-profit ventures, social purpose business ventures, such as for-profit community development projects and hybrid organisations mixing not-for-profit and for-profit elements”. These are done to train and employ community members using the most effective methods for serving social mission (Dees, 1998).

### **3.8.2.1 TYPES OF SOCIAL ENTREPRENEURS**

Bielefeld quoting Paul Light (2005 in 2008: 218) states that a social entrepreneur is an “individual, group, network, or organisation or alliance of organisations that seeks large-scale change through pattern-breaking ideas on how governments, non-profit organisations and businesses can address significant social processes”.

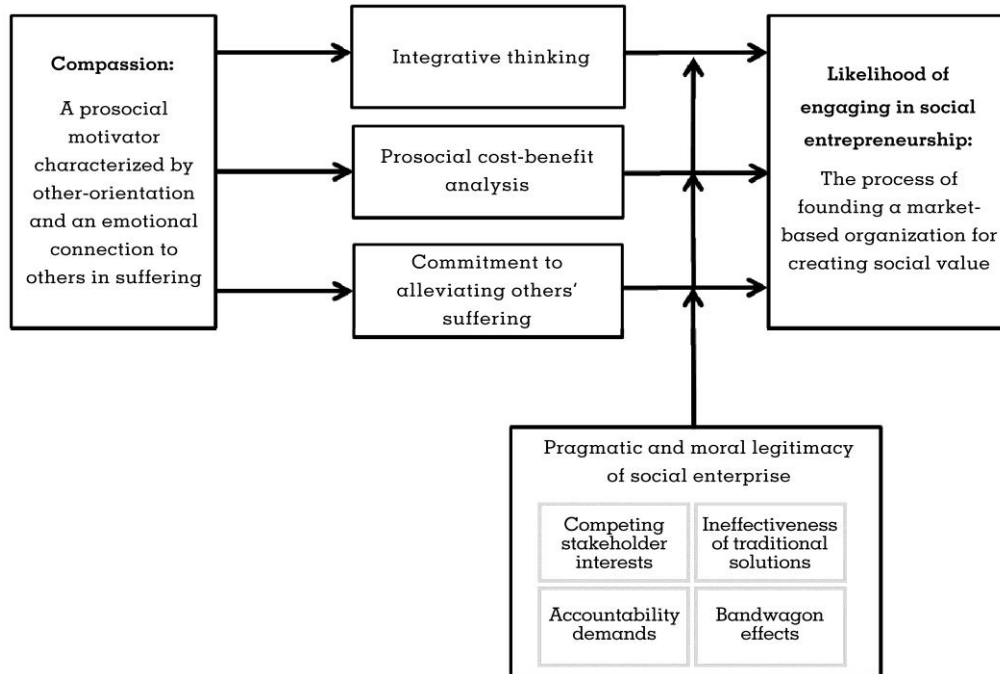
This aspect of entrepreneurship demands that entrepreneurs fuse two key elements of different logics that have little in common and often conflicting (Miller, Grimes, McMullen & Vogus, 2012). It combines market-based organising or resources, which are acquired by promising direct financial returns that are achieved by realising organisational goals of creating economic value and social value.

Innovating for social impact; this is where entrepreneurs focus on innovation and social arrangements to deal with social problems, catalysing social transformation to produce small changes in the short term that reverberate through existing systems to catalyse large changes in the long term (Miller et.al, 2012). According to some authors, compassion is a key attribute that social entrepreneurs possess (Dees, 1998; 2007; Fowler, 2000; Miller et.al., 2012). This is where the field of design for sustainability has linkages as it focuses on social equity, environmental sustainability, technology development and the sustainable economic development.

### **3.8.2.2 MOTIVATION FOR SOCIAL ENTREPRENEURS TO EMBARK ON THEIR VENTURES**

Compassion as the motivator for social entrepreneurs is triggered by seeing others suffering and wanting to do something to alleviate it.





**Compassion encourages social entrepreneurship**  
 (Source: Miller, Grimes, McMullen & Vogus, 2012)

In the case of vegetable tanning the motivators are compassion for humans who are suffering as well as the environment and other affected species. Social entrepreneurs pro-social motivation and cognitive and social processes encourage integrative thinking, pro-social judgement and fostering commitment to alleviate others suffering (Miller et.al., 2012). Abidine (2014) is one example from Morocco of a social entrepreneur that works with a deaf artisan group in Marrakech - a group of leather artisans who are trying to preserve the culture of leather tanning while at the same time trying to offer skills training to deaf people. With the help of the designer they produce high-end leather goods from leather that has been produced using traditional techniques.



Figure 3.11: Erkati deaf artisan group, Marakesh, Morocco  
(Source: Erkati, 2014)



Figure 3.12: Handmade vegetable-tanned leather bag  
(Source : Abidine, 2014)

They focus on solutions to social problems such as poverty alleviation through collective actions is one of the missions of social entrepreneurs (Alvord, Brown & Letts, 2004).

According to Olson (1965:5) “the logical place to begin any systematic study of organisation is with their purpose. He also asserts that there is often no single purpose but the economic aspect is important. Social entrepreneurs can assist in coming up with economic development strategies that bridge the gap between rural and urban areas in South Africa. Rural areas form a support system for urban areas and therefore are interconnected and this could be an important factor of regional development.

### **3.8.3 REGIONAL DEVELOPMENT AS A POSSIBLE MODEL OF DEVELOPMENT FOR THE LEATHER INDUSTRY**

Basic product theory explains long-term factors of economic growth, which is referred to as the concept of economic base. The theory suggests that regional development is achieved through the gradual specialisation of selected products (Landes, 2000 in Szajnowska-Wysocka, 2009). Specialising in leather production using existing knowledge as a base has a comparative advantage in terms of development. The economic, political and social actions of regional authorities should be strongly influenced by orders and help formulate the basis of geographical regional development of scales, global, national, regional and local pointing to economic benefits coming from a spatial concentration of economic activities (Szajnowska-Wysocka, 2009).

The regional development model which is also known as the industrial district model does not only focus on obvious economic hubs like the cities, it is more inclusive and includes rural areas and also helps focus on environmentally sustainable production based on local expertise and knowledge (Barca, 2009). The regional growth model of development looks at skills and technological change to reinforce developmental patterns. This model should be pursued in developing countries where there is an abundance of local knowledge and skills linked to local cultures and belief systems that needs to be explored (Desmet, 1999).

Regional development has been seen as the solution to sustainable development and achieving knowledge-based economic development. The role of place within regional national and global

systems has a profound effect on the ability of any sector to exert control over the political, economic and cultural transactions, which occur within the administrative or cultural boundaries defining a specific locality (Simone, 2003). The model of Third Italy is referred to by many authors as a good example of small-scale production for a knowledge-based economic development which has been successful (Boschma, 2000; Criscuolo, 2002; Favazzi, 2002).

The Third Italy is an example of a type of industrial development, which was socially initiated as a response to economic challenges. The actions are based on common interest and the ambitions of its citizens. The group effort made it possible for society to achieve its goal, as an individual, unorganised action would not have been able to advance the common interest of all (Olson 1965). In Italy it was a post-war initiative characterised by growth of a large number of local networks made up of flexible, small and medium sized firms that specialised in craft-based industries that proved that collective action can achieve more positive results (Amin & Thrift 1992); Salmi, Blomqvist & Ahola, 2001; Santisteban, 2006). Networks were formed motivated by society's belief systems and are a response to some of the challenges faced by society. The Third Italy area consists of the Trentino Alto-Adige, Veneto, Friuli-Venezia-Giulia, Emilia-Romagna, Tuscany, Umbria and Marche regions of the North East and Central parts of Italy.

The industrial development of these regions is associated with 'flexible specialisation', neo-Fordism, or "new industrial space" (Piore & Sabel, 1984; Scott, 1988). The specialisation generally depend on a number of defining variables, which include a trained workforce who understand various aspects of production, puts emphasises craftsmanship, flexible and informal management. The integration of the process of conception and execution, integration of various systems helps in the delivery of varied specialised or fragmented market and pursuit of niche market rather than mass markets (Turner, 2000).

Regional specialisation has never been associated with high industrial growth. Instead through decentralisation it created division of labour which is expressed through absorbing workforce in high peak of demand and exceeded the capacity (Graziani 1975; Paci. 1973; Brusco 1991).

At the core of this development growth is achieved through interaction and cooperation based on economic, geographical and cultural locality in the entire production system. Some authors have termed it endogenous growth process, which is necessitated by the tradition of small-scale

artisan production and a socio-cultural structure which constitutes development (Fua & Zacchia 1983; Pyke & Sengenberger, 1991; Aghion & Howitt, 1992).

Regional specialisation is often a response to globalisation challenges and helps in narrowing down developmental gaps between urban and rural communities and encourage interaction between these two economic societies (Quere & Ravix, 1997; Bénassy-Quéré & Coeure, 2000). It keeps the benefits balance amongst the regional systems and economic, ecological and social sub-systems (Binwu & Donghai, 2010). The local knowledge become an important asset for regional specialisation. Bellandi (1997:16) suggests, “productive knowledge embedded in life experiences of local communities as a result of past activities are a hidden source of development potentialities”. Therefore for any country that is attempting economic development should look at what already exists within the country, as this will put them at an advantage. It is important for countries to put emphasis on specialising in the production of goods in which they have a comparative advantage (De Sa Porto, 1998). Industrially developed countries are often viewed as leaders in innovation and product design (Oyelaran-Oyeyinka & McCormick, 2007).

Some authors suggest that the success of economic regions depends on high-tech clusters (Florida, Mellander & Stolarick, 2007). Clustering is seen as a strategy to overcome growth constraints for small manufacturing industries (Schmitz, 1995; Humphrey & Schmitz, 1996; Van Dijk & Rabelotti, 1997).

The rise in new theories of economic development, such as economic clusters, and regional development can be useful in guiding local economic development initiatives (Jarboe, 2001). The new place based approaches tap into economic potential that remains unused like indigenous knowledge so that all parts of the country contribute to national development (Barca, 2009; Tomaney, 2010). In other words, regional development encourages us to go back to promoting basic methods of production that encourage local development.

The regional development model can help enhance labour intensive production industries like vegetable tanning and indigenous knowledge in rural areas. This model could be promoted as one of the processes that assist in implementing the Industrial Policy Action Plan, which encourages decentralisation of production in order to ensure the development of rural areas in South Africa.

### **3.8.4 INDUSTRIAL CLUSTERS TO SUPPORT REGIONAL DEVELOPMENT**

Porter (1990) introduced the theory of industrial clusters, which focus on the appropriate location of economic activities as its main factor. The model of industrial clusters fulfils four conditions; production factors; demand; related co-existing sectors; and economic strategy. The location paradox focuses on producing locally and selling globally, enterprise focus their activities in industrial clusters and often form a network of cooperative competition (Bellussi & Sammarra, 2010).

Industrial clusters are made out of geographical concentration of interconnected companies with close supply links of a system of integrated enterprises (Rabellotti, 1998; Oyelaran-Oyeyinka, & McComick, 2007; Bellussi & Sammarra, 2010; Daddo, et.al, 2012). Their value is added value. Clusters theory is used to analyse regions and towns mainly focusing on the development cycle (Porter, 2001; Bellussi & Sammarra, 2010).

Basic product theory suggests that regional development is achieved through gradual specialisation of selected products (Landes, 2000 in Szajnowska-Wysocka, 2009). Therefore, specialising in leather production using existing knowledge as a base has a comparative advantage in terms of development. The economic, political and social actions is strongly influenced by orders and help formulate basis of geographical regional development of scales, benefits coming from spatial concentration of economic activities (Szajnowska-Wysocka, 2009).

The cluster theory refers to a dozen or more chains of production and has similarities to the Italian industrial districts, while the French meso-system covers nets of companies and institutions gathered around one particular product or Marshall's industrial districts (Szajnowska-Wysocka, 2009). There are differences between clusters and the industrial regions. Clusters may include several branches and types of industry, while industrial regions are one branch type.

In many European countries, and to a lesser extent in industrially developing countries clusters are seen as a new model of regional development. This is due to the realisation that there are more advantages than disadvantages in developing clusters in any part of the country where there are resources available (Chlebíková & Mráziková, 2009). In Slovenia clusters are seen as a new model of regional development (ibid). Models such as those of Third Italy are some

examples of small-scale production for knowledge-based economic development, which has been sustained for generations (Criscuolo, 2002; Favazzi, 2002).

The framework of small-scale production is also applicable in the design of interconnected arenas which are conceptualised as an idea of innovation network, which might contribute to sustainable development. New knowledge emerge through the innovation spillage effects of different disciplines (Liang, 2002; Skytt & Winther, 2006; Bank, 2008). Few attempts have been made to examine the difference between clusters in industrially developed and developing countries, which can help understand the importance of locality, which is a critical aspect of innovation.

### **3.8.5 CLUSTERS AS CONTRIBUTORS TO INNOVATION**

Clustering combines passive collective-efficiency, which focuses on the producer. Active collective-efficiency requires joint action (will be discussed further in chapter 4). The leather industry has a great potential for cluster development due to its long value chain. Clusters consist of specialised skills, available specialised input, easy access to specialised knowledge and rapid dissemination of information which leads to market access and attraction of customers (Rabellotti, 2008). Clustering is linked to knowledge creation and vertical innovation, and results in increased collaboration between firms and businesses associated with production processes and helps to construct a common vision amongst different role players (Aghion & Howitt, 1992; Malmberg & Power, 2003). Clusters are usually less politically motivated, and are a local intervention to economic challenges through using local knowledge. Incorporating IKS thesis into production process will promote sustainability, IKS is place based and integrate IKS world which is concerned with the environment, and promote sustainable processes that have long standing tradition (Gruenewald 2003; DST, 2008).

Sabel (2001:4) notes that “clusters are not craft communities that organise themselves on the basis of common tacit skills, nor hierarchies tied together by tacit routines. Instead there is a material which links innovative capacities of agglomerations to diversity and partial formalisation of knowledge that coordinates different demands”. Small firms focus on sector specialisation, have close inter-collaboration, stronger socio-cultural identity, are based on partial formalisation

of knowledge based on local demands, and promote social entrepreneurship which contributes to sustainable economic development (Salmi Blomqvist, Ahola, 2001:2).

Clusters help in identifying priorities of action and improvement of interfaces in the innovation systems. They also help encourage cooperation between various members of clusters and support the development of good products and services.

Clustering fits into an innovation system framework because of its systemic, networking features and the reliance on collaboration as its source of dynamism (Kline and Rosenberg,1986). Six primary areas of innovation: research, applied research, product development, manufacturing research quality research and commercialisation research. These forms of research are particularly directed to the technological sector and manufacturers (Hage & Hollingsworth, 2000).

According to Puga (2009:1), “there is substantial evidence of such agglomeration economies based on a clustering of production beyond what can be explained by chance or the heterogeneity of space, based on the spatial patterns of wages and rents, and based on the direct measurement of how productivity varies with the urban environment”. Agglomeration of economic activities is based on clustering of production, and studies that have been conducted on this topic mainly focussed on clustering in urban environments. Since a lot of studies focused on clustering in urban areas, this study is proposing to get an understanding of learning and agglomeration of economic activities in rural areas. Rural areas in South Africa remain neglected and some kind of development is required. One possible answer is a community participatory form of development (Orfod, 2004; Allen & Brennan, 2004). Specialisation activities and the tacit of lived quality of knowledge that is produced from practice, can lead to empowerment with strategic solutions, which are community and country relevant. However, these tacit, lived experiences are often not recorded in the industrially developing countries because local industries and policy makers do not value them.

The resources for upgrading production processes originate from the local environment. Competition in a collective-efficiency environment is dealt with through improving organisation of the cluster. Hence, it is imperative that development must diffuse local knowledge within a cluster that is made up of not only incidental synergies but networks of local actors through competition and trust are the formula to the success of clusters (Humphrey & Schmitz, 1998).



### **3.8.6 PROMOTING LABOUR INTENSIVE KNOWLEDGE-BASED INDUSTRIES IN SOUTH AFRICA THROUGH THE IPAP POLICY**

The policy framework is aimed at building competitive manufacturing industry with strong growth and employment generation. The frameworks focus on the future vision with no clear outline of effective implementation strategy. At the centre of the frameworks is job creation and decentralisation in order to ensure that even those living in rural areas are able to participate in the economy (See Figure 3.9). The policy also wants to “ensure long-term intensification of South Africa’s industrialisation process and movement towards a knowledge economy” (The DTI, 2010; 2013: 11).

South Africa is currently ranked number 67 in the World Bank’s Knowledge Economy Index (KEI) (World Bank, 2012). The ranking looked at “incentives that promote efficient use of existing and new knowledge, the flourishing of entrepreneurship, efficient innovation systems, research centres, think-tanks, consultants and other organisations which can contribute to growing global knowledge, adapt it to local needs and the creation of new technological solutions” (*ibid*).

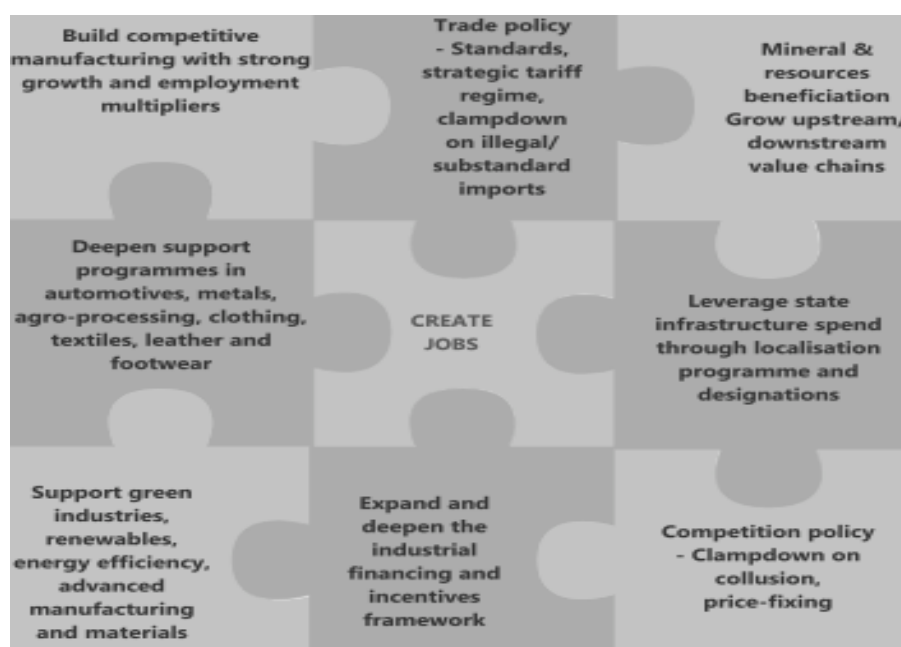
The study benchmarks Botswana and Italy as countries that are involved in small-scale leather production. Italy is known for developing and maintaining the cottage industry for production, and for the maintenance of local knowledge and skills, and is ranked number 30 in the World Bank’s KEI ranking. Botswana which is ranked number 85 and has an artisan industry in vegetable tanning, while South Africa is ranked number 67 by the World Bank’s KEI and has one recorded tannery that produces vegetable-tanned leather (Comesa.org, 2009; ITC, 2011; World Bank, 2012).

However, it is not very clear how the government plans to implement the plan towards a knowledge economy. The World Bank Knowledge Economy Index (KEI) this is an index based on a simple average of four sub indexes that represent four pillars of a knowledge economy. The following section looks at the four pillars in relation to the South Africa leather tanning industry as stipulated by the World Bank (2010).

The first one is the Economic Incentive and Institutional Regime (EIR) that promote efficient use of existing knowledge and new knowledge and flourishing entrepreneurship. Second, innovation and technology adoption requires that government support and encourage innovation systems

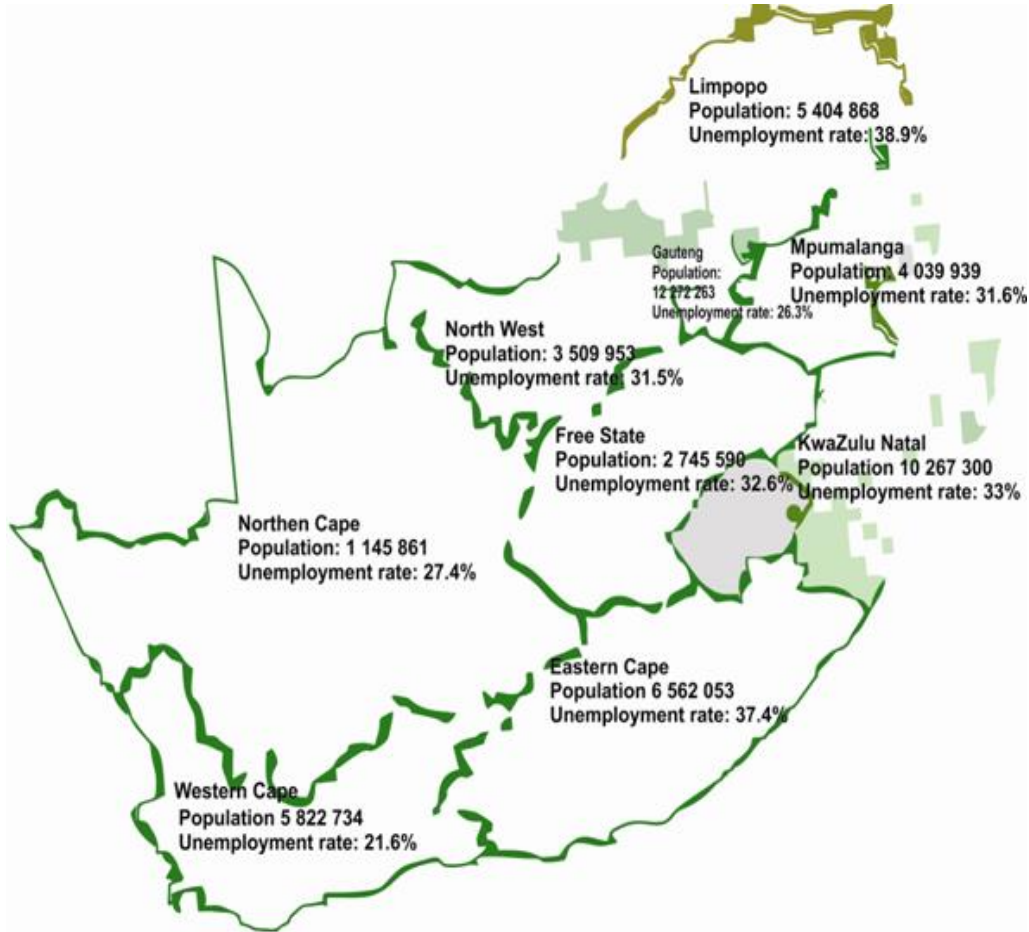
that are made up of firms, research centres, universities and communities that will take up research on leather production, as well as think-tanks, consultants and other organisations that can tap into the growing stock of global knowledge and find ways of adapting it to meet local needs while creating new technological solutions that are context relevant. Third, education and training are required in order to create a population that values its knowledge and is capable of creating new forms of knowledge. The fourth, is facilitation of infrastructure through information technology in order to ensure effective communication even in rural areas where 30% of the country's population still live (See Figure 3.10). The communication infrastructure could help in creating linkages between the leather goods manufacturers who are usually based in urban areas and leather tanners in rural areas.

Traditional small-scale manufacturing systems have the potential to employ many young people and possibly contribute to sustainable development of communities which is in line with the IPAP framework (IPAP, 2010; Romer et al., 2011b; IPAP2, 2012). The economic development policies have often been unfair towards promoting the use of local knowledge for the advancement of labour intensive industries such as leather tanning. There is no arguing that industrialisation is a prerequisite to competitive growth. However, globalisation has created challenges that impede competitive growth and instead destroyed local industries, promoted urbanisation and technology dependence stalls production which when it is not available.



**Figure 3.9: The IPAP and its different key focus areas for development (Source: The DTI, 2013)**

It is currently estimated that the leather and footwear value-chain employs approximately 32 000 people (The DTI, 2013).



**Figure 3.10: South African population and the breakdown of unemployment percentages statistics (Source: StatsSA Census, 2011)**

The leather industry should be one of the priority industries in South Africa as leather tanning is a labour intensive industry with the ability to employ many people. The IPAP is aiming at reviving the industry through developing fundamentally new support programs to help upgrade the industry’s competitiveness, recapture domestic market share, and contribute to a knowledge-based economy (IPAP, 2010).

Vaughan (2013) suggested that “by shifting away from a reliance on exporting raw materials to the production of premium products, Africa can ease its dependency on aid and slowly move towards industrialised growth”.

South Africa currently has 29% of the total population of 51,770 560 who are unemployed (See Figure 3.10). Only 30% of the country’s population still remains in rural areas, as people have migrated to urban areas in search of employment opportunities (Statistics South Africa Census, 2011). Creating opportunities in rural areas will help in developing the areas of the country that are left behind in terms of development which is what IPAP policy is trying to achieve. Dealing with the country’s socio-economic challenges requires that new strategies focus on local resources, knowledge and skills that could contribute to the development agenda. The goal is to encourage sustainable use of renewable resources while creating opportunities for the communities (IPAP, 2013).

“Tackling underutilisation of natural resources for the benefit of communities is important”. Some of the issues contributing to the lack of development are little or no access to socio-economic infrastructure and services, migratory labour practices, decay of the social fabric and the decline of indigenous cultural values (The DTI, 2012). Therefore, the implementation strategy will require the participation of local communities as well as tapping into the existing forms of knowledge and skill that have been neglected. This is also an opportunity for government to bridge the gap between the existing and the envisaged development, and how industries could draw on local knowledge and skills therefore creating a bridge between rural and urban areas. Rural communities are the reservoirs of local knowledge that forms part of norms and values that are critical to the business environment. Knowledge-based economic development, as envisaged by government’s policy, will require a conducive environment and development of the correct policies and people to implement those policies for the SMEs to develop and thrive.

### **3.7 INTERCONNECTEDNESS OF CITIES TO RURAL AREAS**

There are no cities that can exist without the support of rural areas; however, many governments are unaware of this relationship between cities and rural areas (Folke, Jansson, Larsson, Costanza, 1997; Costanza, 2000). Rural-urban linkages are crucial for poverty alleviation and sustainable development in South Africa. Strong linkages between the two have

the potential to help improve living conditions and create opportunities by working with designers who are mainly based in urban areas (Sheng, n.d.; Mylott, 2009). The IPAP policy and the UNDP are placing emphasis on the development of rural areas in South Africa. Rural areas are a reservoir for local knowledge and resources, which can be used for economic development.

The connection of urban to rural areas includes the flow of goods and people, the flow of knowledge, information, and ideas and cultural practices which were mentioned in the previous sections as contributors to the business environment as well as the socio-cultural environment that are some of the factors that contribute to the business. The ecosystem approach is one method of regional development that integrates rural and urban areas. Integrated rural development aims at empowering the rural communities through promoting participation in the design and implementation of projects and accepting the poor as stakeholders and partners in the development of their economic condition. The voices of the poor need to be heard in order for any form of development to be sustainable - it must be community driven with the support of good policies and governance (Ela, 2012).

In South Africa, areas that are more developed like the Western Cape province with considerable design activities require material source. The Eastern Cape province is the source of the black wattle and is the biggest producer of hides and skins which means there is a potential for endogenous development and collaboration. Collaborative efforts between developed regions and less developed regions is the cornerstone to ensuring that there is an overall economic development (Jekede, 2012). Endogenous growth theory suggests that economic growth is developed from within a country (Ray, 1999; Barreto 2000; Tomaney 2010; Srholec 2011) – it holds that investment focus on human capital, innovation and knowledge are some of the very significant features or contributors to economic growth.

Policy measures have an impact on the long-term growth of the economy; this is true with regards to the endogenous growth theory. Harrison (1992: 479) proposed a link between socio-cultural dimensions and trust and socio- capital. He saw the industrial district model as one that embeds economic relations deeper into the social fabric and contribute to innovation in rural areas. The distinctive social structure of the Third Italy provided a basis for the emergence of industrial development, stimulated by interaction and facilitated co-ordination between local actors to also enhanced flexibility in the production process (Boschma, 2000). Trust and other

forms of social capital are best developed at regional level which is where there is regular interaction and the condition of trust-building can be sustained over time (Harris, 1992:501).

Through decentralisation of production that puts emphasis on the importance of culture for economic growth is crucial. However, this is a dimension that is often ignored by policy makers. Some authors have however, realised that social foundations of economic development have become critical.

Industrially developing countries in Africa need to understand that traditional knowledge can help industries transition from low-tech to successful innovation clusters, because local knowledge unlike western knowledge is open to new forms of knowledge. Some developed countries have strengthened their traditional industries and then made the transition through innovation into powerful sectors that have become leaders in the world.

### **3.8 POTENTIAL CONTRIBUTION OF LEATHER PRODUCTION TO THE ECONOMIC DEVELOPMENT STRATEGIES IN SOUTH AFRICA**

Currently regional development looks at skills and technological change to reinforce developmental patterns promoted as development model that should be pursued by developing countries (Desmet, 1999). Some authors argue that the success of economic regions depend on high-tech clusters (Florida, Mellander & Stolarick, 2007).

The regional development model can enhance labour intensive production industries like vegetable tanning in rural areas. This model could be relevant in South Africa because research on the availability of resources. In the case of this study the plants that produce tannins and the availability of skins and hides for tanning as previously discussed in chapter two could lead to sustainable development of rural communities through local knowledge-based development. This study therefore focus on regional development model as it supports growth that is based on local knowledge and expertise that in turn leads to sustainable development.

There are very good grounds in developing countries to encourage sustainable promotion of the leather industry as it can potentially employ a significant number of people. The socio-economic challenges that face the country could potentially be addressed through using already existing

local systems to establish value add to local knowledge and skills that help societies improve their quality of life and achieve various pillars of sustainability which are discussed in the following chapter.

The supply of hides/skins in South Africa depends on the number of livestock slaughtered (DAFF, 2011a). Livestock is the highest value of the agricultural production commodity in South Africa, the country produced between 2000-8000 tonnes of meat in 2010. Putting the country in the top ten countries that produce meat at a high rate in Africa (DAFF, 2011; Prakash & Stigler, 2012).

### 3.8.1 PLANTS THAT ARE AVAILABLE IN SOUTH AFRICA FOR VEGETABLE TANNING AND THE EXTRACTION OF TANNINS

Historically, the process of extracting tannins from the inner bark (See Figure 3.11) of a tree was in it self labour-intensive using basic tools such as stones wheels and oxen until the wood was consistency of a fine powder. Figure 3.11 shows an example of the quebracho trunk that has tannins not on the trunk.

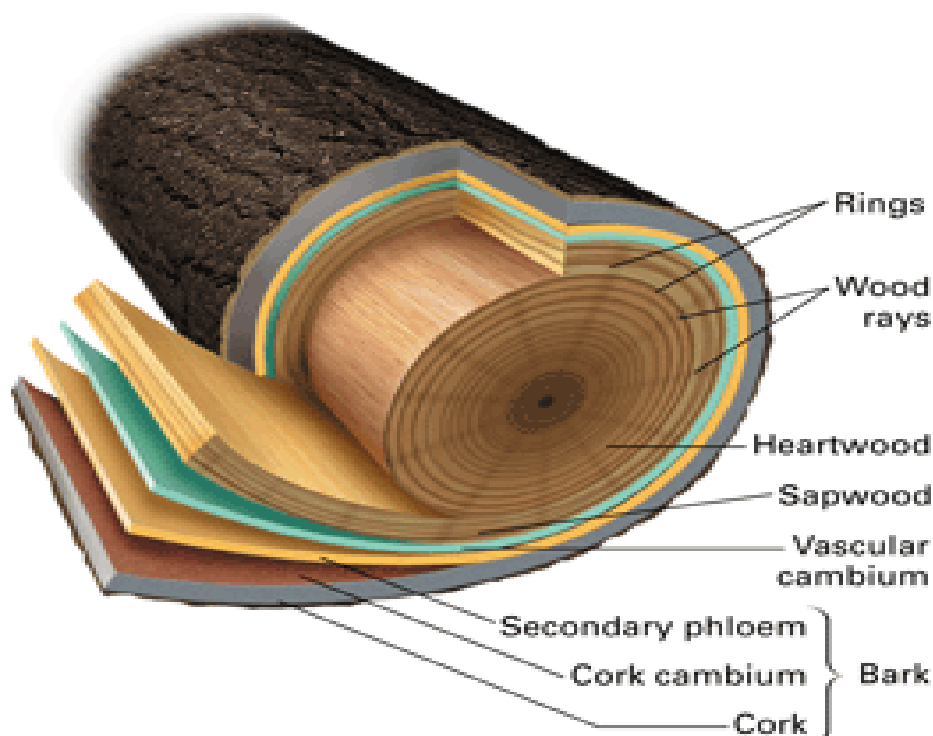


Figure 3.11: Quebracho bark extraction of tannins  
(Source: Baller leather, 2014)

However, with modern technology, the development of grain mills, chippers and shredders make it possible to refine the bark in order to extract more tannin from it (See Figure 3.12). The collection process of the bark is usually done in springtime when the sap starts to rise from trees, as they are easier to peel due to their concentrated form.



**Figure 3.12: Various textures of the mimoso bark that has been extracted and grinded for tanning (Source: Google images, 2014)**

Extracting tannins from the plants is an industry on its own which has a potential to add to job creation. Tannins are found in the inner bark of tree in the vascular cambium layer. Many trees in South Africa that produce tannins are categorised as alien invasive species (AIS) that needs to be used before they start infesting the entire eco-system.



The babul tree has been studied in South Africa with the focus on the fact that it is an AIS and conservationists are finding ways of eliminating the plants (McGarry et al., 2005; Shackleton et al., 2006; Bosch & Borus, 2006; Impson et al., 2008).

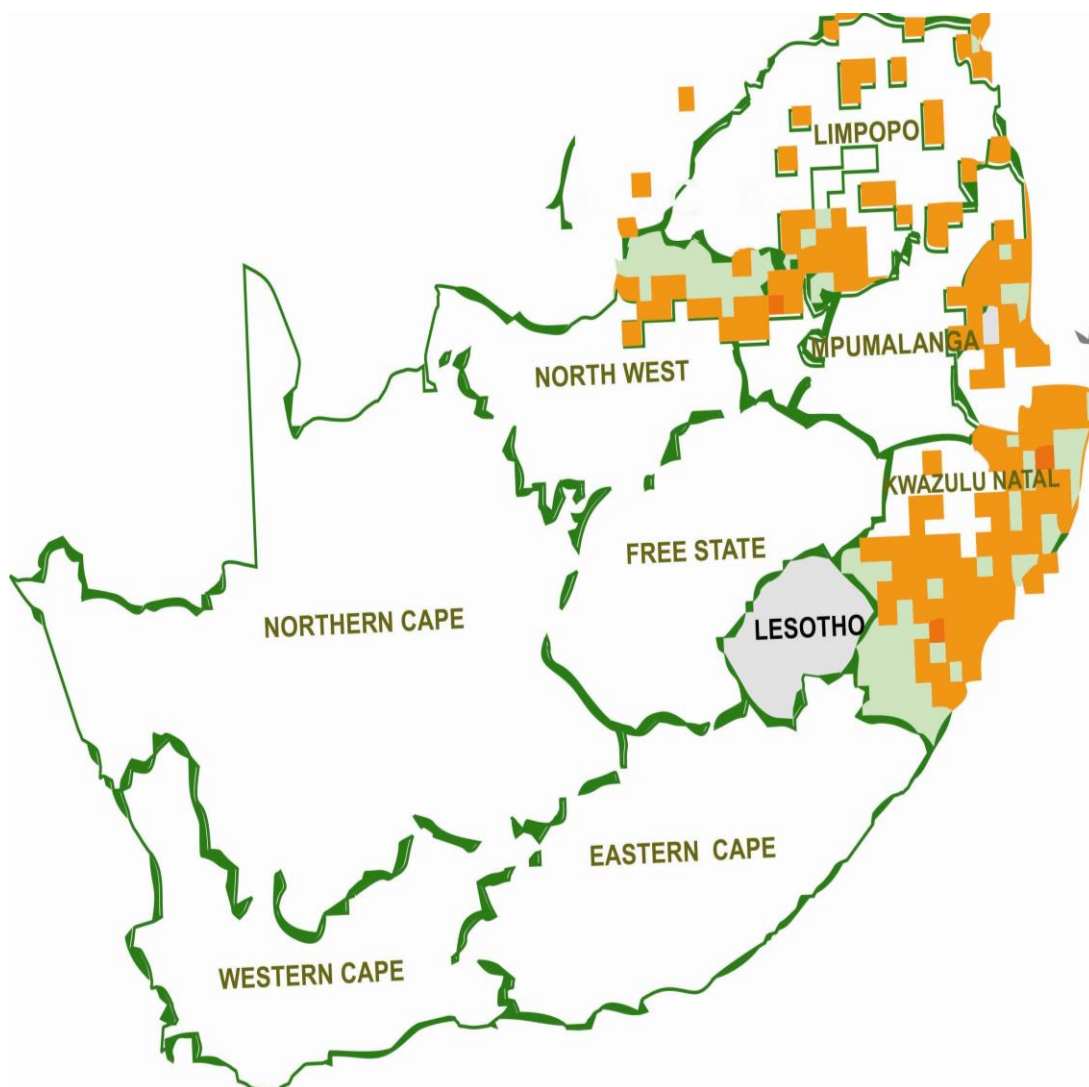


Figure 3.13: The distribution of the Babul tree in South Africa  
(Source: Foden & Potter, 2005)

Babul tree (*acacia Arabica* or *acacia nilotica*) is native to Africa. It is also known as *lekkerruikpeul* or scented thorn in South Africa.



**Figure 3.14: Babul tree**  
(Source: Fodel & Porter, 2008)



**Figure 3.15: Babul leaves tree leaves**  
(Source: Fodel & Porter, 2008)

The tree grows in the Limpopo province, Mpumalanga province and KwaZulu Natal province (See Figure 3.14 & 3.15). The plant is an invasive species in South Africa and is viewed as a weed. The leaves of the plant produce 10-15% tannins; although it is slow to tan it produces dark colours, firm and durable leather.

### 3.8.1.1 MANGROVE

The bark, also known as "cutch" or "kutch", Africa has 19% of the global coverage of the species. The tree is the family of *Rhizophoraceae* and the *Rhizophora*, *Bruguiera*, *Aicennia* and *Ceriops* are used for tannins. In South Africa the tree covers 1221 km<sup>2</sup> and 3.75km of coastal line (See Figure 3.16 & 3.17) (Rogerson & Gwaltney, 2005).



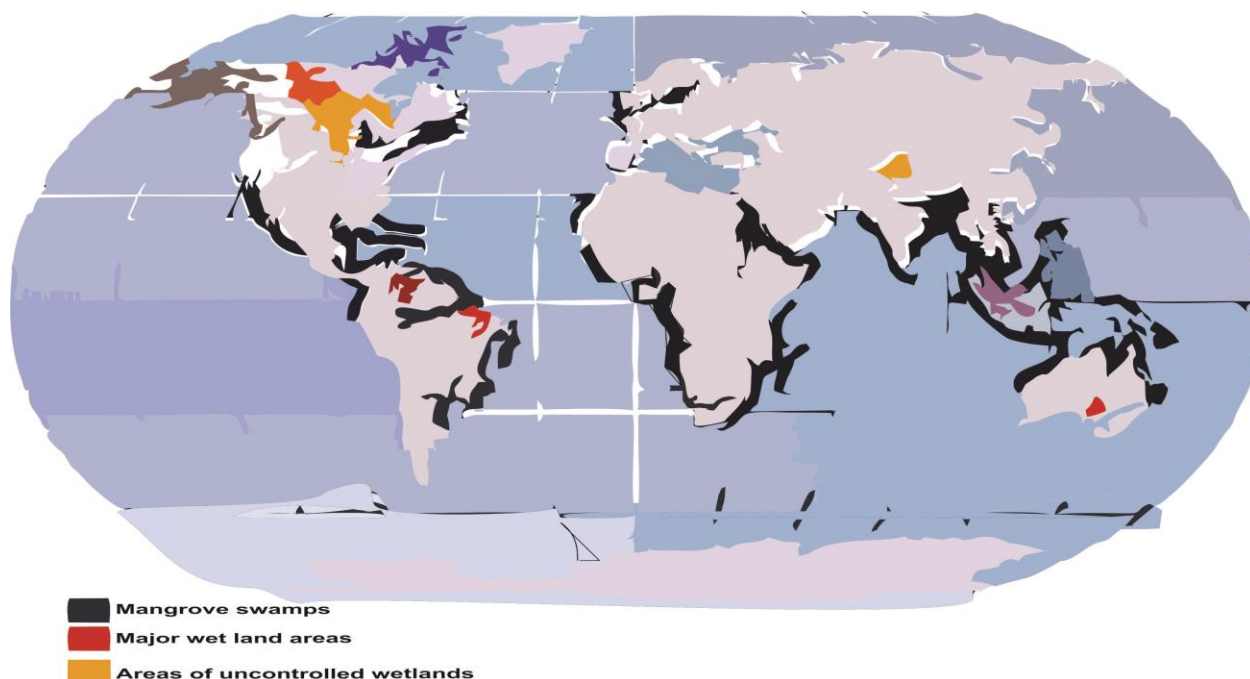
**Figure 3.16: Mangrove plant swamps**  
(Source: Rogerson & Gwaltney, 2005)



**Figure 3.17: Mangrove leaves**  
(Source: Rogerson & Gwaltney, 2005)



The darker areas indicates the swamps where the Mangrove is grown (See Figure 3.18), with a total of 6 different species, and this makes it the third largest population in Africa (UNEP, 2003 & 2006; Rajkaran, 2011). The plant is considered to be the most economical and most abundant vegetable tannin available. It has low acid content and high pH levels and is very soluble.



**Figure 3.18: Mangrove plant distribution**

(Source: Polidoro, Carpenter, Collins, Duke, Ellison, Fransworth, Fernando, Kathiresan, Koedam, Livingston, Miyagi, More, Ngoc Nam, Ong, Primavera, Salmo, Sanciangco, Sukardjo, Wang & Yong, 2010; Ghosh, 2012)

Leather tanning using mangrove alone tends to be harsh and thick-grained (Rajkaran, 2011). The plants produce tannins at various degrees. The penetration rate of tannins is slow but this is a problem that can be overcome by mixing it with other tannins (CBI,2005).

### 3.8.1.2 EUCALYPTUS

This bark is from a tree of the genus Eucalyptus with over 600 species many of which produce tannins. However, the focus is only on the species that are available in South Africa. The Eucalyptus plants were introduced in South Africa mainly for timber, firewood, ornamental purposes, and beekeeping. The plant is indigenous to Australia but is currently grown in other countries and produces the high quantities of tannins (Museum of Fine Arts Boston, 2010). The

tannins from the bark tend to produce leather that is dark in colour, the plant also requires mixing with other tannins in order to fix tannins into the leather (CBI, 2005).

### **3.8.1.3 EUCALYPTUS CAMALDULENSIS**

This plant is considered invasive in South Africa, and falls under category two of the Conservation of Agricultural Resources Act, 1993 (Act 43 of 1983) (CARA). These are plants with a proven potential of becoming invasive but, have certain beneficial properties that warrant their continue presence in certain circumstances (See Figure 3.19 & 3.20).



**Figure 3.19: Eucalyptus Camaldulensis tree  
(Source: Haugen, 2010)**



**Figure 3.20: Eucalyptus Camaldulensis leaves**  
(Source: Haugen, 2010)

The leaves contain 5-10% tannin, while the bark contains 2,5-16 % of tannin and the wood contains 2-14%.

#### **3.8.1.4 KARRI EUCALYPTUS DIVERSICOLOR**

The tree originates from Australia and is cultivated in plantations, mainly for wood. The bark of the plant produces up to 20% tannins (see Figure 3.21 & 3.22).





**Figure 3.21: Eucalyptus Diversicolour**  
(Source: Haugen, 2010)



**Figure 3.22: Leaves of Eucalyptus Diversicolour**  
(Source: Haugen, 2010)

### 3.8.1.5 EUCALYPTUS GRANDIS

This is a category two plant that also originates from Australia, it is the widely grown species of eucalyptus with an estimated 2 million hectares in South Africa in the 1980s and commonly found in Brazil, South Africa, Argentina, Australia, India, Uruguay, Zambia and other countries.



**Figure 3.23: Eucalyptus Grandis tree**  
(Source, Haugen, 2010)



**Figure 3.24: Eucalyptus Grandis leaves**  
(Source: Haugen, 2010)



The plant has long trunks and grows in various parts of South Africa (see Figure 3.23 & 3.24). In Africa, volume yields of the plant are higher (Ugalde, & Perez, 2001).

### 3.8.1.6 EUCALYPTUS LEHMANNII

This plant also falls under category two and has become a naturalised species in South Africa (See Figure 3.25 & 3.26).



Figure 3.25: Eucalyptus Lehmannii tree  
(Source: Google images, 2013)



Figure 3.26: Eucalyptus Lehmannii leaves  
(Source: Google Images, 2012)



### 3.8.1.7 BLACK WATTLE *ACACIA MEARNSII* OR *ACACIA MOLLISSIMA*

This is a tree that is indigenous to Australia that is currently being extensively cultivated in South Africa and other areas (See Figure 3.27 & 3.28). The tree originally comes from Australia and was introduced to South Africa in the 19<sup>th</sup> century (McGrarry, Shackleton, Fourie, Gambiza, Shackleton & Fabricius, 2005). The tree currently falls under category two of AIS. The bark is harvested and pounded into a powder, which contains high quantities of tannins (also known as wattle extract). The tannins from the plant are concentrated mainly in the bark (Gujrathi & Babu, 2007).



**Figure 3.27: Black wattle tree *Arcacia meansii***  
(Source: Google images, 2012)





**Figure 3.28: Black wattle leaves**  
(Source: Harris, 2008)

Tannins from the plant are very astringent. They penetrate the hide rapidly and have a high degree of tan fixation (CPI, 2005). Eight to ten year old year old black wattle trees can contain up to 36-44% of tannins in the bark (Gujrathi & Babu 2007). The plant is available in seven provinces of South Africa with only two provinces the plant is grown in large plantations: KwaZulu-Natal, and Mpumalanga, while the earlier established plantations in the Eastern Cape are said to have been abandoned (De Wit, Crookes & Wilgen, 2001).



**Figure 3.29: Black wattle bark that has been stripped and crushed**  
(Source: Owners photo, 2014)



**Figure 3.30: Black wattle tannin powder**  
(Source: Author's own, 2014)

Many researchers have found that the bark produces high quantities of tannins (Dunlop, Resender, Beck, 2005; Bosch & Borus, 2006; Van Wyk, 2009; Romer, et.al., 2011). Availability of the black wattle tree in South Africa is indicated in Figure 3.31. Currently, large quantities of the black wattle bark extracts are exported to Europe from South Africa. In a controlled environment the plant produces approximately 30 000 tons of tannins per annum (Impsoston, Kleinjan, Hoffmann & Post, 2008; Van Wyk, 2009).

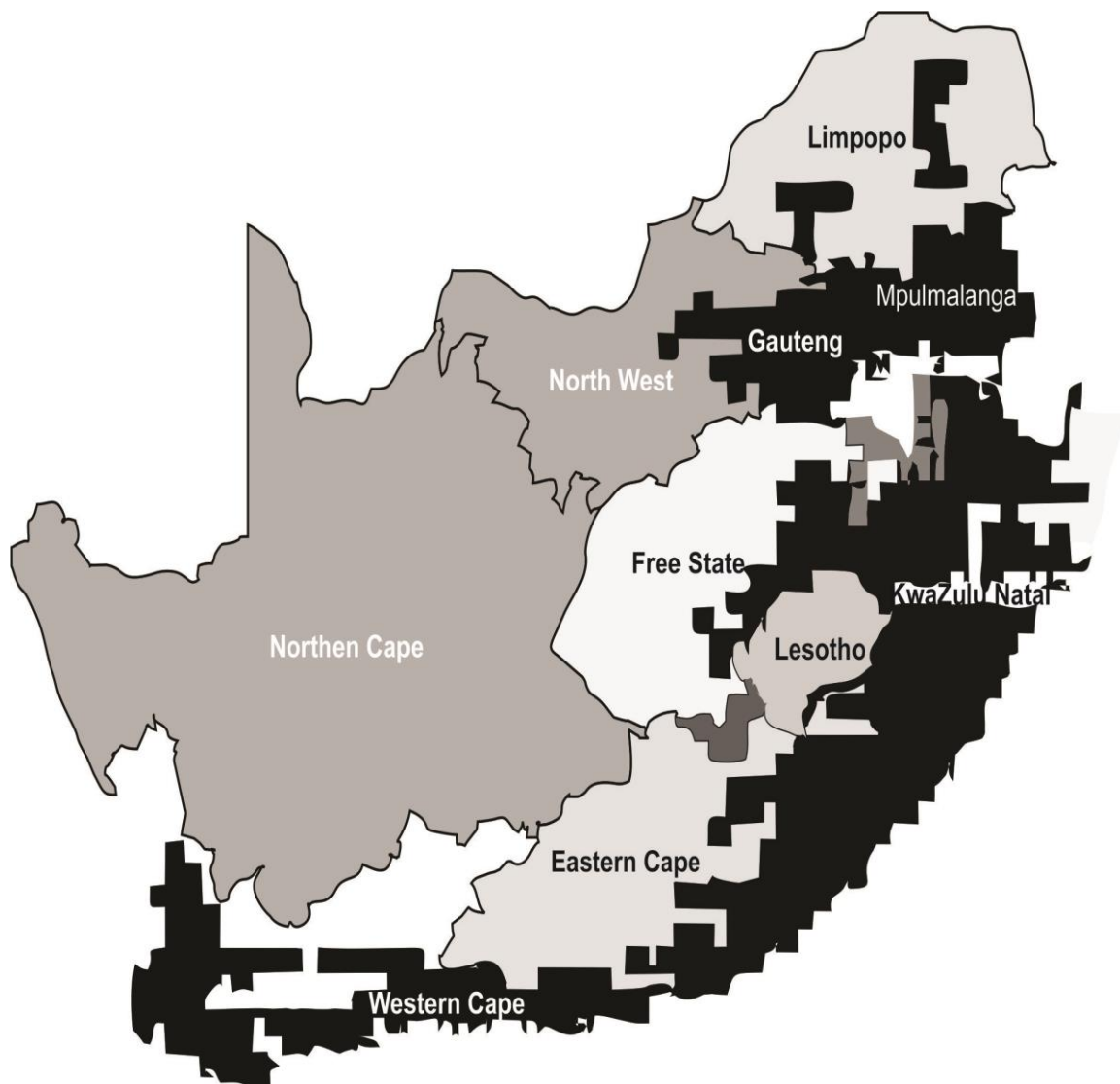


Figure 3.30: Availability of black wattle plant according to provinces (Source: Aitken & Rangan, 2009)

The black wattle tree produces high quantities of tannins, this is a tree of absolute importance particularly in the rural areas where it seeds itself naturally and therefore needs to be given more attention by policy makers and the communities (Dunlop, Resender, Beck, 2005; Bosch & Borus, 2006; Van Wyk, 2009; Romer,et.al, 2011).

When the plant is left uncontrolled it becomes an invader that causes problems to the ecosystem but when the plant is grown under carefully controlled conditions it produces approximately 30 000 tons of tannins per annum and this makes the plant very lucrative (Impson, Kleinjan, Hoffmann & Post, 2008; Van Wyk, 2009). The plant also has multiple uses which are all important from a South African perspective (de Wit et al., 2001; Bosch & Borus, 2006).

#### **3.8.1.7.1 USES OF BLACK WATTLE**

The plant can contribute to helping eradicate some of the socio-economic challenges that face the country such as unemployment, housing materials, environmental erosion and other products (Table: 3.3). The plant has multiple uses like, firewood, charcoal, resins, pulp, nitrogen fixation, carbon sequestration, medicinal products, combating erosion and building materials, while the bark is used for tannins (de Wit et al., 2001; Bosch & Borus, 2006;Gujrathi & Babu, 2007).

The wattle extract is not toxic, it is biodegradable and the reaction of the black wattle extract with dust or soil is used for dust control and changes the tannin into ferric tennate which is partially water proof and rain fast. The extract also acts as a temporary herbicide (Gujrathi & Babu, 2007). The plant produces high quantities of tannins compared to other plants that have been discussed and it grows in most parts of the country and it readily available.



**Table 3.2: Some of the known uses of the black wattle (Source: De Wit, 2001; Bosch & Borus, 2006; Impson & Van Wyk, 2009; Grainger, Clarke, Auldish, Beauchemin, McGinn, Waghorn & Eckard, 2009)**

<b>Benefits</b>	<b>Nature of benefits</b>	<b>Size of annual benefits</b>	<b>Net present value</b>
Tannins extracted from the bark	Tanning agents used in the production of leather	154 000 tones	\$ 363 millions ZAR 3 085,5 million (De Wit, 2001)
Timber	Building materials and mining timber	11 000 tones	(Bosch & Borus, 2006)
Pulp	Mainly exported, for the production of paper and other products	744 000 tones	(De Wit, 2001; Impson & Van Wyk, 2009)
Wood chips	Used in the production of paper	98 000 tones	(De Wit, 2001)
Fire wood	Fuel source for rural communities	161 000 tones	\$ 143 millions ZAR 1215,5 million (De Wit, 2001)
Building material	Used as laths and as poles by rural communities	90000 tones 5000 tones 10000 tones	\$ 8 millions ZAR \$5 millions \$ 9 millions (De Wit, 2001; Bosch & Borus, 2006)
Carbon sequestration	plantations stores carbon as a counter to carbon build ups in the atmosphere, from fossil fuel burning (Grainger, Clarke, Auldish, Beauchemin, McGinn, Waghorn, & Eckard, 2009)	347,000 tones	\$24 millions
Nitrogen fixation	Addition of nitrogen through fixation by roots could be regarded as a benefit or a cost in some areas	-	-
Medicinal products	Possible use as styptics or astringents	-	-
Combating erosion	Planting wattles can decrease erosion in severely degraded sites away from river courses (Grainger, Clarke, Auldish, Beauchemin, McGinn, Waghorn, & Eckard, 2009)	98 000 tonnes	-
Charcoal	Fuel for use in barbecues	-	-

This plant has a potential of contributing to other sectors of manufacturing in South Africa besides the leather industry. It requires innovative strategies that could assist in coming up with strategies to put the plant into good use in dealing with challenges such as shortage of housing and to help create employment based on this renewable resource.

### **3.9 SUMMARY**

This chapter looked at the South African leather tanning industry, its challenges and potentialities. The chapter also examined the policy frameworks that the South African government introduced as a means of dealing with the challenges of economic development. The study focused on the locally available resources that could contribute to the process of economic development such as human resources, hides and skins from the agricultural sector and the black wattle plant which is widely available in South Africa and is used in other parts of the world to tan leather. The chapter also looked at models of economic development that are applicable to the South African context and could work in relation of vegetable leather tanning. The various models include regional development through clustering which fosters networks and cooperation which are elements of collective efficiency.

The following chapter discuss collective-efficiency as the approach that small-sale manufacturers can use to contribute to the notion of solidary economy based on the used of local knowledge to achieve sustainable development.



## CHAPTER FOUR

### COLLECTIVE EFFICIENCY FOR SMALL-SCALE MANUFACTURING SYSTEMS AND RELATED CONCEPTS

#### 4.1 INTRODUCTION

The previous chapter focused on analysing the IPAP the NGP, and the NDP in relation to leather production in South Africa. The chapter also looked at the role of SMEs in the process of economic development and at the concept of decentralising production, which is currently championed by government under the IPAP policy. In addition, this chapter continues this discussion by analysing the theory of collective efficiency in relation to small-scale leather production systems and the use of local knowledge in order to achieve sustainable development. This chapter also looks at local African concepts of *Ubuntu* and its relation to global concepts such as sustainability and collective efficiency and how they all could potentially contribute to sustainable development. The role local knowledge plays in the process of economic development. The philosophy of *Ubuntu* from a business point of view and its potential benefits are also discussed. The notion of solidary economy which is linked to cooperation and collective efficiency are also discussed. The chapter also looks at the role of social networks in relation to collective efficiency. Finally, sustainability through collective efficiency is discussed.

#### 4.2 COLLECTIVE EFFICIENCY

“Collective efficiency is a competitive advantage derived from local external economies and joint actions” (Schmitz & Nadvi, 1999: 504). It involves greater joint action associated with improved performance in small-scale production systems. The CE approach helps in explaining the dynamics and the competitive advantages of local producers by virtue of being part of the specialised collective that can sustain competitive demand through local joint actions and the use of renewable natural resources in the production process (Baleiras, 2011). According to Schmitz (1995: 530), “collective-efficiency brings together the incidental passive and consciously pursued active effects. Manufacturing businesses that collaborate have a competitive advantage derived from external economics as well as joint action”.

It also promotes collaboration and interaction between various key stakeholders (Schumacher, 1973; Schmitz, 1999; Baleiras, 2011). CE is linked to the social capital, which is defined by the norms, and networks that enable people to act collectively through social networks and civic associations, which are in a stronger position to confront poverty and vulnerability, resolve disputes, and take advantage of new opportunities because of them being based in a community (Rabellotti, 1998; Woolcock & Narayan, 2000).

The CE approach's competitive advantage is derived from local external economies and joint actions which act as catalysts for growth. Clustering opens up efficiency gains, that would otherwise not be easily attained by individuals, and enables investments (Schmitz, 1999). The CE high growth can be made accessible by fostering horizontal and vertical cooperation between local manufacturers and other stakeholders, focusing on intra-clustering cooperation networks (Salmi, Blomqvist, Ahola & Kylaheiko, 2001:2).

Local level CE promotes interaction between producers which leads to incremental upgrading and improving of production activities (Srholec, 2011). With economic integration competitive producers in clusters have to increase their skills and their activities and move into niche areas of the production process to add value to the collective and relieve competitive pressure on them.

The CE strategy is a set of consistent strategically justified initiatives that are integrated into the action program. The motivation for CE is that it is socially embedded and helps with the production of social system and management of local resources through a collective effort of the community (Staber, & Morrison, 1999).

Economic development should therefore focus on local knowledge to heighten the use of resources to form part of the CE strategy which is aimed at redressing the vicious development circle faced by developing countries to stimulate local, human, social and regional communities to make use of local resources as capital. In this study the initiatives are integrated into the process of vegetable tanning aimed at innovating and modernising vegetable leather tanning methods and foster structured emergence of clusters via cooperation, collaboration and interaction between rural leather producers and the designers that use the leather to create products. The process is seen as having the potential to strengthen rural economic development based on local knowledge and innovation that is relevant to the environment. It

should further encourage the upgrading of current production through knowledge transfer and the expansion of local capabilities (MESPRD, 2007).

However, collective-efficiency model of small-scale production system has been left unexplored in many countries, even though it is a cultural practice when it comes to social and cultural events. Indigenous regional development theory has brought agglomeration economies and social capital to the attention of policy makers as competitive drivers in developing countries, and implies that success of developing economies relies on the smart use of available resources and sustainable development (Schmitz, 1999). Available resources include tacit knowledge, human resources and natural resources. Specialisation activities and the tacit of lived quality of knowledge that is produced from practice, leads to empowerment with strategic solutions, which are country-relevant.

Many authors have found that local knowledge-based economic development increases returns driven by knowledge spillages between industries, and communities in which manufacturing is taking place (Romer, 1987; Grossman, 1988; Grossman & Helpman, 1990; Aghion & Howitt, 1992). Very little is being done at policy level to promote local knowledge-based economic development because it is regarded as informal and therefore not relevant (Rajasekaran, 1993). The concept of innovation and flexibility is founded on tacit specialisation. It finds natural expression in world of problem solving associated with producing tools and materials for industries such as leather tanning (Sabel, 2001).

Currently, many studies attribute job creation in both developed and developing countries to Small Medium Enterprises (SMEs) (Di Tommaso, 2000; NCR, 2011; Mawardi, 2011). SMEs create employment, have the ability to adapt to change, and more often than not rely on local skills, knowledge and support (Munyai & M'Rithaa, 2012). This study puts emphasis on promotion of small-scale industries as they have the ability to adapt to change and are the source of innovation.

The oldest explanation of the role SMEs play in the economy is found in the theory of entrepreneurs as described by Jean-Baptiste Say and Richard Cantillon, they focus on the impact of entrepreneurs on economic change particularly in small and new firms (in Julien 1992). Julien further argues that "SMEs have become leaders in the regeneration of many

industrialised regions to the point that many specialists now speak of a new renaissance of small businesses that is reversing the secular trend towards centralisation of production”.

Entrepreneurs who run SMEs generate new ideas and new opportunities on the markets later changing the market equilibrium, while also having other objectives such as independence and autonomy (Julien, 1992). CE for sustainable vegetable-tanned leather does not need a complicated innovation program or strategy; it requires a structure that will drive change in a scalable way. The structure could be made out of community members who are involved in the process, urban designers who are using the materials, researchers and other interested parties. Good networks are an important part of the collective efficiency production systems.

#### **4.2.1 SOCIAL NETWORKS**

In this study networks refer to the relationships between individuals involved in business activities (Nichter & Goldmark, 2009). Social networks are critical for the growth of SMEs as well as information sharing. Traditionally the relationships between producers, suppliers and customers were thought to be market-based. However, networks are a social process and are formed through discussion, interpretation and helping entrepreneurs refine their ideas. The process is socially embedded (Mawardi, 2011). Trust is one of the values influencing the interaction between individuals or social networks. Trust relies on the cultural values of the society and becomes a key aspect of social cohesiveness (Parrilli, 2009). Cultural values play an important role in creating support and cultivating trust amongst the members of the network.

According to Nadvi (1999), social network relies upon kinship, family, and localness. In the rural historical traditional African context networks relied on kinship which usually forms social relationships from tribal lineage. While family values bound actors in communities based on immediate or extended family lineage, local community and neighbourhood formed local social networks. Trust, social interaction and shared vision form the basis of the social capital. However, these types of relationships can be seen in many African systems, and are based on trust, societal values, cultural values and beliefs.

#### 4.2.2 THE AFRICAN CONCEPT OF COLLECTIVITY AND RESPONSIBILITY

Ubuntu is the African concept of collectivism and responsibility. The concept is known as *Ubuntu*. According to M'Rithaa (2009:21) "*Ubuntu* is a traditional African ideal that finds expression through mutually reaffirming communal interaction, mutual support, group solidarity and humanness". The concept is a metaphor that defines the significance of group solidarity on survival issues; issues of poverty have been and are still central to African communities. The concept of *Ubuntu* is a local ethos that promotes humanness and working together towards a common sustainable future while collective efficiency is a global concept used to understand decisions of production processes in a group environment. *Ubuntu* is understood as working as one and puts emphasis on the reciprocal relations with a paradigm shift from solitude to solidarity, from independence to interdependence, and from individuality to community (Louw, 2002:15) (See Figures 4.1).

The collective-efficiency approach can be better understood as an extension of the African philosophy of *Ubuntu*. The *Ubuntu* philosophy encourages the changes that are necessary to create a future that is sustainable (Hailey 2008). It helps societies to value themselves through relationships with community members, through community building, and by encouraging community collective work and consensus building. It has potential in conflict mediation and reconciliation and finally it makes an impact on organisation effectiveness and productivity. This makes the concept more than just a philosophical construct but of practical value to the process of community development (Louw, 2002).

The collective responsibility from an indigenous knowledge point of view recognises that survival is derived from a group harmony and that all the action should be within a collective system, in order to maintain harmony and balance within the system (Mkabela, 2005) (see Figure 4.2). However, the concept has also been criticised as being an out-dated mode of social cohesion and hierarchy, thus reducing *Ubuntu* to an ethical ontology of a purportedly shared world. Moreover, what is not clarified is the activism that is inherent in participatory differences of *ubuntu* as having an aspiration and an ideal ability to bring about a humane world and for people become important in that humane world and make a difference in it is often overlooked (Cornell, 2010).

This is very important for this study as part of this research is to understand how collective-efficiency and responsibility can contribute to the development of sustainable small-scale production of leather. Since the study's main focus is on the sustainable development of small-scale production of leather production processes in order to contribute to the development of rural areas, it is vital that the development process be driven by the "triple cultural heritage" to help reconcile the historical differences as well as enhance the achievement of improved efficiency in production and economic profitability (Mbigi & Maree, 1995). Therefore, there is a need for harmony and the ability to work as a collective in order for any form of development to be achieved. This harmony is vital for the process of economic development, by creating opportunities and enabling environment for the community can participate in create their own networks according to their own needs with the guidance and support from government. In many communities in Africa the culture of *Ubuntu* also strives to incorporate relations of individuality and communality to help contribute to the economic and sustainable strategies that help address societal challenges in the process of generating income (Bratman, 1999).



**Figure 4.1: Venda women working as a collective to carry out house work  
(Source: Mashovela, 2008)**



According to Bratman (1999:128) “In various non-Western cultures such as African, Aboriginal, American Indian, and East Asian cultures emphasis is put on the collective and relational features of human beings and collective intentions that involve a sense of action and willingness to do something together” the shared intentions coordinate the actions by making sure that the personal plans of action join together (Bratman, 1999). This can be seen in many aspects of craft production in the above mentioned countries. It is therefore the intention of this study to investigate how the same thinking and practise is applied in the leather production processes in Botswana and Italy which are benchmarked in this study.



**Figure 4.2: Women working together**  
(Source: BBC, 2010)

The shared intentions also act as a framework for negotiations, Marx's theory contends that a collective action paradigm is a paradigm of socialism/communism, and there has been a problem in rationally realising collective action on a mass scale (Marx ,1934; Woolcock & Narayan, 2000). In the labour intensive processes division of labour has been identified as one of the keys to knowledge transfer in the African culture through apprenticeship (Nakazibwe, 2005). In Uganda for example labour was divided in the bark cloth making process, people worked as a collective (ibid). The labour intensive process of producing the bark cloth is similar to that of producing vegetable-tanned leather.

The philosophy of *Ubuntu* has a deeply engrained meaning that demands that families, neighbours and communities work together, cooperate and support each other as a unit. They also understand the silent code of supporting and helping each other today because next time they might also need assistance and that the neighbour would do the same for them (Broodryk, 2006; Urban, 2008; Sigger & Polak, 2010; April & Peters, 2011). These are not practices that only focus on one aspect of life but extend to weddings, construction of homes and funerals, where the code is applied without formal invitations and neighbours can turn up and offer assistance with the preparations and the cleaning up (Mbigi & Maree, 1995; Mkabela, 2005). Their actions are based on the premise that a human being is a human being because of other human beings.

However, international trends such as globalisation have been disruptive to many countries and resulted in many people abandoning their homes and therefore adopting new ways of living and doing things (Jaja, 2012).

#### **4.2.3 THE PHILOSOPHY OF *UBUNTU* FROM A BUSINESS PERSPECTIVE**

Business needs to move away from being about business and society to be about business in society. Business is in itself a social system and therefore should look after the interests of everyone who contributes to the system. Mbingi's African collective fingers theory considers the thumb to be ineffective without the collective cooperation of the other fingers from a business point of view (Mbigi & Maree, 1995). This means collective forums, which are inclusive, are



necessary in order for any form of economic development to succeed and for it to have an effective change on society (The DTI, 2010).

The IPAP policy's goal is to create opportunities in rural areas through the decentralisation of the production process in order to help develop the parts of the country that have been long neglected. This will require the collective forum approach by consulting and assessing existing skills, knowledge and resources at the planning stage. The implementation can be done by the communities which will help them gain confidence and motivate them to take responsibility of their own economic well being with the guidance of other role players. This provides space for the decentralisation process to succeed without being disruptive to local cultures.

The philosophy of *Ubuntu* can help in dealing with challenges which the business sector often grapples with, such as alienating the South African work force, discriminatory employment practices, old management principles that stimulated confrontation and often result in low productivity, a corporate culture that is primarily white and male, and most importantly, deal with the issue of highly centralised business (Mbigi & Maree, 1995). Applying democracy in business could help in minimising the high rate of corruption which is mainly driven by greed which viciously become rampant when the control of resources is in the hands of the few individuals which essentially leads to corrupt behaviours. *Ubuntu* is the belief in communalism and interdependence and using democratic processes to reach a resolution on various issues of concern.

The values of *Ubuntu* played an important role in the fighting of colonial governments through solidarity in the struggle enhanced by the resilient nature of *Ubuntu* culture to survive the harshest historical conditions (Mapadimeng, 1998). Colonialism and its associated lifestyles is responsible for the dilution of IKS to the extent of near extinction in some countries (Barasa, 2007). Hence the importance of reintroducing local practices that have sustained communities for generations. However, the philosophy of *Ubuntu* could play a significant role as a code of ethics to establish and conduct business in South Africa. For a very long time the philosophies of *Ubuntu* have been neglected by the African leaders and business leaders as businesses are mainly run based on the western business concepts (Mbigi & Maree, 1995; Colff, 2003; Sigger, Polak & Pennink, 2010) (see Figure 4.3). However, the philosophy is now being positioned as a new way of strengthening the economic revitalisation of Africa (Sigger, et.al, 2010).



**Figure 4.3: African tree concept of *Ubuntu***  
 (Source: Sigger & Polak, 2010)

This might take time before it becomes entrenched in the business sector, but Africa needs revitalisation by creating an enabling environment for communities to participate in and become part of the cooperatives that are based on their skills and available knowledge and resources.

There is a difference in the management styles of the western world, and the African management in organisations, the African style lies in management of people (Mbigi & Maree,

1995). The African management philosophy puts emphasis on communalism and co-operative teamwork (Sigger, et.al, 2010).

In the African culture people and nature are equal and since people are equal, those who have usually share with those who do not have, and treating people with dignity forms part of the said culture (Sigger et.al, 2010). Sharing is an important value and therefore sharing the wealth of the country with its citizens in the form of economic development by creating opportunities where people and resources are situated should be a priority of many developing countries, through the creation of cooperatives in order to promote sustainable living (Mkabela, 2005). Under the *ubuntu* philosophy in order for one to enjoy the status of being a human being must comply with the rules of humanness (ibid).

Disputes in the work or home environment are discussed and resolved as a collective and every individual's views are listened to until all involved come to a consensus. Grzeda and Assogbavi, (1999 cited Jackson, 2004 in Sigger, et.al, 2010) argue that:

*Conflicts between African and Western values are evident in numerous aspects of managerial work. The African managerial style places greater emphasis on moral rather than on material incentives. Moral incentives are considered to be more meaningful and long-lasting. Indeed, wages are the property of the family not the individual; consequently, monetary incentives have little effect in performance, unless they are paid to the collective.... Western management approaches presume the desirability of taking risks, and value work motivation. In most African countries, the quality of life, and the value attached to personal time exceed any desire to accumulate wealth. Positive interpersonal relationships are valued above money.*

The above statement attests to the most powerful and valuable practices that are entrenched within the African cultures could add value in the business environment. According to Sigger, Polak & Pennink (2010:15) "The heritage in *ubuntu* the African genius lies in caring for people and the application of *ubuntu* should be the foundation of Africa's cultural business renaissance". In essence the business has a role to play in the development and upliftment of society where it operates and taps into local cultures and knowledge, and adds a competitive advantage in the economic development.

### **4.3 THE ROLE OF CULTURE IN THE COLLECTIVE ACTION TOWARDS ECONOMIC DEVELOPMENT**

Moreno, Santagata and Tabassum (2004:8) “Culture is defined as a guide to a set of customs, values and traditions, and the way of life of a society”. Culture promotes collaboration of local networks, combined with competition to stimulate dynamics, innovations, and specialisations which focus on social division of labour, and cooperation (Bertini, 1994; Baleiras, 2011). The cultural collective efficiency network’s core strengths lie in common values, norms, and social-cultural dimensions linked to relations of trust and social capital that help stimulate interaction and coordination between local actors while enhancing local production systems (Boschma, 2000).

The CE approach is usually a response to economic challenges and social challenges that the community face; the challenges are often linked to broader world issues such as globalisation. The post-Marxism form of development is about the mobilisation of communities towards economic liberalisation. Through collective shared knowledge and lived experiences can become key elements in the process of development of small-scale in rural areas industries (Mohan & Stokke, 2000).

There are few examples from both the industrially developing and developed world where the concept of collective efficiency has been applied and proven to help grow small and medium enterprises in different industries. There is no doubt that power to change the situation lies with individual members of the community and increases with successful pursuit of the individual and collective goals of economic independence. This is the type of development that is about participation and empowerment of communities. Mohan & Stokke (2000: 4) indicate that, “empowerment of marginalised communities should not solely depend on the state”, but rather on local actors, and local knowledge and interventions should be the key features of the new development.

Culture often reflects local politics and economics of societies, and it can also be perceived as a type of productive force (Xuewen, 1997). In China culture is viewed as a part of the three gears of any society which are politics, economics and culture, when these three gears are equally promoted it can help develop society rapidly (Xuewen, 1997; Fulner, 2008). Culture helps generate assets such as skills, expressions and insights that contribute to the social well-being

of the country. Culture and community values help shape the economic development endeavours of a country (Sen, 1997; Kneafsey, 2001, Fulner, 2008).

Collective efficiency and the culture economy share a common link in the sense that they put emphasis on local context based approaches to economic development. The theory of culture economy is seen as an attempt to provide local communities with conceptual tools, which can partially appropriate the growing force of consumption through the use of culture as social capital (Lai, 2012). Social capital is amenable to strategic fostering and integration of local actors into collective and participative collaboration. Cultural capital and human capacity get redefined and distributed for material benefits and social well-being of rural communities (Ray, 2006). Social entrepreneurs therefore become the drivers of the process by identifying the culture economy.

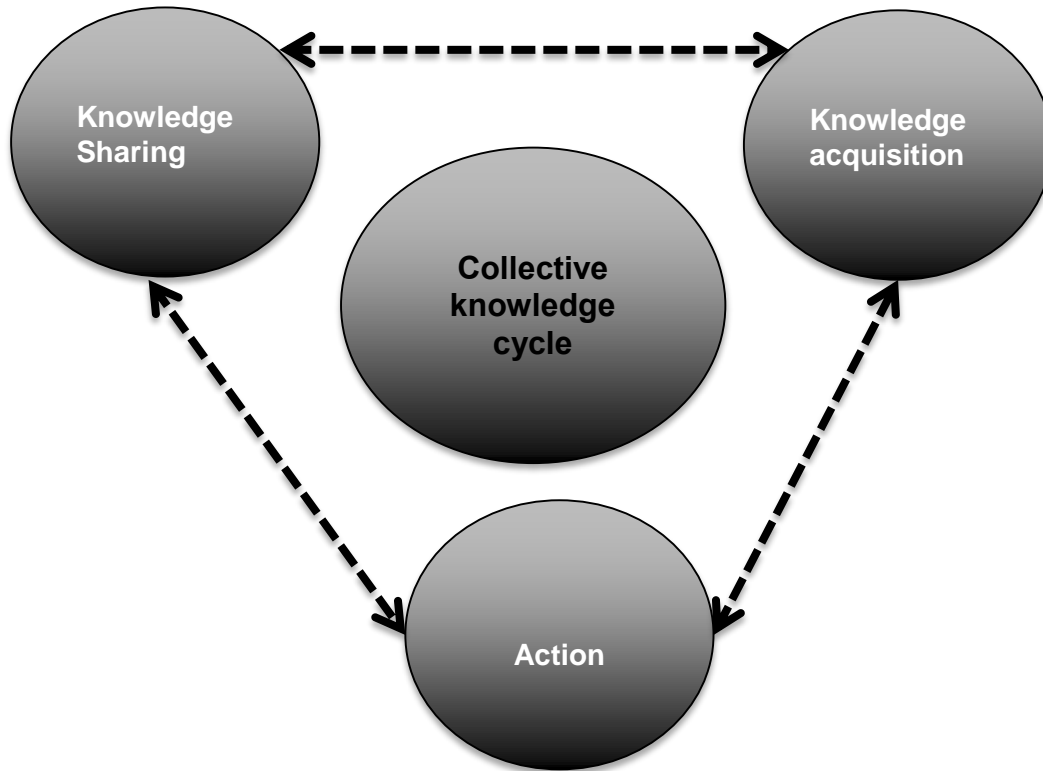
There are four interrelated modes which distinguish culture economy. These include fixing of products/services to the region, enabling the local communities to retain more of the economic benefits and the type of economic activities that occur; construction and promotion of new territorial identity through existing local initiatives or new cooperative structures; and building confidence of the community's own capabilities can also help bring out local development. The last mode puts emphasis on the capacity of the culture economy which can operate within the three other modes (Lai, 2012). The appreciation and love of place can be the guiding reference to local culture as a source of local wisdom and ethics (Ray, 1999; Lai, 2012). Since in the African perspective communalism is an important aspect, the idea of culture economy is also linked to solidarity economy where the traditional cooperative in the community is applied in the economic environment.

#### **4.3.1 COOPERATIVES: A SOLIDARITY ECONOMY**

Solidary economy is important for the manufacturing sector. Solidarity and reciprocity are part of the system, its cohesion and its reproduction, generates relationships and social capital, which assists the community in the process of development (Zoual, 2005). In the solidary economy production takes place in cooperation with others. Cooperatives offer a production model that has come to represent a modern case of solidarity economy, which is connected by values of economic democracy, participatory governance, social capital, social change and social stability

linked to the notion of sustainability (Reskatis, 2000; Munyai & M'Rithaa, 2014). There is now an extraordinary sense of urgency towards social change and there is an increased sense to act now. While this is certainly true of environmental issues, economic and social issues, the sense of urgency and individual responsibility has spilled out into the larger community. More and more people are feeling personally motivated to be more socially responsible. It is therefore important that leaders capitalise on the sense of responsibility and work with communities in the process of development, creating community networks that use available opportunities and traditional knowledge to economically, environmentally and culturally empower themselves. This has become the case in vegetable tanning sector cases that have been chosen as the field of research for this study. It is becoming the case that small-scale manufacturing design industries are becoming environmentally and socially conscious of the impact of their activities. In the case of small-scale production it allows the individual firms to make adjustments to the product, respond to new requirements from clients, or seek additional expertise within their network. The networks apply the attitude and principles of reciprocity, which closely resemble those of civil society.

Cooperatives are also proficient at fostering critical relationships through the collective problem-solving, culture of democratic economic participation by those who belong to their network. The cooperatives comprise highly-skilled, semi-skilled and no skill work forces, which contribute to economic development (Restakis, 2000). The cooperative system is a form of a collective knowledge cycle. Knowledge is shared among the members (See Figure 4.4). Despite the different skills-levels the cooperatives members through their collective actions knowledge and skills may be shared or transferred.



**Figure 4.4: Knowledge sharing (Author's construct, 2014)**

Antoni (1937) defined worker cooperatives as being established by employees for the purpose of jointly practicing their occupation. However, to a certain extent, worker cooperatives foster social change.

Galor (1991) asserts that the production cooperatives are considered a possible solution for development problems. The manufacturing cooperatives use flexible manufacturing networks. The networks replicate strengths of large cooperate structures in production systems that maintain scale, independence, flexibility, and innovation, on a small scale (Restakis, 2000: 4). Furthermore, flexible manufacturing is a set of relationships that link small firms together in a cooperative production system (Restakis, 2000). The creation of decentralised, flexible, high quality production systems is one of the core concepts of a holistic approach to manufacturing systems design (Scherer & Weik, 1996).

Decentralisation is also about controlling complex systems with multi-objectives and optimising problem solving through negotiation (Amigo & Gatti, 2006). The Italian cooperatives grew stronger with economic development in recent years through the expansion of the manufacturing sector. Manufacturing cooperatives optimise economic and human development

and balancing the needs for production, respect for the environment and provision of rewarding work and a stable job. The system is based on worker cooperatives that are based on democratically controlled enterprises.

The management team are accountable to the members; this makes cooperatives a more democratic system. The cooperatives also have checks and balances in place to ensure that the managers do not abuse their power through rotating members on the governing board, setting up committee watchdogs, and having union representatives to ensure that industry has wide wage levels. Generally cooperatives are made up of small or medium size companies due to democratic participation being easier when there are fewer members.

The principles that govern the cooperative movement include the worker-controlled model with the workers participating in decision making at all levels of the organisation, limiting wage and salary inequality by limiting pay margins. Members of the cooperative invest money in the firm and control of the firm goes with membership, which in turn guarantees the member the right to vote on matters that concern the business (Martin & Osberg, 2007). Moreover, the profits of the business belong to the members, who may decide to use the profit to expand their business. In Italy all cooperatives are exempted from paying tax, however they are required to contribute 3% of their annual profit towards a fund that will help establish new cooperatives (Law 8 November 1991 no 381).

Worker cooperatives are non-profit organisations under the Italian tax law, and are legally bound to invest their surplus profits for further job creation in exchange for favourable tax status. Cooperatives are also required to play a positive role in the community through making a positive change - rather than focusing on the shareholders and owners - in order to create new democratic employment (Martin & Osberg, 2007 in Munyai & M'Rithaa, 2014). Cooperatives reduce the over-reliance on government to provide financial assistance and ensure economic sustainability. This type of development is endogenous and therefore the initiatives come from within the community who are experts about the local environment, and are experts in local knowledge and understand its value and potential (Clara, 2000).



#### **4.3.2 LOCAL KNOWLEDGE IN RELATION TO THE COLLECTIVE EFFICIENCY PRODUCTION SYSTEM**

Local knowledge cannot be viewed in isolation from other knowledge structures, such as broader economic and political structures. This process requires contextualisation of place which means paying attention to the representation of the local and the use of the local resources in counter-hegemonic centralisation of production through collective mobilisation (Zaoual, 2005; Batholo, Delamaro & Bursztyn, 2008; Mehta, 2012: 181). Local knowledge is about how communities have coped with various complex situation and how some of the strategies could be used for development strategies (Adesina & Osman, 2007).

Collective mobilisation is a transformational approach founded in the 1980s which empowers communities to create changes in their lived situations by stimulating the needed situation-centred economic development approach and pressing for accountability from government (Simone, 2003; Agrawal & Perrin, 2009). Skerratt (2013) suggests that “localism looks at the relationship between local place-based challenges, community resilience, and dynamism of local communities” and tries to capitalise on that for economic development. Place-based challenges and community resilience offers an opportunity for new solutions and strategies that are based on local knowledge.

Bellandi (1997:16) suggest that “productive knowledge embedded in life experiences of local communities as a result of past activities are a hidden source of development potentialities”. The regional development model can help enhance labour-intensive industries like vegetable tanning in rural areas.

Furthermore, empowerment through localism is inevitable, once voluntary social interaction takes place knowledge is transferred (Skerratt, 2013). The theory of symbolic sites and belonging lays the foundation for a situation-centred development approach that seeks to embed economic discourse within the complex social milieu (Agrawa & Perrin, 2009). The model is cognisant of local community level aspirations and promotes sustainability as well as socio-economic resilience by offering a useful buffer against fluctuation in the global economic markets (Zaoual, 2010). The concept of *homo situs* is relevant to the context and reality of the place where a person resides is advanced by looking at existing local knowledge and skills for economic development (Zaoual, 2005; Bartholo, Delamaro, & Bursztyn, 2008).

According to Zaoual (2005), the market needs rules, conventions and culture to assure certainty. However, the markets have yet to solve this successfully by maintaining *homo economicus*. *Homo situs* seeks harmony and trust in human relationships which could create more certainty in market exchange which is currently a contradiction in modern society (Zaoual, 2005).

Today, taking into account realities and the diversity in which the realities take root, stabilise and evolve, means being more attentive to local actors and their real capacity to manage their practical ways. This will enhance the knowledge economy objective through hybridisation based on the understanding of the embeddedness of economic behaviour in human experience (Zaoual, 2002).

The collective and material manifestations of a country include landscape, habitat, technical know-how and tools which are all important elements of vegetable tanning. So the symbolic site of belonging is the collective heritage that draws its existence from living, experienced players and their ability to use the local knowledge for economic survival. The site contains myths, beliefs, and the influences adopted by a group. All these contribute to the identity of the site that is transmitted through socialisation between generations, as it is the case with IKS. The myths and beliefs are often linked manifested in the way people treat their environment and each other, which are all elements of sustainability. Humanity is one unified and diverse and therefore every site is unique and has something to offer, while also being open to local, regional, national and global levels.

Each site has its own conceptual toolbox that guides its practices this including, the know-how, tools, and modes of exploration of the environment. This indicates that the know-how of the population is linked to self-knowledge and this could be a way of looking at identity as a symbolic engine for effecting social organisation. From this point of view *homo situs* could exceed *homo economicus* and ensure that human endeavour is more closely aligned with communities and the environment to enhance sustainable development (Zaoual, 2005).

The market tends to uproot *homo situs* from closer to lived spaces then the techno-economic world becomes completely separate from the imaginary significations that actors give to their world. The basis of the territory is primarily a story, then a memory and knowledge, and the

knowledge is the organic community of belonging. The knowledge is the endogenous social cue that organises its reproduction. *Homo situs* concept is about the vitality of the informal and the ability to create meaning by combining expectation and action modes for development for communities (Zaoual, 2005; Ferréol, 2007). IPAP's agenda of promoting knowledge-based economic development strategies will need to adapt to the changes of knowledge and practice of local economies and communities (Gruenewald, 2003). It is therefore becoming important to understand how local knowledge affects the economy and the economic success of certain localities. Locality matters in industrial development: locality refers to neighbourhoods (Jarboe, 2001).

### **4.3.3 SUSTAINABILITY THROUGH COLLECTIVE EFFICIENCY**

Sustainable development has three important elements, which are also known as the holy trinity of sustainable development (Findeli, 2008). The three elements are environmental, economic and social sustainability, which include optimising human welfare, income generation, material consumption, and equality. The second element involves physical and economic activities that are compatible with surrounding environments which is very critical for sustainability, that include renewable resources which are critical to this study. The third element focuses on the equitable distribution of bio-spherically compatible improvements in human well-being (Beckenstein, Long, Arnold & Gladwin, 1996:10; Dixon & Pretorius, 2001; Kates, Parris, & Leiserowitz, 2005). Fry (2009:99) argues "Sustainable development is aimed at making forms of national global development less environmentally damaging". However, sustainable development has brought some challenges, it has promoted exploitation of the environment and promoted capitalism as a source of unequal exchange leading to inequity and conflicts (Fry, 2009). The conflicts are as a result of countries scrambling for resources which have been sold to wealthy nations without adding value resulting in local communities not benefiting. Sustainable development opposes the notion of national prosperity and human well-being as depended on increased global trade and industry (Hopwood, Mellor & O'Brien, 2005).

Sustainable development is composed of the theoretical world of sustainability with seven concepts such as ethical paradox, the natural capital, equity, ecology, integrative management, utopianism, and the political global agenda (Agyeman, Bullard, & Evans, 2002; Jabareen, 2006a). The first connection between the nature and humanity was emphasised by the

Bruntland report of 1987 (Kates et al., 2005). The concept raises the question on issues such as pollution; it also questioned the notion of prosperity as only achievable through increased global trade and industrialisation.

It is also important to acknowledge that the concept of sustainability is not a new one, there has been attempts to try and regulate the over consumption by the wealthy. According to (Muzzarelli, 2013) excess was an object of criticism by moralists during the seventeenth century as a result countries of Northern Europe introduced interventions through regulating spending. The legislators wanted to promote and raise awareness of consumption and a reflection on what today has become a popular concept of sustainability though at the time it was called justice. However, whether sustainability is achieved or fully implemented is not yet substantiated. Arguably, those who are more affluent adopt lifestyles which are within the planet's ecological means (Madge, 1997). However, due to little research being conducted within the IKS perspective it is hard to substantiate the contribution of IKS.

More recently the United Nations noted that sustainable development has grown from mostly focusing on environmental concerns to become a widely recognised framework that is utilised by individuals, governments, companies and society to attempt to balance economic, social, environmental and intergenerational issues in their decision-making of all levels (EU, 2010).

Sutton (2004:1) gives examples of things that would generally need to be sustained. "Sustaining the economy is the one that tends to sustain something of value. A sustainable company that is able to last a long time. A sustainable policy would be a policy that is able to persist through time". In the context of this study all the above mentioned areas of sustainability are important and they need to be prioritised in South Africa in order to create a sustainable knowledge based manufacturing sector. Brundtland (1987:16) Sustainable industrial growth means development that meet current needs without compromising the future needs". The following chapters will present findings from sustainable leather tanning countries which have sustained local tradition, knowledge and development.

#### **4.4 SUMMARY**

This chapter discussed the collective efficiency approach and its links to culture economy as they both place emphasis on the local context based economic development that link to local

practices. This chapter analysed the theory of collective efficiency in relation to small-scale leather production systems and the use of local knowledge in order to achieve sustainable development. Additionally, this chapter looked at local African concepts of *Ubuntu* and its relation to global concepts such as sustainability and collective efficiency and how they all could potentially contribute to sustainable development. The role local knowledge plays in the process of economic development. The philosophy of *Ubuntu* from a business point of view and its potential benefits were also discussed. The notion of solidary economy which is linked to cooperation and collective efficiency was also articulated. The chapter also looked at the role of social networks in relation to collective efficiency. Finally, sustainability through collective efficiency was discussed.

The following chapter present the research design and methodology which was employed to collect data from the chosen sites in Botswana and in Italy.

# CHAPTER FIVE

## RESEARCH DESIGN AND METHODOLOGY

### 5.1 INTRODUCTION

An extensive literature review was conducted in order to choose an appropriate research methodology for this study. A qualitative research approach was adopted. Qualitative research, embraces and draws attentions, while hinging on a broad interpretive and critical sensibility. The study draws on an interpretivist and constructivist approach in its analysis (Denzin & Lincoln, 1998). This chapter discusses the research process, methodological design, tools used to collect the data and how they inform the study.

The context in which the collection of data takes place is described in greater detail in this chapter. The sampling technique, the sample size and the reason for the chosen sample are discussed. The data collection process takes place in multiple locations in two different countries, namely Italy and Botswana. The rationale for the chosen methods will be detailed below. Qualitative research and benchmarking were used as primary interactive field research to collect data from the selected individuals in their own settings in order to get an understanding of their practice and the meaning they attach to their production process. Activity theory was used as a lens to analyse the data collected.

### 5.2 INVESTIGATIONAL DESIGN AND SAMPLING TOOLS

The pre-testing of research tools was done at the Design Research Activities Work group in Cape Town, which holds seminars on a weekly basis to discuss research-related matters. The pre-testing was done in order to test the questionnaire to see whether the questions could be understood by participants. The pre-testing was also used to achieve representation of settings, individuals, and activities selected (Maxwell, 2008). A small sample was systematically selected for relativity to ensure control and richness of the data collection.

Benchmarking was used to analyse the Botswana and Italian vegetable tanning industries to find best practices, to get their performance data and an understanding of the contribution of

their products to various industries, the environment and society. Best practices were identified through interviews with various stakeholders as well as observations which will be further elaborated on in the next sections. The data collection process for phase one was carried out over a period of five months.

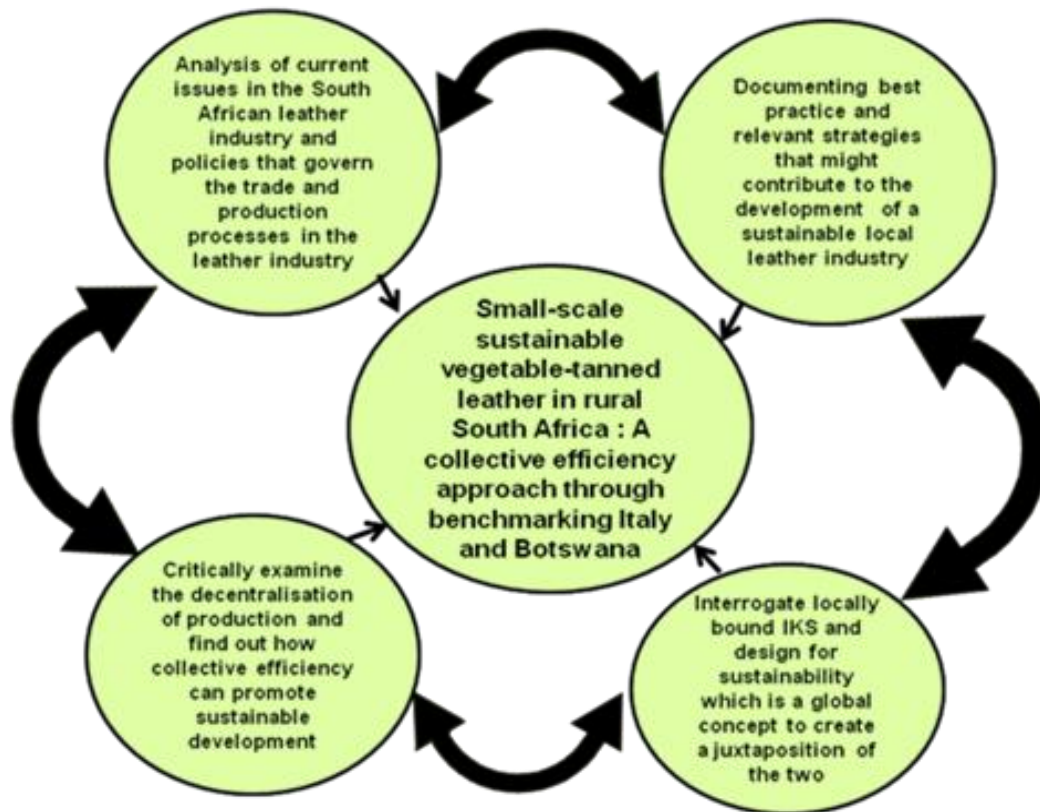


Figure 5.1: Overall research design  
(Source: Author’s construct, 2012)

### 5.2.1 SAMPLING TECHNIQUE

The participants were selected using purposive sampling technique. Purposive sampling was used to follow the set criterion for the study, which was to investigate best practices in the sustainable vegetable tanning process and the possible contribution of the process to the knowledge-based economic development in South Africa (Creswell *et al.*, 2007; Munyai, 2013). The data collection took place in two different countries or sites with multiple locations as will be discussed in the following sections.

Purposive sampling was used to ensure that the participants were involved in the process of vegetable tanning as they would be able to give better insights to the various concepts that were discussed (Marshall, 1996). The goal was to ensure that the conclusions adequately represent a wide range of variations rather than only the selective. Finally purposeful sampling was used to illuminate the reasons for differences between the settings that were studied (Marshall, 1996).

## 5.2.2 PHASE ONE OF THE RESEARCH

Phase one of this study consisted of multiple sites in Italy where the leather-tanning activities are concentrated. The interviews were conducted with vegetable tanners whose families have been involved in the business for generations. The different sites are described below in the following sections.

## 5.3 PARTICIPANTS' PROFILE

There were eleven participants who were interviewed for this study. The participants were based in two different countries made up of various sites.

**Table 5.1: Participants' profile**

<b>Participants' profile site One</b>	
Number of participants from six different companies	6
Age range	20-50s
Male	5
Female	1
Occupation	Vegetable tanners
Education background	Economics, Business administration, High school and primary school education
Country	Italy
Number of sites within the country	6
<b>Participants' profile site two</b>	
Age range	20s-70s
Male	5
Female	2
Occupation	Vegetable tanning trainers, vegetable tanners, government official
Country	Botswana



Number of sites within the country	4
------------------------------------	---

Site one was Italy and the access was requested via emails and telephonic conversations, by the time the researcher arrived the participants have been expecting the researcher. Site two which is in Botswana the researcher used a gatekeeper in Botswana to access the leather vegetable tanning artisans. Having someone that artisans know as a gatekeeper helped in putting the tanners at ease in terms of knowledge sharing with a stranger.

#### 5.4 RESEARCH SITE ONE: ITALY

Interviews were conducted in the Tuscany region of Italy (see Figure 5.2). Within the region there were three different areas where vegetable-tanned leather production takes place, which became research focus areas. Vegetable leather tanning producers in the region which included the area of Ponte a Egola with the nearest town being San Miniato, and Santa Croce area of Pisa region.



Figure 5.2: Map of Italy indicating where tuscany is located  
(Source: google maps, 2014)

The Tuscany region has an estimated 420 000 registered companies with 85% of the companies being made out of less than ten employees, while 9% have less than twenty employees (Fabbri 2012).

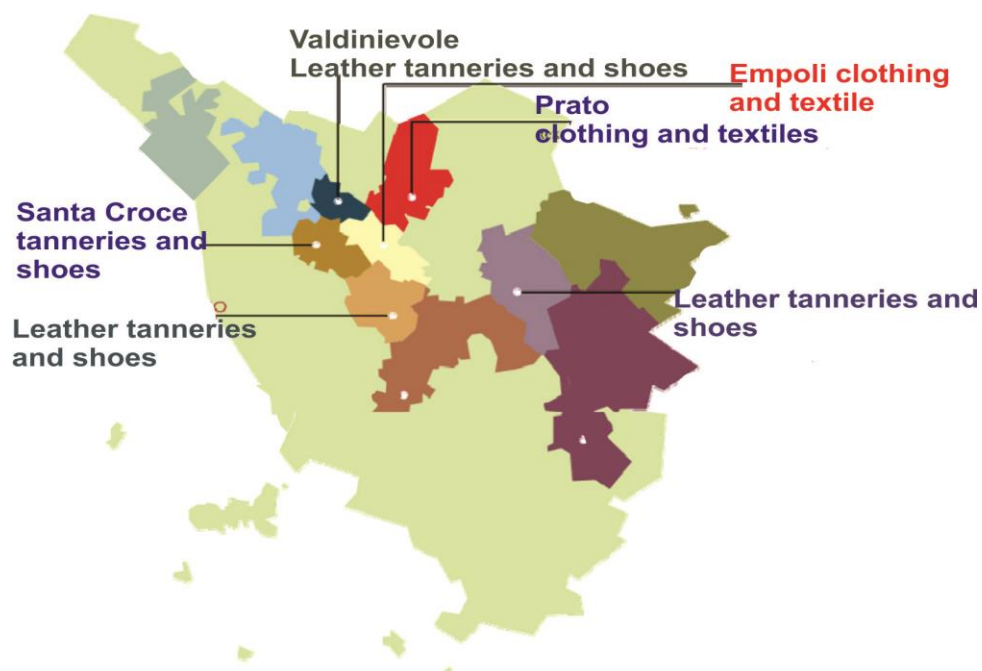


Figure 5.3: Breakdown of manufacturing activities taking place in Tuscany region of Italy (Source: Fabbri, 2012)

The image above is a breakdown of the different regions and their speciality in terms of production in Tuscany.

#### 5.4.1 Location ONE: FLORENCE

Florence is the capital city of the Tuscany region in Italy with a population of 370 000 (see Figure 5.4). This is a city that has been declared as a World Heritage Site in 1982. It is also known as the birthplace of Italian Renaissance (UNESCO). Industry and commerce are still viewed as highly important despite tourism in the city remaining by far the most important industry in Florence. Traditional crafts and leather work are among some of the produced goods that make Florence and high end fashion goods that dominate a fair share of Florence's economy (Fabbri, 2012).



Figure 5.4: Map of Florence indicating the location of the leather school (Source: Google Images, 2014)

#### 5.4.1.1 Participant 1

The Participants in site one are a third-generation of leather crafters. He runs a leather school which was built after World War I in the city of Florence. The school was established as an agreement between the Catholic church and one of the leather crafters for the purpose of empowering orphans with skills that they could use to generate an income while trying to rebuild their lives after the war, which destroyed many industries. The school's focus is to teach leather-crafting skills to designers who are interested in producing high quality leather goods.

#### 5.4.2. Location two: Ponte a Egola in SAN MINIATO

San Miniato is a town with a population of 27 979 located in the lower Arno valley on the South Eastern hills halfway between Pisa and Florence. San Miniato is economically linked to Florence with tanning having begun in the 19<sup>th</sup> century in the area. The area accounts for 35% of Italian leather production, which contributes 2 billion euros to the economy. The contribution is from small manufacturing companies, which make up a total of 900 companies with an average of 12 employees per business (Favazzi, 2002).

### 5.4.2.1 Participant 2

The first company in the area has been involved in vegetable tanning for 63 years has 37 employees with nine of the employees doing administrative work. Four to five members of the family are involved in the running of the business. There are also other employees who are related. The nine administrators are a mix between males and females. The average age of employees in company one is between 40 and 45 years. None of the employees involved in the leather tanning process have been through the formal education system. An interview was conducted with a third-generation leather tanner at this company.

### 5.4.2.2 Participant 3

The third participant was from a company that is also based in San Miniato and has been involved in leather tanning for the past 41 years. The company is currently run by a second-generation leather tanner, and produces vegetable-tanned leather which is used for belts, handbags and other leather goods.



Figure 5.5: San Miniato which is on the eastern side of the river Arno  
(Source: Google maps, 2014)

### 5.4.3 Location 3: SANTA CROCE SULL'ARNO

Santa Croce Sull'arno is situated of the lower basin on the Arno river on the western side of the river. The area has a population of 13 400 residents, with all the leather activities related to the leather industry with more than 400 factories and laboratories spread over an area of 17 square kilometres.



Figure 5.6: Map of Santa Croce on the western side of the river Arno  
(Source: Google images, 2014)

#### 5.4.3.1 Participant 4

This company has been involved in leather tanning for the past 50 years and specialises in vegetable-tanned leather. The company has four members of the same family who are involved in the business.

#### 5.4.3.2 Participant 5

This is a family-owned company that company has been in existence for 50 years. It has thirteen employees, two of whom are women, which make up the team of three administrators. There are four related members of the family who make up the managerial team. An interview was conducted with a family member who is a third-generation leather tanner.



#### **5.4.4 Location 4 VICENZA**

Vicenza province is made out of sixteen towns situated in the Veneto region of Italy with a population of 115 927. Eighty-three percent of the population is Italian, forty seven percent of the population is male and fifty two percent are female. Vicenza has more than 92 000 enterprises with 1 077 of those being tanneries, these numbers confirm the economic and entrepreneurial dynamism of the town. Vicenza had an unemployment rate of 5% in 2011 (Vicenza.org, 2014). This is the province that with very high productiveness and well-structured commercial area that is careful to quality and protagonist in the domestic market and with a propensity to exporting strategies. Leather tanning is one of the many industries that operate in the province. The leather industry in this region specialises in chromium-tanned leather.

Arzignano is a leather tanning areas within Vicenza and has a leather making history that dates back to the 15<sup>th</sup> century and accounts for 30% of Italian leather production. Tanneries and leather making industries integrated with machinery and chemical manufactures that also support the leather industry 30 and 35% of the leather produced in the region is exported. Leathers produced in the province of Vicenza are primarily used for home furnishings, footwear, leather goods and clothing. The leather tanneries in this region employ a total of 11 640 personnel.

##### **5.4.4.1 Participant 6**

This family owned company run by a second generation leather tanner who has been involved in leather tanning for over 40 years. The company employs 19 people. This company is different from many that have been interviewed as its main focus has been chromium tanning until recently when, at the request of fashion, house it started experimenting with vegetable-tanned leather.

## 5.5 SITE TWO: BOTSWANA

Botswana is one of the small countries within the SADC region with a population of only two million people. The country is endowed with vast amounts of land space as well as livestock. Moreover, the country is endowed with natural resources such as coal, diamonds and gold. The country is trying to diversify from the traditional mining industry to other labour intensive value adding industries such as leather tanning. The country never followed the industrialisation boom of the 80s with its leather industry. According to the LEA report (2011: 40) report Botswana had a total of 66 artisan tanneries scattered in villages around the country. The majority of those involved in leather tanning have no formal education.

However, the majority of the artisan tanners have received training from the Ministry of Agriculture (MoA) artisan leather-training programme. The majority of those trained are males making up 81% of the artisans. The Botswana artisan tanneries mainly operate from their backyards and generally get skins/hides from their surrounding communities. The central part of the country is made out of desert land with little potential for food farming and human habitation.



Figure 5.7: Map of Botswana  
(Source: Google images, 2014)

The research site is made out of four different locations within Botswana namely; Gaborone, Molepolole, Kanye, Mogoditshane. These locations were chosen due to their accessibility as well as the concentration of artisan tanneries (LEA, 2011).

### **5.5.1 Location one: Gaborone**

Gaborone is the largest city in Botswana with a population of 231 626 which makes up 10% of the country's population. Gaborone is the capital city of Botswana with all the official leadership based in the city as well as some of the training and development authorities such as the Local Enterprise Authority (LEA). The Ministry of Agriculture, LEA and the Central Statistics Office provided the secondary data used in this study.

#### **5.5.1.1 Participant 1**

During personal communication with the Director of Local Enterprises Authority he gave an overview of the local industry and the current situation as supporting secondary data. The director has been involved in the leather industry for the past 35 years, he has been instrumental in the establishment of the artisan training program at the Ministry of Agriculture (MoA). The programme is aimed at training the artisans in the handling of animal skins/hides, as well as preservation and tanning.

#### **5.5.1.2 Participant 2**

The researcher had personal communication with an official who is part of the group that is instrumental in setting up the artisan training programme. The programme ensures that hides and skins benefit the communities that they come from.

### **5.5.2 Location two: Mogodishane**

Mogodishane is a village in the Kweneng district of Botswana with a population of 56 139 in 2011.





Figure 5.8: Map of Mogoditshane village and its surroundings  
(Source: google maps, 2014)

### 5.5.1.3 Participant 3

This participant is vegetable artisan tanner. She is 32 years old and has been involved in vegetable tanning since 2006 after receiving the six weeks training from MoA.

### 5.5.3 Location three: Kweneng district

The Kweneng district is located around 75km South-east of Botswana, with a population of 304 549 which makes up to 15% of the country's population, scattered around 57 villages. Sixty seven percent of the population is made out of youth, majority of them being females (Botswana, 2014).

Kweneng is a homeland to the Bakwena people of Botswana, who are considered to be the first group that were converted to Christianity by David Livingstone. This is an area that has a lot of survivalist vegetable tanners who apply local knowledge in their production process. Within the Kweneng district the focus was on the area of Molepolole that has a population of 63 248 people.

#### **5.5.1.4 Participant 4**

Artisan vegetable leather tanner is 50 years old and she has been involved in leather tanning for the past 13 years based in Molepolole village outside Gaborone. The participant received training from the MoA artisan-training programme to empower them with basic skills of leather tanning.

#### **5.5.1.5 Participant 5**

This participant is 26 years old and has been involved in leather tanning since 2007. He also received six weeks training from the MoA, and has since started his own business of vegetable tanning and leather goods manufacturing which he runs from home. The participant works alone.

#### **5.5.1.6 Participant 6**

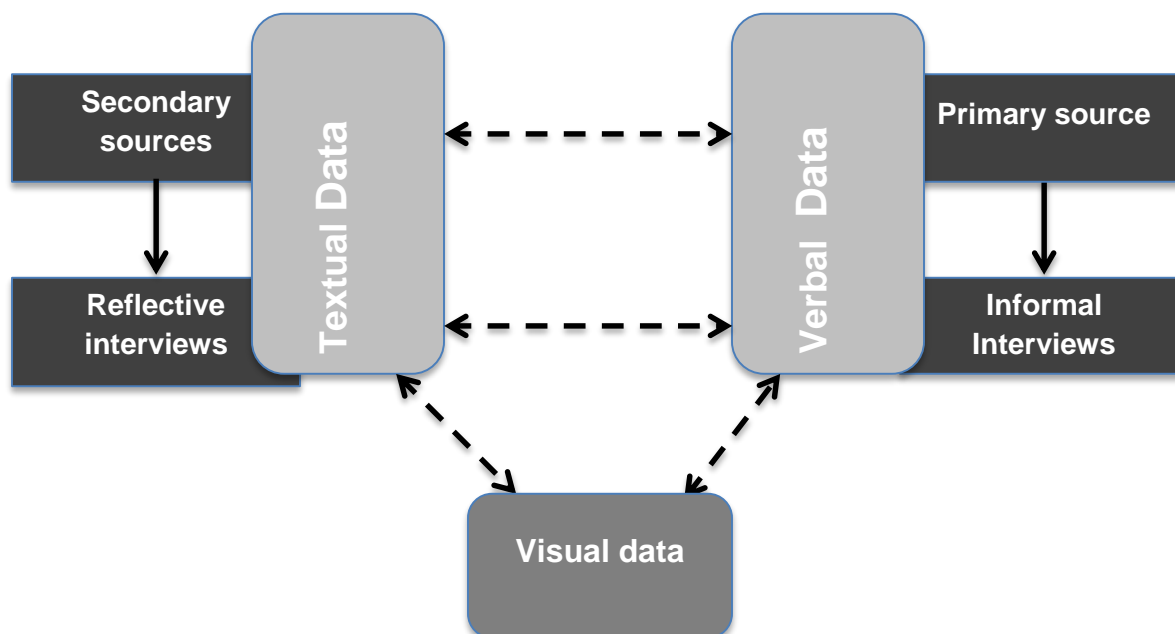
This participant is a 33 years old male who also received training from MoA for six weeks. He has been involved in leather tanning since 2011. He now runs a leather goods manufacturing business focusing on traditional Batswana attire, as well as sandals made out of springbok skin.

### **5.6 DATA COLLECTION**

#### **5.6.1 METHOD OF DATA COLLECTION**

The methodological process of inquiry hoped to increase knowledge in the research area of vegetable tanning and its links to local knowledge. In this area few earlier studies have been conducted (Munyai, 2013). The researcher wanted to gain familiarity and synthesise existing knowledge into issues related to sustainable small-scale production processes. The researcher

hoped to analyse the issues to construct a clearer system and generate new knowledge about the contribution of small-scale decentralised production systems to economic and community development (Sekeran,1992:4).



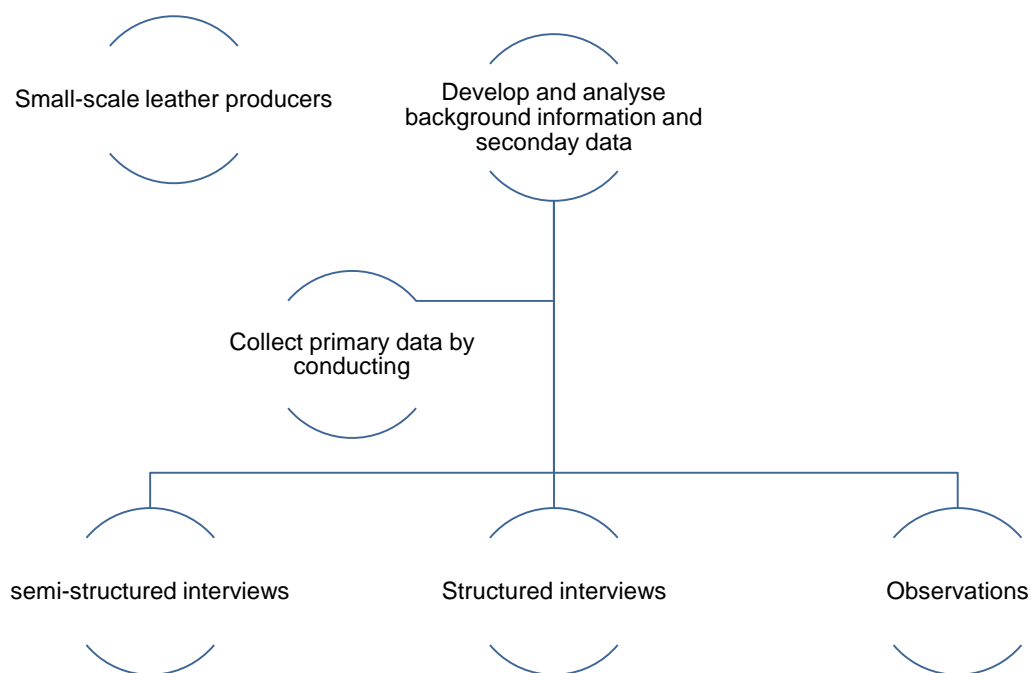
**Figure 5.9: different sources of data used**  
(Source: Author's construct, 2014)

Data triangulation was achieved through using multiple data sources as an investigation tool for analyzing the vegetable tanning system (See Figure 5.9). Triangulation contributed to a rich account that was developed to capture different dimensions on the research topic (Denzin, 1978; Creswell, 1998).

## **5.7 STRATEGY UTILISED**

Many of the vegetable tanners that were interviewed in Italy for this study have been involved in the process of vegetable tanning for more than 50 years. The companies focus their production methods on keeping the tradition of vegetable leather tanning alive. These are mainly family owned businesses. In Botswana individual artisan tanners who are finding strategies of continuing tradition as well as deal with waste from meat which would otherwise have been exported out of the country or thrown away were interviewed.

The process of data collection included identifying small-scale leather producers, analysing background information from secondary sources, collecting primary data through interviews and observing the process to determine whether any information might have been missed during the interview process (see Figure 5.10).



**Figure 5.10: Benchmarking methodology adapted from Raymond and St-Pierre (Source: Raymond & St-Pierre, 2010; Munyai, 2013)**

An Interview guide was used which consisted of a list of memory prompts of areas which the researcher wanted to focus on. The memory prompts helped to ensure that the participants answered questions about certain activities and their links to local knowledge, while allowing for flexibility in individual interviews.

### 5.7.1 STRUCTURED INTERVIEWS

Interviews were used as the primary tool of data collection. Yates (1994) recommends that structured interviews be used in the first contact interview to allow the researcher to examine the level of understanding about topic under discussion in this case, sustainable development of vegetable tanning and its potential contribution to the local economic development strategies through the use of locally available renewable resources. Yates, (1994); Compion, Compaign and Hudson, (1994) suggest the structured interviews can be used to gauge how participants

feel about certain topics being discussed. At the same time the method was also used to collect participants perceptions about collective efficiency (Curzon, 1995; Eder & Harris, 1999). The interviews were done over a period of eight months.

### **5.7.2 SEMI-STRUCTURED INTERVIEWS**

Semi-structured interviews were used to interview crafters involved in the small-scale vegetable tanning in rural areas of the two countries being benchmarked. The semi-structured method is flexible and uses a loose framework so as to accommodate any circumstances and therefore was suitable for interviewing leather tanners in rural areas who work in an informal environment (Denzin & Lincoln, 1998; Munyai, 2013). The interview method was used in both Botswana and Italy to interview the participants.

### **5.7.3 OBSERVATIONS**

Observations were used as primary method of data collection. Observations allowed the researcher to absorb and note details, action and subtleties of the field environment (Pretzlik, 1994; Webb et al., 1966; Munyai, 2013). Unstructured observations were used to understand and interpret the small-scale leather tanning processes and provided insight into interactions between the tanners with each other and the communities where they live. The observations also helped illustrate the whole production process and capture the context and finally, to found out what informs the influences of the physical environment (Mulhall, 2003; Munyai, 2013).

## **5.8 DATA ANALYSIS PROCESS**

The data collection and analysis is geared towards understanding the current state of vegetable tanning and the motivation for vegetable tanning as opposed to chromium tanning which is much faster. After the data was collected it was then analysed to identify the standard practice and its impact on the environment, society, and the economy.

**Table 5.2 DATA COLLECTION PROCEDURES**

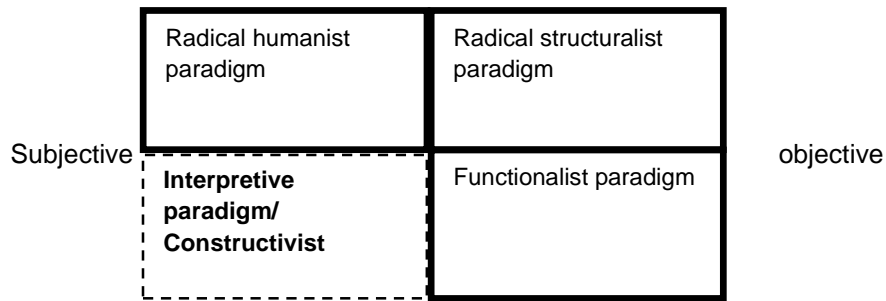
<b>Stage</b>	<b>Activity</b>	<b>Duration</b>
<b>1.introduction</b>	<ul style="list-style-type: none"> <li>• Identifying gatekeepers</li> <li>• Identifying potential participant</li> <li>• Identifying the role of participants and the process</li> <li>• Visiting international leather fair to identify potential participants</li> </ul>	<b>Three Months</b>
<b>2. Research</b>	<ul style="list-style-type: none"> <li>• Conducting interviews</li> <li>• Observations of the process</li> </ul>	<b>Four months</b>
<b>Transcribing interviews</b>	<p><b>Voice recordings</b></p> <p><b>Notes</b></p> <p><b>Personal communication</b></p>	<b>Two months</b>
<b>Analysis</b>		<b>Four months</b>
<b>Total duration</b>		<b>Sixteen months</b>

## **5.9 THE ROLE OF THE RESEARCHER**

The researcher was the facilitator of the interviews and an observer of the tanning process as well as the environment. The researcher interacted with the participants in an open manner to get their opinions on their activities, policies, the networks and the socio-cultural dynamics that are involved in the process of vegetable tanning.

## **5.10 THEORETICAL PARADIGM**

This study is situated within two paradigms an the interpretive and the constructivist which are used in the process of sense making Burrell & Morgan, 1979: 24; Denzin & Lincoln, 1998; Hantrais, 2009:57-59; Munyai, 2013).



**Figure 5.10: Burrell and Morgan's four social paradigms on organisation theory**  
(Source; Burrell & Morgan, 1979 in Munyai, 2013)

The interpretivist aspect of this study focuses on understanding and interpreting patterns of small-scale vegetable leather tanning process. The patterns and meaning of the production process weave human experience and the meaning the participants attached to the process. Logic was used to capture patterns which were interpreted with diligence in search for meanings they might hold (Geertz, 1973; Mlitwa & van Belle, 2010; Munyai, 2013).

The first order of interpretation of the data collected centred on participants making sense of their actions. The second order concentrated on finding relationships between the production process, local knowledge and social systems (Jacobs & Cleveland, 1999). “The interpretivist approach makes observations of subjects and seldom gives a full explanation of actions but can account for what the researcher has done and why, through seeking better ways of making the experience understandable” (Denzin & Lincoln, 1998:21).

The constructivist approach was used for systematic investigation. The approach focus on the reasons why this investigation was undertaken and how it was done (Barnes, 1997; Robson, 2002). The systematic constructivist thinking was derived from the interdependency between society, culture, families, and persons and their actions (Barne, 1964). The constructivist theory was used as a means to determine the participants’ involvement in determining what needs to be developed, meaning that the development is influenced by the participants’ and their cultural base. The constructivist thinking was underlined by the researcher’s beliefs in the possibility for change in the way goods are produced. Social constructivists exemplify a collaborative and respectful framework in which the research is constructed. The researcher used substantive theory to formal theory through comparing data from different literature sources and disciplines in order to develop logical-deductive thinking (Glaser & Strauss, 1967; Munyai, 2013).

## **5.11 ONTOLOGICAL STANDPOINT**

Small-scale manufacturing systems make reference to local knowledge and use cultural knowledge for the economic development of communities in which they operate through job generation. The communities used in this study are forerunners in hide/skin value-adding manufacturing systems that have been passed down generations. These are the systems that are linked to sustainability and local knowledge that need to be explored by the South African policy makers.

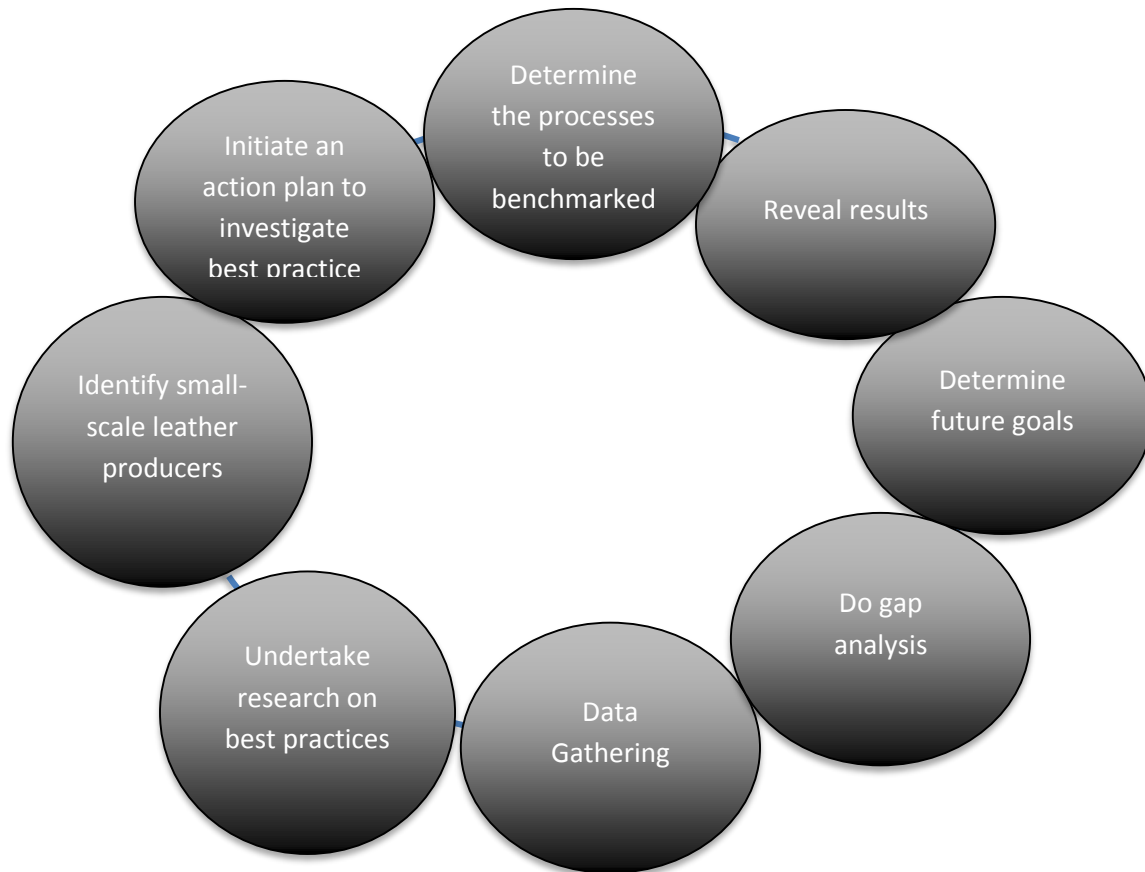
## **5.12 EPISTEMOLOGICAL STANDPOINT**

The study used the qualitative method based on assumptions that local knowledge's epistemological legitimacy is the connectivity of the physical and spiritual nature of life, hence the use of ecological materials in leather processing (Moreton-Robinson & Walter 2009). Epistemology indicates the basic premises underlying action and cognition it is embedded in (Keeny, 1983 in Munyai, 2013). Epistemology reflects the guidelines used by the participants for making sense of their world (Hoffman, 1981 in Munyai, 2013). Local knowledge is used for economic benefits through collective efficiency in rural areas. The communities that the study focused on are a reservoir of local knowledge that needs to be explored by the South African tanning industry and policy makers for local knowledge-based economic development which is currently under consideration (Denzin & Lincoln 1998; Dei, 2002). When local cultural assets such as skills, and material knowledge receive attention this could help in the economic revival (Tung, 2012).

The interpretivist process is used to interpret the participants' activities and how they contribute to their environment, socially, economically and with regards to sustainability. The interpretivist aspect is concerned with fact finding as well as predicting relationships between concepts of best practice, while the constructivist aspect of this study focuses on reality as constructed by the participants. The constructivist paradigm implies that no single truth or interpretation exists and therefore the social and cultural context should be included in studying the manner in which a person makes sense of their world (Joseph, 2010). This approach is also concerned with understanding reality as socially constructed, hence the use of the qualitative research approach.



The benchmarking aspect looked at the best practice within the small-scale leather tanning sector in three selected areas in Italy, the Kweneng district in Botswana and finally the community and its links to the social unit, individual, LK, culture, social structure, and meaning making. Cybernetics looks at interconnected units and their as beings of a larger whole (Hoffman, 1981; Keeny,1983; Marshall, 1996:523; Munyai, 2013).



**Figure 5.11: 8 steps used in benchmarking methodology  
(Adapted from Churchward, 2009; Munyai, 2013)**

Figure 5.11 shows the different steps of benchmarking methodology which were followed during the study.

### **5.13 ETHICAL CONSIDERATIONS**

There are various participants who were involved in this study, the stakeholders include: rural leather tanners, policy makers, designers that use the materials, and researchers.

#### **5.13.1 ETHICAL ISSUES RELATED TO THE INFORMANTS**

- Informants were not compelled to participate in this study
- Participants were given the option of withdrawing at any point if they felt uncomfortable during the course of the study.
- Names of the informants are not used in the findings to protect their reputation and that of their companies.
- The informants were made aware of the intent of the study before they could participate
- After the data had been analysed the participants were informed and given the choice to read it and clear any misconceptions.
- There were no incentives offered to the participants; instead emphasis was put on the participants and their information.

#### **5.13.2 ETHICAL ISSUES RELATED TO THE RESEARCHER**

The researcher was ethical when conducting the study and the following issues will be taken into account:

- The researcher ensured that the data collection process and interpretation was not biased
- The results of the report were communicated correctly without bias
- The researcher avoided obtaining information adversely from the informants
- The researcher endeavoured to uphold the ethics and principles of respect and human dignity

The primary source of funding for this study was from conception to completion the National Research Foundation Free standing scholarship, Europe South Africa Partnership for Human Development (EUROSA) scholarship and the Cape Peninsula University of Technology's University Research Fund. The research was not commissioned by the sponsors, it is conducted purely for academic purposes.

## 5.14 ANALYSIS STRATEGY

### 5.14.1 CULTURAL HISTORICAL ACTIVITY THEORY

Cultural Historical Activity Theory (CHAT) is a framework based on establishing how a system's principles through collective activity within a social context works (Koszalka, & Wu, 2004). The framework is a philosophical cross-disciplinary approach for studying different forms of human activity as a development process for individuals and society (Kuutti, 1991 in Munyai, 2013). In this study, CHAT was used as a lens to analyse the process of small-scale vegetable tanning, its impact on the environment and its contribution to economic development.

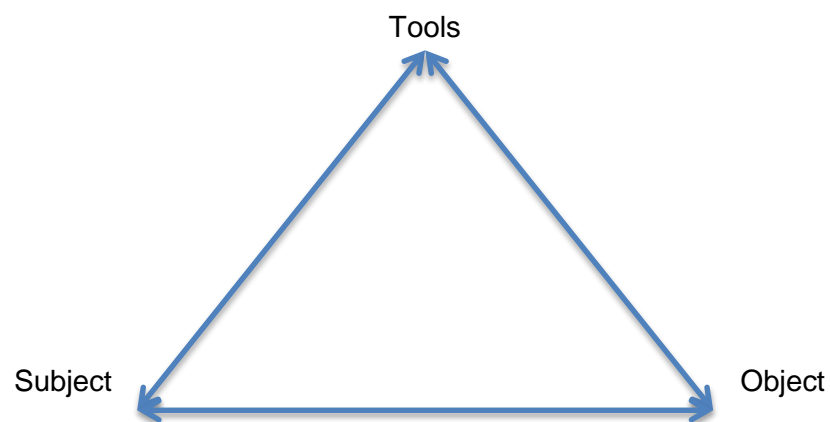
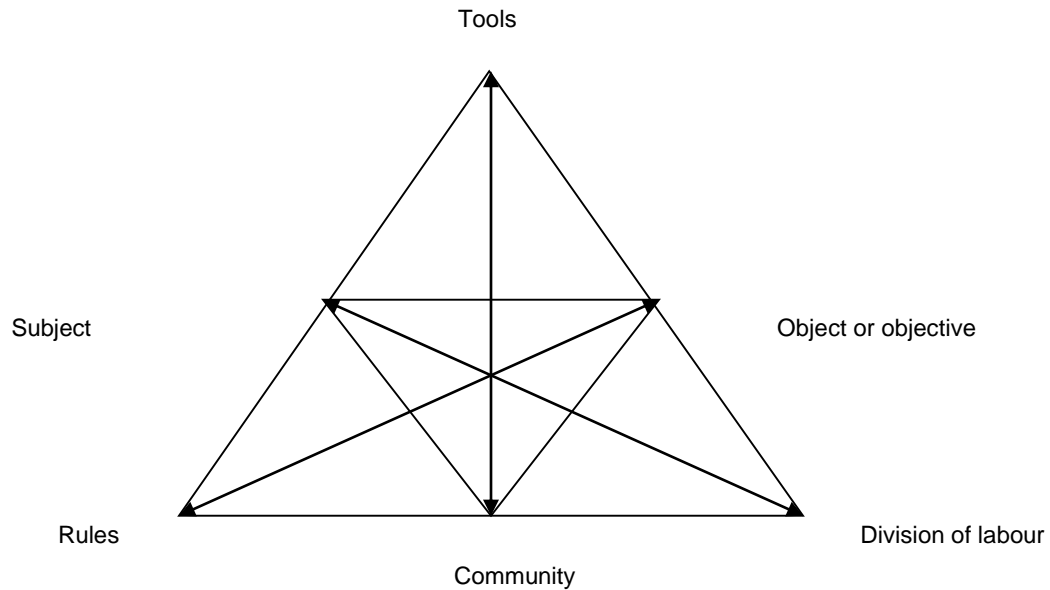


Figure 5.12: Vygotsky's basic mediated action triangle (1978)

CHAT presented an opportunity to distinguish between the goals of action, object-oriented activity, and allowed for the analysis of historically-evolving activity seen through related processes. The different levels of CHAT were used as prime units of analysis. The unit of analysis was used to interpret goal-directed action driven by the collective (Engeström, 2000).

Furthermore, the hierarchical levels of activities consist of linked operation that enabled the researcher to look at the vegetable-tanning production system as a whole (Leon'ev, 1978 in Foot, 2001). Therefore, it is a descriptive tool whose focus is on understanding human activities that incorporate history, interventions, collaboration and development of the production process (Foot, 2001; Nardi 1996 in Munyai, 2013).



**Figure 5.13: Activity theory model (adapted from Leon'ev,1978)**

### 5.14.2 ACTIVITY THEORY IN CONTEXT

First, CHAT was used to clarify the purpose of the activity system and understand the context to which vegetable-tanning takes place and its relevant contribution to the modern context (Jonassen & Rohrer-Murphy 1999 in Munyai, 2013). Secondly, CHAT was used to analyse the tanning system and its components. Thirdly, CHAT was used to analyse the tanning structure and its different operations. Fourthly, CHAT allows for the analysis of tools that have direct or indirect connections to the tanning process, the tanners and the community.

Fifth, it looks at internal dynamics that exist and are essential to the vegetable tanning process. Finally, the researcher analyses the interrelationships of the activity and how they affect each other (Zurita & Nussbaum, 2007:215-216; Munyai, 2013).

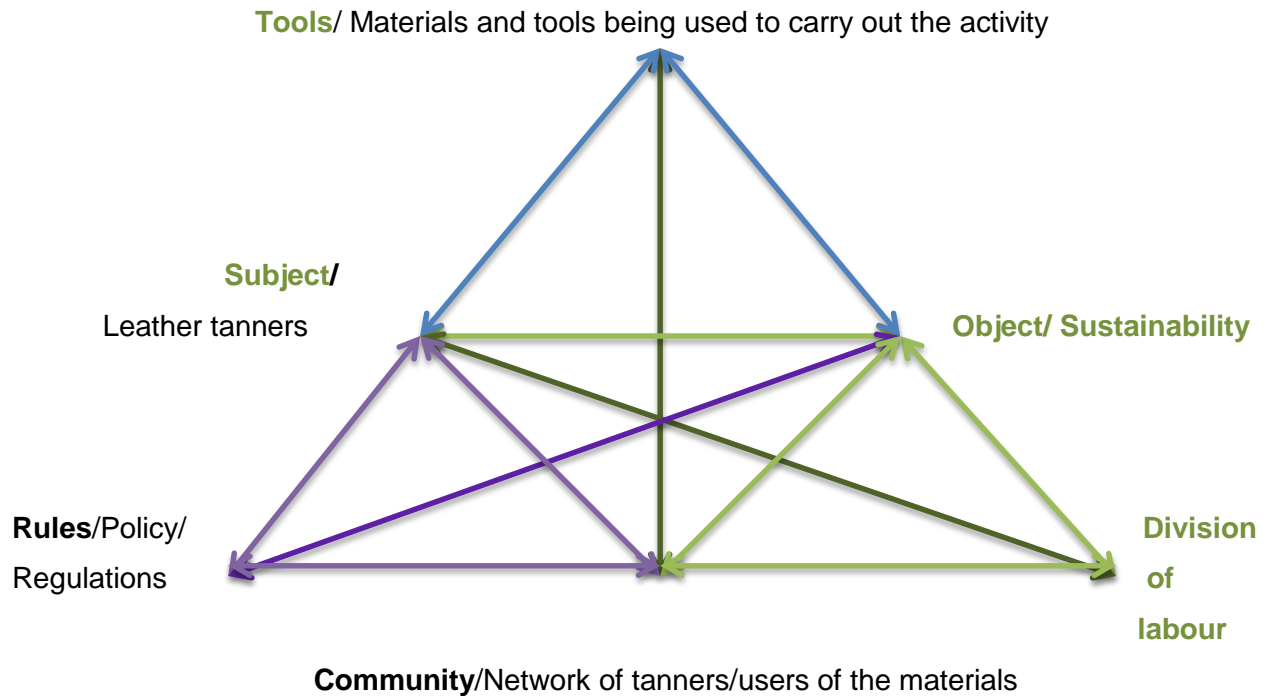


Figure 5.14: Activity theory model (Source: Engeström, 1987)

- Tools -refer to the materials used for tanning
  - Subject - is the vegetable tanners who tan the leather
  - Rules -that govern rural tanners and the regulations that govern the sector
  - Object - is sustainable vegetable leather tanning as well as economic development
  - Community -refer to the collective networks that contribute to the success of the sector
  - Division of labour -refers to how participants allocate work within their environment
- vegetable tanning system

An interpretivist approach was used in this study, which uses a social critique or symbolic interpretation rather than constructing empirically falsifiable theory. Additionally, a systematic constructivist thinking strategy through the coding process enabled the researcher to identify emerging themes and concepts from the data collected (Barne, 1964; Daly et.al, 1997; Leedy & Armrod, 2005; Munyai, 2013).

The identified themes were used to search for patterns. The patterns informed the interpretation of the collected data (Alvesson & Skoldberg, 2000). Therefore, a broad range of subjects were

covered to achieve maximum variations of all aspects of production processes that are related to vegetable leather tanning and its value chain (Miles & Hubberman, 1994).

### **5.15 CODING FRAMEWORK**

This section discusses the analysis of the data that was collected through interviews, observations and literature data in Italy followed by Botswana. The first step was content analysis. The following were taken as samples of analysis for collective efficiency, and of the relation of the concept of collective efficiency to sustainable production process and community development. In order to analyse the data collected a coding system was developed (Table 5.3). The coding system was developed after the proposal stage of the research. The process included labelling and grouping data into themes which were made out of similar concepts (Schervish & Herman, 1998).

The process resulted in the following seven themes namely:

- Identification of social cultural factors and their influence on the small businesses.
- Importance of collective problem solving.
- Political will to support small-scale manufacturing.
- Environmental policies and their impact on SMEs.
- Collaboration of academia, SMEs and government to ensure continuous innovation and technological development takes place.
- The role of local knowledge in the establishment of SMEs.
- Call for makers model in order to find new strategies for production systems.

Thirty-five codes were generated from the seven themes (see Table 5.3). The thirty-five codes that were generated included: family culture, reputation, social culture, knowledge transfer, intergenerational interactions, communal culture, and gender differentiation of activities, collective-efficiency, social network and collective problem solving.

**TABLE 5.3 CODING FRAMEWORK: ITALY**

<b>Theme</b>	<b>Property</b>	<b>Code</b>	<b>Example</b>	<b>Description</b>	<b>Interpretation parameters</b>
<b>Social cultural dynamics and their influence on the small scale vegetable tanning</b>	Family culture	<b>FC</b>	“The life of the company is strongly linked to the life of the family”	Social norms	Strong family culture contributes to the strong businesses
	Importance of reputation	<b>IR</b>	“The company is very well respected and the company has a good name”.	Competitive advantage	Reputation based on good business practices helps small-scale manufacturers to succeed in a competitive environment
	Knowledge transfer within the family	<b>KTWTF</b>	“You grew up with your father talking about leather then you start getting involved in it as well”  “being a small family company we have 7 members of my own family”	Continuing of tradition	Preservation of tradition that contributes towards continuity of production processes that have a proven track record
	Gender	<b>GND</b>	“Generally women are involved in the administration side of the business”	Woman in tanneries	Male dominated industry, there is a cultural belief that women are not strong enough to work in a tannery
	Required skills	<b>RS</b>	“It varies we have difference university, high school, middle school level it’s a whole mix”	qualification	The industry depends mainly on good craftsmanship as opposed to high levels of education
	Family culture and social capital	<b>FCSC</b>		Social capital	Contribute to strong social capital
<b>Importance of</b>	Collective-	<b>CE</b>	“Is the establishment of the third company	Sharing	Companies can still manage to

<b>collectivism</b>	efficiency		specialising in some aspect of leather tanning”	production	meet the high quality demand while creating employment through the creation of companies that focus on aspects of production based on trust.
	Social network	<b>SN</b>	“A lot. Yes in this part of Italy the concept of association is very strong. There is a lot of small tanneries, there is a lot of relations”	Shared experience	Networks allow for more shared experience and responsibility
	Collective problem solving	<b>CPS</b>	“We tend to solve the common problems together”..... . Many things are done together	Collective sharing	Problem solving in a decentralised manufacturing system
	Company networks	<b>CN</b>	“If one day I need to buff the leather I don’t need to buy the equipment and I don’t know the knowledge, he knows it”  “We supply vegetable-tanned leather to some of the famous international fashion brands with their red soles”	Strong network culture	The large manufacturing companies have a large network of small-scale manufacturers to supply their products.
	Family networks	<b>FN</b>	“We also have second generation family members working for us and I don’t think a father would send his son to come and work for our company”	Strong family systems	The strong family culture contributes to the success of the family businesses due to good support structures
<b>Political support</b>	SME support	<b>SMES</b>	“The share of state aid resources dedicated to SMEs is highest in Italy, even though it dropped slightly compared to last year	Policy documents	Italian laws have created a supportive environment for SMEs to strive



			(23.8 %)”		
<b>Environmental pollution</b>	Regulations	<b>R</b>	“Well... being in Italy we have a lot of regulations about waste”	Strict environmental laws	Government puts strict laws in the interest of its citizens and the environment
	Dealing with waste from the tanning process	<b>DWW</b>	There is a large water treatment plant that receives all the wastewater from all the tanneries in the area. And treats 100% of them and reduces pollution to 0.9% of dirty water that is in-coming	Production pollution	Curbing environmental pollution linked to tanning
	Contribution of SMEs	<b>CSME</b>	“because the company is small we are able to adapt to the continuous changes in policy, I must admit it is not easy, but because of the concentration of leather production in the area that puts us in the spotlight”	Adaptability	SMEs are more flexible in terms of their production and they are able to with stand changes and adapt to new product requirements
<b>The Industry higher education collaboration</b>	Educational institutions linked to industry	<b>EILI</b>	“we work with PO.TE.CO in this region”	Industry related Skills development	Leather research institute in parts of the country that are involved in leather activities
	Research & Technology development	<b>TD</b>	“Equipment mainly Italian. Mainly local because in the past even now we have the largest concentration of shoe leather, so the equipment is produced locally”		Linking technology development to industry needs
<b>Role of local knowledge in vegetable tanning</b>	Value of local knowledge	<b>VLK</b>	“I think that’s the strength of this district shared knowledge”	LK & development	Local knowledge is of great importance in the process of economic development and establishment of

					knowledge based economic development
	Long-standing tradition	<b>LST</b>	“39 years of vegetable tanning”	Cultural resilience	Long standing culture of resilience producing vegetable-tanned leather and resisting industrialisation
	LK for everyday running of business	<b>LKERB</b>	“Its important because we use this knowledge rely on it for our survival, we start with what we know and try to improve it”	Mutual respect	The owners and employees are afforded the same amount of respect as ones family would
	Success of the Italian VT	<b>STIVT</b>	“Passion and the willingness to do the job are a critical part that contributes to the success of the Italian vegetable tanning system”.	Will power	The success of the industry is attributed to passion as it is a highly-labour intensive and a very messy job
Business system	Family ownership	<b>FO</b>	“Family system tannery”	Localisation	Because of the strong family culture in the community the same culture and social norms are translated into the business environment as well
	Company size	<b>CS</b>	“Total of seven employees”	Small manufacturing	
	Vegetable tannins supply	<b>VTS</b>	Chestnut is mainly Italian and Slovenian, <i>Quebrabracho</i> from Argentina and <i>Mimisa</i> from South Africa		

			from Kenya and Brazil.		
	Equipment supply for VT	<b>ESVT</b>	“the equipment is produced locally”		

**TABLE 5.4 CODING FRAMEWORK: BOTSWANA**

<b>Theme</b>	<b>Property</b>	<b>Code</b>	<b>Example</b>	<b>Description</b>	<b>Interpretation parameters</b>
<b>Social cultural dynamics and their influence on the small-scale vegetable tanning</b>	Family culture	<b>FC</b>	“I do not involve family in the business”	Social norms	No family culture
	Importance of reputation	<b>IR</b>	“I am known in the community for what I do”	Competitive advantage	Reputation based on good business practices helps small-scale manufacturers to succeed in a competitive environment
	Knowledge transfer within the family	<b>KTWTF</b>	NA	NA	NA
	Knowledge transfer within a community		“I work alone most of the time, but there are people I normally ask when I need help:		Very little transfer of knowledge due to less interaction with others
	Gender	<b>GND</b>	“women mainly focus on processing skins because they are easier to handle”	Woman in tanneries	Male dominated industry.
	Required skills	<b>RS</b>	“higher primary and high school”	qualification	The industry depends on interest and craftsmanship
	Family culture and social capital	<b>FCSC</b>		Social capital	Contribute to strong social capital which is often not applied in a business environment

<b>Importance of collectivism</b>	Collective-efficiency	<b>CE</b>	NA	NA	Lack of trust
	Social network	<b>SN</b>	Not applied in the business environment	NA	
	Collective problem solving	<b>CPS</b>	NA	NA	NA
	Company networks	<b>CN</b>	NA	No culture of networks	No proper supply chain
	Family networks	<b>FN</b>	NA	NA	The strong family culture but makes no contribution to the success of the family businesses due to lack support structures
<b>Political support</b>	SME support	<b>SMES</b>	NA	NA	NA
<b>Environmental pollution</b>					
	Regulations	<b>R</b>	“ New environmental regulation was introduced in 2009”	Strict environmental laws	Government is working on the environmental laws for industry
	Dealing with waste from the tanning process	<b>DWW</b>	“Solid waste like hair is used to stuff cushions”  “wastewater is used as manure”	Production pollution	Indigenous ways of dealing with waste
	Contribution of SMEs	<b>CSME</b>	“Because the company is small we are able to adapt to the continuous changes in policy, I must admit it is not easy, but because of the concentration of leather production in the area that puts us in the spotlight”	Adaptability	SMEs are more flexible in terms of their production and they are able to with stand changes and adapt to new product requirements
<b>The Industry higher education</b>	Educational institutions linked to industry	<b>EILI</b>	NA	NA	NA

<b>collaboration</b>	Research & Technology development	<b>TD</b>	NA		NA
<b>Role of local knowledge in vegetable tanning</b>	Value of local knowledge	<b>VLK</b>	"I think that's the strength of this district shared knowledge"	LK & development	Local knowledge is of great importance in the process of economic development and establishment of knowledge based economic development
	Long standing tradition	<b>LST</b>	"I have been involved in vegetable tanning for 13 years, I now train people who are interested in the process"	Cultural resilience	Growing tradition of artisan tanners
	LK for everyday running of business	<b>LKERB</b>	Its important because we use this knowledge rely on it for our survival, we start with what we know and try to improve it		
	Success of the Italian VT	<b>STIVT</b>	"Passion and the willingness to do the job".	Will power	The success of the industry is attributed to passion as it is a highly-labour intensive and a very messy job
<b>Business system</b>	Family ownership	<b>FO</b>	Individual ownership	Localisation	
	Company size	<b>CS</b>	"I work alone"  "I work with six males because the hides require a lot of manpower to stir and lift"	Small manufacturing	Individual businesses

	Vegetable tannins supply	<b>VTS</b>	“ <i>Mosetsane</i> and <i>Mogonono</i> are indigenous to Botswana, and mimosa from South Africa is also widely used because it comes already processed”	Locally available materials as well as imported	Production system mainly based on locally available resources
	Equipment supply for VT	<b>ESVT</b>	“the equipment is produced locally”	Found objects	The production systems is also mainly based on the use of found objects

The analysis process includes triangulation of data collected through interviews, observations and the available literature.

**5.17 CODING VERBAL AND TEXTUAL DATA**

Statements from the participants were used as the unit of analysis; these were further categorized into segments, which were specific thought units that convey an idea or theme (Weber, 1990). Each segment was a phrased or reference to a specific theme (table 5.3). Data analysis for this research consisted of two sections the first section was to identify the patterns of the concept or statement. The second action involved a relational analysis approach that further examines and identifies relationships among concepts and themes present in the text. The concepts are viewed as having inherent meaning (Carley, 1990). The process focused on reflecting participants’ views on using collective-efficiency approach to achieve sustainability of SMEs in vegetable tanning.

Data coding entailed assigning idiosyncratic labels to passages such as phrases, words, sentences, or paragraph that contains concepts that speak to specific themes to help identify patterns (Reinharz, 1992;155).

## **5.18 SUMMARY**

This chapter discussed the research approach which was qualitative and gives reasons for why this approach was chosen. Qualitative research and benchmarking were used as primary interactive field research to collect data from the selected individuals in their own settings. This chapter discussed the research process, methodological design, tools used to collect the data and how they inform the study. The context in which the collection took place was described in greater detail in this chapter. The sampling technique, the sample size and the reasons for the chosen sample were discussed. The multiple locations in which the data collection process took place in two different countries, namely Italy and Botswana was discussed. Activity theory was used as a lens to analyse the data collected. The data analysis strategy was also discussed in order to give a clear indication of how the analysis was done.

The following chapter discusses data analysis process and the interpretation of the data.

# CHAPTER SIX

## DATA ANALYSIS AND INTERPRETATIONS

### SITE ONE

#### 6.1. INTRODUCTION

This chapter presents the analysis of data that was collected from the sites that were discussed in the previous chapter. The data collection process strategically focused mainly on small-scale vegetable tanning companies, companies that produce leather goods as well as artisan tanners. The process included thorough engagement with the data in order to find the key factors that contribute to the success of the traditional vegetable-tanning industry and the strategic use of technology in order to enhance economic development using local knowledge. It can therefore be benchmarked by developing countries that are trying to develop the economy and development of society through value-adding strategies as well as employment creation opportunities.

The analysis approach is based on the understanding that meaning from discovered concepts is generated as a result of relationship amongst the identified concepts in relation to the process of small-scale vegetable tanning. These comprise of family culture, dealing with competition, knowledge transfer, gender, collective-efficiency, social network, collective problem solving, company networks, family networks, policies, support for SMEs, role of industry, regulations, waste management, role of higher education, research and technology development, local knowledge and sustainability and related factors. The following sections are the key component of this chapter.

#### 6.2 THE ROLE OF LOCAL KNOWLEDGE IN THE DEVELOPMENT OF VEGETABLE TANNING

Local knowledge is viewed as playing a significant role in the development and the sustainability of the industry. Local knowledge is considered to be at the heart of all vegetable-tanning activities. The participants attribute their motivation for getting involved in vegetable-tanning to the local knowledge and seeing older people involved in vegetable tanning in all their lives.



<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
1	“local knowledge contribute 100% to the success of their business”	<b>RLK</b>
2	“local knowledge is what they work with every day and is very important to the process of vegetable tanning”	<b>RLK</b>
5	“Sharing knowledge and skills is what the working relations in the region are based on, it is considered to be the ingredient that contributes to the success of the region”	<b>RLK</b>
4	LK is important because it promotes the entrepreneurial spirit starting with what they already know based on local knowledge”	<b>RLK</b>
<b>Site two Participants</b>	<b>Statements</b>	<b>Code</b>
1	“local knowledge has helped in establishing the business, I saw a potential after watching a family member make ropes”	<b>RLK</b>
3	“I got support and guidance just like in our cultural practices and I have built from there”	<b>RLK</b>
4	“I got to know what I know through spending time with people who have been involved in the leather tanning process, they taught me what I know”	<b>RLK</b>
5	“Local knowledge is important because I had not seen other knowledge growing up, what I am doing here is partly because of what I have seen as a child”	<b>RLK</b>

### **6.2.1 KNOWLEDGE TRANSFER WITHIN THE FAMILY**

Knowledge transfer helps to preserve tradition. Family members get involved in the family business because they understand the value of tradition and respect the family tradition. Some family members go to university to study courses that will help them make valuable contributions to the sustainability of the family business.

<b>Site one Participant</b>	<b>Statement</b>	<b>Code</b>
1	"I decided to get involved after getting my MBA, you have to decide. I developed an interest and decided to get involved. You have to evaluate passion first. So if you have passion you get involved it's not a job"	<b>KTWTF</b>
2	"You grew up with your father talking about leather then you start getting involved in it as well"  "being a small family company we have 7 members of my own family"	<b>KTWTF</b>
5	"I started very young and the tannery is a family tradition so there was no time to choose"	<b>KTWTF</b>

### **6.2.2 GENDER PARTICIPATION IN THE LEATHER TANNING INDUSTRY**

The empirical data and literature show that men dominate this industry, with women on a very small scale playing a supporting role of administrators. A question was posed to all the participants as to why no women were involved in the tanneries. The majority of the male participants attributed the disparities to the labour intensiveness of the sector and suggested the work was too hard for women. During the research it was noted that none of the female family members are involved in the leather tanning process.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
1	"In terms of gender the majority of our students are females. I would say about 60% females and 40% males"	<b>GND</b>
2	"is due to the fact that on one hand the industry is very much labour intensive. Secondly, family women are not interested in the tanning business".	<b>GND</b>
3	"It is all male in the tannery, and one female doing the administration work"	<b>GND</b>
4	"Women in the family are not interested in leather tanning".	<b>GND</b>
<b>Site two Participant</b>	<b>Statement</b>	<b>Code</b>
1	"There are three males and one female, especially for processes such as scraping and lifting because they are difficult"	<b>GND</b>

3	"I employ six people most of whom are males, because hides require a lot of manpower to stir and lift"	<b>GND</b>
4	"I work alone"	<b>GND</b>
5	"I employ one person"	<b>GND</b>

However, in the leather goods manufacturing more women are involved in the factory performing duties such as sewing, cutting, quality checking of finished goods and packaging. On the other hand males dominate the design department and the marketing and management departments.

#### **6.4 THE REQUIRED SKILLS FOR VEGETABLE TANNING**

Skills feature prominently in any discussion of the challenges that face the manufacturing industry, in particular the leather industry, as discussed in chapter 3. The employees in the tanneries which were interviewed have different skills such as administration skills and engineering skills, majority of the employees involved in vegetable leather tanning process in the Italian companies interviewed had high school education as well as primary education. Those with lower education form part of the core business of tanning, as they are the ones who see the process of converting animal hides/skins into leather. The results were the same in the case of Botswana.

In the following comments from the participants, they indicate that the vegetable tanning process does not require higher education or specialised education. The process requires basic training and the rest is learned on the job through everyday interactions with the skilled craftsmen. This is not to suggest that there is no need for higher education as it contributes to the research and development of technology for the industry.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
2	"The employees have only done short courses in terms of leather tanning and this has never been an issue".	<b>RS</b>
3	"For the tannery they have high school"	<b>RS</b>
4	"All of us are without a degree, I would say high school for the majority and some people junior high"	<b>RS</b>
5	Two graduates, 5 diplomas, and junior higher and high school level	<b>RS</b>
<b>Site two Participants</b>	<b>Statement</b>	<b>Code</b>
1	"I finished high school"	<b>RS</b>
2	"I finished high school"	<b>RS</b>
3	"I have a diploma"	<b>RS</b>
4	"I never finished high school"	<b>RS</b>
5	"I never finished high school"	<b>RS</b>

The notion of the industry requiring highly skilled and trained people in order for it to succeed does not hold true in most cases.

## **6.5 MOTIVATION FOR USING VEGETABLE TANNING**

Vegetable tanning is a labour intensive and a time consuming process that requires passion and patience and dedication. The participants in site two in Italy spoke of their passion for the family tradition of leather tanning. Most of the participants got involved in the tanning business because they always heard their family talk about leather.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>

2	"Passion and the willingness to do the job are a critical part that contributes to the success of the Italian vegetable tanning system".	<b>MVT</b>
<b>Site two Participants</b>	<b>Statement</b>	
1	"I saw an opportunity to earn a living"	<b>MTV</b>
3	"I love working with leather and teaching people about it, I now run training workshops teaching people who are interested in the vegetable tanning"	<b>MTV</b>

Passion is defined as a "strong inclination toward an activity that the participants like, find important and in which they invest time and energy" (Vallerand & Houliort, 2003). According to Vallerand and Houliort (2003) there are two types of passion: "obsessive passion and harmonious passion". In the case of this study the focus will be on the harmonious passion, which is defined as autonomous internalisation that motivates individuals to choose to engage in the activity that they like (*ibid*). All the tanneries that formed part of this study are "family run and owned". In most cases the tanneries that were interviewed still have the founding members who are actively involved in the production process and share their wisdom with the younger generation that is joining the tannery business.

## 6.6 KNOWLEDGE TRANSFER WITHIN FAMILIES

Tradition is highly valued by vegetable leather tanners, and therefore innovation is centred around preserving culture while improving the quality of their production, which in turn contributes to the economic development of the community. The importance of tradition, in terms of respect for family and culture, means that values that govern family life also manifest in the business environment where families are respected because of the way they carry themselves in the community.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
1	"Our master craftsmen and women share their knowledge and skills with our students"	<b>KTWTF</b>
2	"Skills transfer takes place from one generation to the next through on -the-job day -to -day interactions"	<b>KTWTF</b>
<b>Site two Participants</b>	<b>Statement</b>	
1	"Some of what I know I observed from my husband and I also learned a lot from the training"	<b>KTWTF</b>
3	"I now also train people who are interested in learning the art of vegetable tanning"	<b>KTWTF</b>

## **6.7 IMPORTANCE OF GOOD REPUTATION IN A HIGHLY-COMPETITIVE ENVIRONMENT**

Since the tanneries belong to a network made up of family owned businesses it is important to keep the family reputation leading to a strong social capital, which is an enabling factor in collective efficiency. The reputation of the tanneries is essential for its survival within the competitive environment. The trust and confidence of its clients has an effect on the tanneries' bottom line.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
1	"The company is very well respected and the company has a good name"	<b>IR</b>
2	We also have second generation family members working for us and I don't think a father would send his son to come and work for our company. So I think we are not a bad company. A father would not send his son to come and work for us. We have a very good reputation amongst our clients and the community	<b>IR</b>
<b>Site two Participants</b>	<b>Statement</b>	
1	"We are known in the community for what we do, people come to us with their hide or skins for us to tan them. We don't buy or advertise for people come to us because we have a good reputation"	<b>IR</b>

2	"I am known in my community for what I do"	<b>IR</b>
3	"People know what I do and they love my work"	<b>IR</b>

However, in Botswana the reputation of the individual artisan tanners is what has kept them going in terms of producing vegetable-tanned leather.

### **6.8 FAMILY CULTURE AND ITS CONTRIBUTION TO STRONG SOCIAL CAPITAL**

For those interviewed in Italy, strong family considerations contributed to the prosperity of family units and ultimately the family business. This essentially speaks to the notion of business being a unit of the social system, and treating one's family and business family with the same respect that one affords ones family.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
2	"What got me involved is the passion for business and the love for family"	<b>FC</b>
1	"Working with leather is a family tradition, and when I completed my MBA I saw an opportunity to make a difference in the family business"	<b>FC</b>
5	"The only option for me after finishing school was to get involved in the family business"	<b>FC</b>

All the participants that were interviewed have a very strong family culture, which has ensured continuity of tradition. For them being without family is like an empty sack, '*un sacco vacante*'. The value system is organised primarily around protecting the family. The family is viewed as a source of provision, support, guidance and comfort.

<b>Participant</b>	<b>Statements</b>	<b>Code</b>
5	"Family is very important in our culture, even in our business we are like a family".	<b>FC</b>

## 6.9 MANAGEMENT OF FAMILY OWNED-BUSINESSES

The family businesses represent 93% of Italian manufacturing companies which combine the relevance of SMEs and account for a significant portion of the Italian economy (Mussati 2008).

<b>Site one Respondent</b>	<b>Statement</b>	<b>Code</b>
1	"It is a family business and has been in the family for generations"	<b>FO</b>
2	"It is a family business"	<b>FO</b>
3	"This is a family system tannery"	<b>FO</b>
4	"It is a family owned business"	<b>FO</b>
5	"Family business"	<b>FO</b>
6	"Family run business"	<b>FO</b>
<b>Site two Participant</b>	<b>Statement</b>	<b>Code</b>
1	"This is a family business we work together"	<b>FO</b>
3	"It is my business"	<b>FO</b>
4	"It is my business, I work alone"	<b>FO</b>
5	"I am the owner"	<b>FO</b>

The data suggest that there are overlaps between ownership of the business and family and the business. This creates subsystems that have objectives and practices that needs rational management because they are all interdependent and therefore needs coordination.



### 6.9.1 FAMILY RELATIONS

Most participants in the case of Italy had family members who were involved in the business, while in Botswana this was not the case.

Site one Participants	Statement	Code
1	"Four members of the family are involved in the business"	FR
2	"Like I said being a small family company we have 7 members of my own family"	FR
3	None	FR
4	"Four members of the family are involved in the tannery"	FR
5	"Four members of the family"	FR
Site two Respondent	Statement	Code
1	"I work with my husband, but it is very difficult"	FR
3	None	FR
4	"I work alone"	FR
5	None	FR

From the data, In a family-owned business the shareholders that the management represents are not anonymous and their interests are well understood. In family owned and run businesses "social capital and important management decisions are made by family or few families linked to each other" (Mussati 2008), and in this case the vegetable tanning businesses and the (*pelle consotiata al vegetale*).

### 6.10 LONG STANDING TRADITION OF TANNING

Italy has a long-standing tradition of vegetable tanning in the Tuscan region which dates back to the Renaissance period. The families that are involved in the vegetable tanning process are

committed mandated to keeping the tradition going, especially in terms of natural quality and the use of technology. The tanneries have been using vegetable tanning for generations and the knowledge and skills have been passed down generations.

<b>Site one Participant</b>	<b>Statements</b>	<b>Code</b>
<b>2</b>	" The company was started by the current CEO's father"	<b>LKT</b>
<b>1</b>	"the school was started by my great grandfather, and my grandfather got involved, my parents, me, and now my nephew is also involved"	<b>LKT</b>
<b>3</b>	"the company was established 39 years ago"	<b>LKT</b>
<b>4</b>	"we now have three generations involved in the business"	<b>LKT</b>
<b>Site two Participants</b>	<b>Statements</b>	<b>Code</b>
<b>2</b>	"I grew up with my grandfather processing ropes for tying cows during the ploughing season"	<b>LKT</b>

## **6.11 VEGETABLE TANNING CONSORTIUM**

Most of the participants that were interviewed in Italy belong to a vegetable-tanned leather consortium. The consortium is made up of both young and old tanners in order to ensure continuity and skills transfer. The consortium plays an important role in the promotion of vegetable-tanned leather as well as regulating the production process to ensure that high quality leather is produced using old traditions. The other duties covered by the consortium will be discussed in the following chapter.

However, it is important to note that strong social networks are more prevalent in the SMEs sector in other industries as well, such as the farming, clothing and textile industries and footwear manufacturing. Moreover, large private companies in Italy work with manufacturing SMEs in order to get high-quality products, which is easily achievable through the flexibility of SMEs manufacturing systems. The majority of the companies that were interviewed have less than twenty employees.

Site one Participants	Statement	Code
2	"in this part of Italy the culture of association is very strong, there is a lot of small tanneries, a lot of relations...we have a water treatment together to treat waste water and to treat tannery fleshing in one plant"	CNC
4	"The culture of association is very important"	CNC

From the data, the consortiums use a democratic process to come to a resolution; issues are resolved through proper dialogue with all the stakeholders involved in the process of vegetable tanning. The most important part of the consortium is the notion of shared responsibility and shared production systems. Using the notion of collective-efficiency, which was discussed in chapter four, due to the nature of their small business the consortium members tend to share with others within the consortium when they cannot meet the required order quantities. Owing to strong networks the businesses specialise in smaller production, although they are still able to meet large quantity demands due to this support.

However, that data from Botswana revealed that the artisan tanners have no company networks and therefore work in isolation, due to lack of trust of family members and others when dealing with money. Even when they have processed the leather they go on to produce leather goods themselves. Furthermore, the retailing of the final products is also carried out by the same artisan tanners. This constantly sets back rural producers in Africa who have no support even when large orders come in.

## 6.12 VEGETABLE TANNING LOCAL NETWORKS

Social networks have already been defined and discussed in great detail in chapter four. According to the data, strong social relations within the local vegetable tanning industry are attributed to the strong family relations within the Italian vegetable leather tanning industry.

Site one Participant	Statement	Code
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2	“The company itself the life of the company there is a stronger link to the life of the family. Changes in the family can also mean changes in the company”.	<b>FC</b>
5	“the life of the company is strongly linked to the life of the family”	<b>FC</b>

Networks within the vegetable tanning SMEs are linked to strong family ties because all are family owned and family-run. A family business is defined as a business whose ownership is controlled by a family and where two or more family members work in and have significant influence over the business (Mussati, 2008; Bettinelli, 2009:2). Effective management in the business allows for creation of a suitable identity for the business employees through a sensible and the motivating direction and motivation and discipline to help the business achieve its goals.

Moreover, Italy has a very strong inter-firm networks which have helped immensely in sustaining and maintaining a competitive edge even in the midst of cheap imports which threaten SMEs. There is a strong collective sharing of problem solving through the consortiums and manufacturing cooperatives.

### 6.13 COMPANY SIZE

<b>Site one Participants</b>	<b>Statements</b>	<b>Code</b>
1	“17 master craftsmen”	<b>CS</b>
2	“37 employees”	<b>CS</b>
3	“A total of seven employees”	<b>CS</b>
4	“10 people who work in the company, only four are related”	<b>CS</b>
5	“13 employees”	<b>CS</b>
<b>Site two Participants</b>		

The cooperatives are usually set up in order to deal with various socio-economic challenges that face society, in the case of manufacturing cooperatives the goal is to create employment opportunities including for the marginalised sectors of society.

SMEs learn to work with other firms within their social network. Despite the competition, each company has to manage independently its own place in the supply chain by focusing on the quality of their own products and services and mastering the logistics in order to meet the customer's demands.

#### 6.14 CULTURE OF SHARING

Site one Participant	Statement	Code
2	"it not necessary for companies to have all the required equipment for the required processes and finishes, we share the production"	<b>CS</b>
4	"when we have a big order or we need something done we ask other companies to help us"	<b>CS</b>
5	"there are other companies here that have the equipment we do not have, so when we have order that requires their expertise we call them"	<b>CS</b>

Strong networks and industry links within the vegetable-tanning industry has been achieved through combining tradition with modern technology in order to preserve tradition. The social networks contribute to the resilience of the traditional vegetable-leather tanning system, through bringing together various skills and expertise to strengthen the system and the SMEs.

#### 6.15 SOCIAL NETWORKS CONTRIBUTE TO THE SUCCESS OF SMEs

The data revealed that the SMEs in the regions are organised in clusters of suppliers, manufacturers and services providers according to the production they are involved in, but maintain hierarchical cooperative and competitive relational ties with each other. As participant two explains "The tanneries do not always carry out the production from start to finish"

<b>Site one Participant</b>	<b>Statement</b>	<b>Code</b>
2	“There are smaller companies that specialise in the finishing processes and other aspects of tanning”	SN
4	“There is also a strong connection between equipment manufacturers, suppliers and service providers”	SN

This ensures collective efficiency as there are strong relations amongst the role players and each player knows their responsibility within the value chain. One of the well-known fashion brands is one example, with a network of 800 firms that belong to the leather cluster and employ 5000 people.

The process allows for sharing of economic benefits, hence creating a very strong inter-connection between the production value-chain. Great value is also placed in the collaborative production systems where companies collaborate in a production process which allows for each company to bring its expertise to help in the process of improving the quality of their goods.

## **6.16 SME-BASED LEATHER MANUFACTURING SYSTEMS**

Small-scale leather manufacturing offers flexibility and exclusivity, which has impelled the increase in demand for vegetable-tanned leather goods which fall under the luxury goods category. Through collaborative manufacturing processes the small manufacturers are able to meet their market demands.

<b>Site one Participants</b>	<b>Statement</b>	<b>Code</b>
2	“Small companies contribute to the national growth of the economy through the provision of niche consumer goods and specialised leather products”.	<b>SMES</b>

Italian entrepreneurs are generally known for their loyalty to family tradition, preferring to get financing from cash flows and bank loans. When there was no interest within the family financial managers from outside of the family were brought in and paid a salary.

## 6.17 SUPPORT FOR SMALL-SCALE MANUFACTURING SYSTEMS

In Italy there are policies and regulations that are aimed at supporting the growth of small manufacturing companies. The country also has higher educational institutions that play a supporting role in terms of research. The institutions are situated in all the regions of the country where there are leather activities taking place. There are many support mechanism for the leather tanning industry in order to ensure that the companies are able to meet their full potential, innovate and develop while not destroying the environment.

With all the different support mechanisms in place it is therefore understandable that Italy has the highest number of SMEs in Europe. The focus of the support covers all aspects of the business, including skills development that is context-relevant, which is often overlooked.

Site one participant	Statement	Code
3	"POTECO"	EILI
4	"the university of Pisa has a leather incubation called <i>Polo Tecnologico Conciario</i> (POTECO) or the technological tanning hub that offers training courses to tannery employees"	EILI
5	"POTECO"	EILI
Site two Participants	Statement	EILI
2	"I did a six weeks course at DASP"	EILI
1	"DASP under the ministry of agriculture and I did another three year training at LEA"	EILI
3	"I did a twelve weeks training course with DASP which helped me a lot"	

In Botswana the Ministry of Agriculture (MoA) as well as Local Enterprise Authority (LEA) who are helping to mobilise support and recognition for artisan tanneries. These two authorities offer training in hides and skins handling as well as tanning through the six-week training programme by the MoA. Furthermore, LEA offers a three-year incubation programme on leather goods production. The students are trained in cutting, sewing and assembling products using various

technologies. However, the challenge is that none of these technologies are accessible to them once they leave the programme.

However, there is also a need for academic institutions such as engineering and design schools to contribute to the development of the industry.

## 6.18 TECHNOLOGICAL INNOVATIONS RELEVANT TO TANNING EQUIPMENT

The data also revealed that in Italy, in all the areas where there are leather activities, there are institutions that offer support services to the industry. The local leather industry has strong links within the leather production value chain and therefore the innovation takes place at all levels of the value chain. The equipment is developed in the region. In the process of trying to keep the culture and tradition of vegetable tanning alive countries resort to developing their own equipment and tools for the process.

<b>Site one Participants</b>	<b>Statements</b>	<b>Code</b>
4	"Most is made by companies in Santa Croce"	<b>ESVT</b>
2	"The equipment is from the region"	<b>ESVT</b>
3	"from here in italy, mainly santa croce"	<b>ESVT</b>
5	"Italian"	<b>ESVT</b>
6	"is from Italy"	<b>ESVT</b>
<b>Participants Site two</b>	<b>Statement</b>	<b>Code</b>
1	"for the tanning process we use stuff mainly found in the surroundings, like stones, old oil drums and wooden sticks"	<b>ESVT</b>
2	"we use stuff that we found locally"	<b>ESVT</b>
3	"We use basic stuff which is easy to find here in the village"	<b>ESVT</b>

In Botswana the artisan tanners use found objects as well as recycled items as tools for their leather tanning process. In most cases tanning does not take place in one dedicated space, it is



rather moved according to the weather conditions. In some cases the ground is used as the surface for working, while other tanners use wooden surfaces to keep the leather clean from dust. Not having access to proper working space or equipment and tools that could improve the process does not deter the craftsmen and women from continuing with their craft as for many of them this is their only source of income.

## 6.19 RESILIENCE OF SMESs

Adaptability and resilience are some of the traits that can be seen amongst the SMEs that were investigated. Because of the industry rely on local craft skills and renewable materials for the production process, the small businesses are flexible and offer exclusivity, which results in increased demand for luxury goods. The small companies have the advantage of rapid decision-making, rapid internal communication, capacity for fast learning and the ability to adapt to new strategies. Moreover, the SMEs have a tendency to work more informally in order to achieve the face-to-face element which is an important characteristic of the SMEs (Storey & Sykes, 1996).

Site one Participants	Statements	Code
1	"Initially the school was a form of giving back to society after WWII"	LKT
2	"Its has now been 62 years "	LKT
3	"39 years of vegetable tanning"	LKT
4	"The company was Founded in 1967 so its 47 years"	LKT
5	"50 years"	LKT
Site two Participants	Statement	
1	"Since 2006"	LKT
2	"Since 2009, but I use to see my father working the skins and hides to make ropes for cows"	LKT
3	"13 years"	LKT

4	"Since 2007"	LKT
5	"Since 2010"	LKT

The tanning of leather in Botswana has a long standing tradition, however, it is only in recent years that some of these activities have been recorded in order to get an understanding of the scale of leather tanning in Botswana and its potential for economic development and job creation.

## 6.20 WASTE MANAGEMENT FOR THE VEGETABLE TANNING INDUSTRY

The vegetable tanning process is an industrial process and therefore produces wastewater. As a result there are systems in place to ensure that the proper management of the waste is followed. Every Italian tannery that was visited has a meter reader that measures the amount of wastewater that is generated by the tannery and the company pays according to the quantity. Vegetable tanners' wastewater ends up in a centralised city water treatment centre.

Site one Participants	Statement	Code
2	"waste from the chromium waste is collected separately due to the pollution by a company that specialises in chromium waste management".	DWW
3	"there are three large centralised sewage treatment plants".	DWW
4	"Vegetable tanning companies don't need the state of the art equipment for recycling it, because its natural it's not polluting. But because it's an industrial system there is waste generated. The residue is filtered in the centralised town's water purifying system"	DWW
Site two Participants	Statement	
3	"I use the hair for stuffing cushions, I also realised that when I throw away the wastewater from the tanning process on a space in the ground I am able to grow plants there"	DWW
4	" after using the hair, I usually dig a hole on the ground where I pour the waste water. Sometimes I burn the solid waste"	DWW

Italian tanneries have to abide by the waste management of reduce, reuse, recovery and treatment of certain wastes. However, due to the shifting of the pre-tanning (Riviera) stage to

other countries, particularly in the chromium-tanning industry Italy is now experiencing a decrease in number of discharges in the purifiers.

## **6.21 SUMMARY**

The chapter focused on the analysis of the data that was collected, as well as the interpretation from the concepts that were identified in the themes that were generated from the transcribed interviews. The data from the interviews revealed similarities in the two sites which are related to using local knowledge in the process of vegetable tanning. However, the differences that were identified included the application of strong family culture in a business environment was found to be more prominent in Italy as well as trusting of family members and network members to conduct business and use as a source of support. The concepts identified indicate the importance of social, family, higher education and government support in order to create resilient and sustainable SMEs.

The following chapter will further discuss the findings and their implications in the establishment of sustainable small-scale production systems in Africa.

## **CHAPTER SEVEN**

### **FINDINGS**

#### **VARIOUS FACTORS THAT CONTRIBUTE TO A SUSTAINABLE SYSTEM OF VEGETABLE TANNING IN ITALY AND BOTSWANA**

##### **7.1 INTRODUCTION**

The findings of this study relate to how the collective-efficiency approach contributes to small-scale sustainable vegetable tanning industry. The collective-efficiency approach has been identified in order to help create an understanding of how small-scale production systems can be sustainable and contribute to development in rural areas which are the biggest source of support of urban areas. The research findings indicate that local knowledge contributes immensely towards the sustainability of a community that uses the knowledge for economic development while including elements of innovation and research.

In Italy the knowledge is used in the day-to-day running of the tanneries, which has in turn helped in ensuring their resilience through generations because of keeping traditional values. This does not in anyway suggest that the Italian vegetable tanning industry is perfect, instead there are best practices that any industry that is involved in leather tanning can learn from. The findings also indicate that there are similarities in the actual tanning process between the artisan tanneries in Botswana and Italy, the difference is in the scale, the tannins being used and the available equipment. In Botswana artisan tanners generally use found objects to help in their production process which is on a very small scale in comparison to Italian producers.

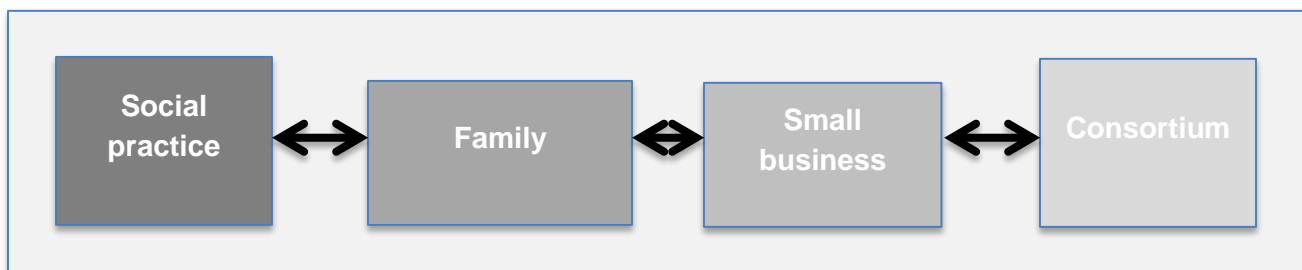
##### **7.2 STRONG FAMILY CULTURE INFLUENCES THE WAY SMALL BUSINESSES ARE RUN**

The main purpose of this study is to show the links between local knowledge and small-scale vegetable tanning which is based on local practices and the concept of sustainability. The combination of traditional local practices and the process of vegetable tanning has led to sustainable economic development of the Tuscan region. Moreover, the people who are involved in the process of vegetable tanning come from a very strong family culture and have managed to bring the same culture into the way they run their family business. Strong family ties

help build strong civil society where individual members are not exploited and children are taught to respect others (Llunge, 2013).

The strong sense of family in the Italian home environment is also very evident in the business environment as the small companies belong to a consortium that in itself is like a bigger family. The consortium is made of like-minded family businesses with the shared vision of preserving the tradition of vegetable tanning.

Social practices based on local knowledge influence the family practices, which in turn influence the way small businesses are run, which ultimately all becomes a source of influence to the association or consortium (See Figure 7.1).



**Figure 7.1: Family culture in vegetable tanning**  
(Source: Author's construct, 2014)

The strong family values perhaps also reflects in the way the employees are treated. As already indicated in the previous chapter that some of the employees in the family run business who are not family of the owners are the second or third generation of their own family working for the same company. Moreover, a family is a unit and therefore the idea of a collective is very strong within the Italian small-scale vegetable tanneries.

### **7.2.1 THE DYNAMICS OF COLLECTIVE NETWORKS**

In the vegetable tanning the network is made up of many different role players due to the long value-chain of the industry. The networks are vital particularly for the leather industry which has so many complexities through flexible networks that will be discussed in the following sections. The strict environmental regulation in Italy have advanced many innovative strategies with

regards to dealing with waste generated through the tanning process. The regulations have also resulted in the formation of strong collective efficiency within the sector, which would never be achieved if companies worked with a solo mentality.

The vegetable tanning networks help SMEs build strong relationships with their suppliers as well. The leather industry has a long value chain (See Figure 7.2). As a result the network might include vegetable-tanned leather goods manufacturers who are supplied by the tanneries, while the tanneries also have relations with the suppliers of hides and vegetable tannins. Whereas in some instances the large manufacturers who have smaller companies doing the manufacturing on their behalf tend to be the ones who have relationships with the tanneries.

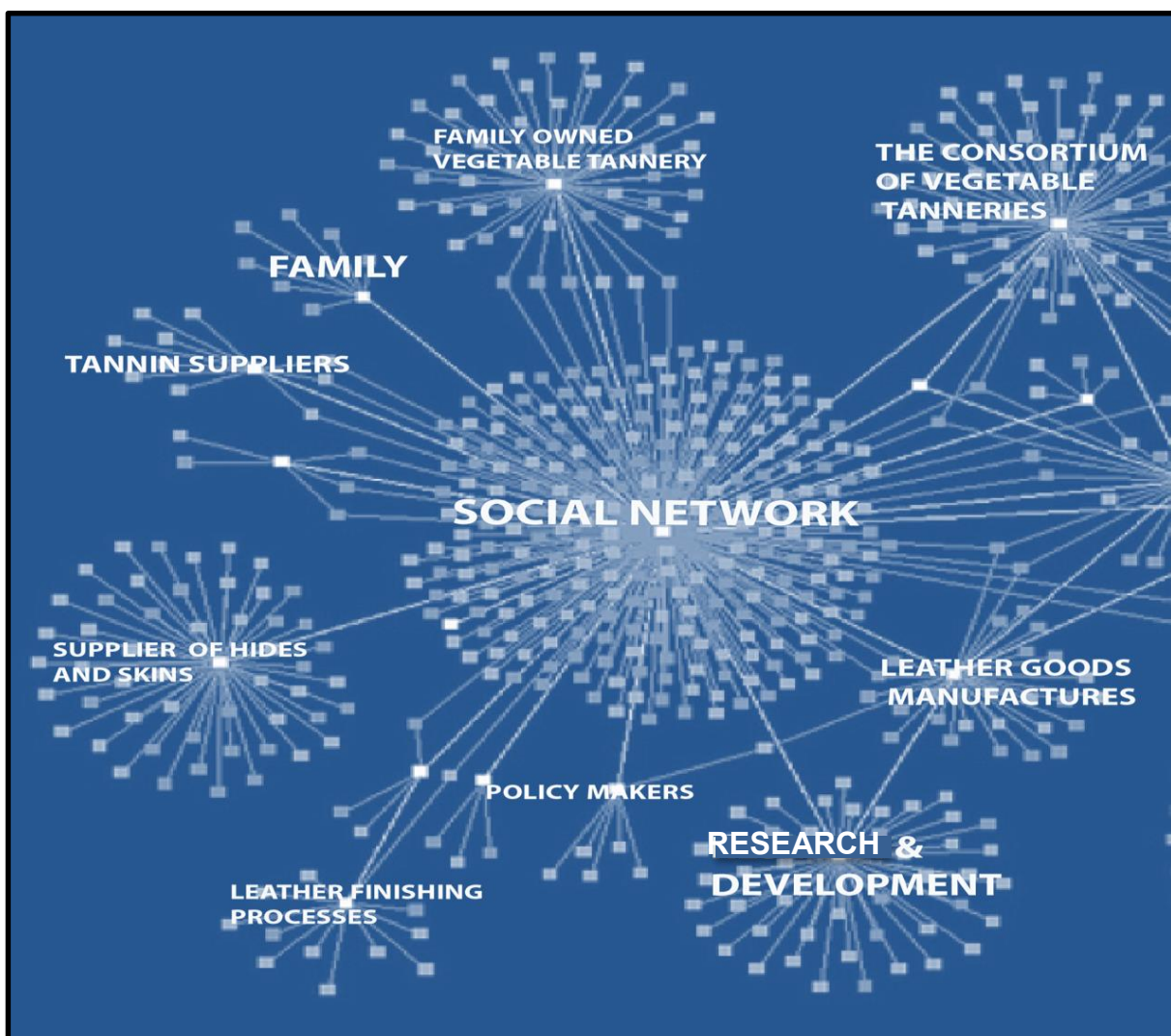


Figure 7.2: Social network and its related linkages in the vegetable tanning industry  
(Source: Author's construct, 2014)

### **7.2.2 COLLECTIVE EFFICIENCY AND ITS INFLUENCE ON THE DEVELOPMENT OF POLICIES THAT HELP GROW THE INDUSTRY**

Collective action does not only benefit the small-scale businesses or families involved in the process of vegetable tanning. They also help in shaping policies that are small business friendly.

Italy introduced a “statute of enterprises, which makes operations easier for SMEs” (European commission, 2012). The country also adopted a comprehensive three-year strategy in 2010 specifically aimed at SMEs. In 2011 the SME envoy was appointed to help guide the technical and permanent consulting forums for SMEs. One of the duties of the envoy is to collect entrepreneurs’ requests, through research and consultations, and collaborate with the Italian Ministry of Economic Development in drafting policy that addresses needs (European Commission, 2012).

Part of the consortiums job is also to identify the challenges and strengths of the sector and share those with the Ministry of Economic Development in order to ensure that they are factored into new policies. This is also the case with the leather crafters who produce leather goods (Leather International, 2007; *Pelle Vegitale*, 2014).

This is particularly important because law makers cannot make or pass policies without the practitioner’s, and user’ perspectives as their voices add value of understanding challenges, as well as areas which government needs to focus on in terms of capacity building and improvement.

### **7.2.3 TECHNOLOGICAL INNOVATION IN THE SECTOR**

Constantly changing stringent environmental laws and society’s awareness of environmental sustainability issues has resulted in continuous innovation in order to meet regulations. The vegetable tanning industry in Italy was found to have as a collective with their network, been able to find a good way to collaborate in innovating and developing new systems and equipment that helps improve the process without compromising the most valuable aspect of vegetable tanning which is tradition.

#### **7.2.4 ACADEMIC INSTITUTION SUPPORT**

The University of Pisa's engineering and chemistry faculty offers a degree in tanning application programs. The space is also used for tanning classes for experimental tannery and research on alternative tanning systems and testing of eco-friendly production cycle systems.

The technological tanning hub operates as a training and research centre for degree seeking researchers who want to test some of their findings. Having an academic institution that has links with industry not only creates an opportunity for the young graduates that they produce but also creates an environment where new strategies can be tested and implemented in order to create sustainable leather production systems.

#### **7.2.5 SUPPLY OF VEGETABLE TANNINS**

The vegetable tanning system has other important role players to ensure that the system remains functional and successful. Those include the suppliers of hides/skins, and the producers and suppliers of tannins. In Italy the chestnut tannins improve the hydrophobic properties of leather, the distribution and binding of colour pigment and fats, as well as weight yield.

The hides/skins used in Italy come from Italy, Europe and various parts of the world. The Chestnut tannins used by the participants come from Slovenia, while *Mimosa* tannins come from South Africa (see chapter 3), and the Quebracho comes from Argentina in powder form. All three plants have their own qualities in terms of the leather they produce. The extraction and processing of tannins in these regions is a satellite industry which could benefit from an increase in vegetable-tanned leather production. In this way the development and support of SMEs has benefits for related industries which contributes to economic development. If the increase in the extraction of tannins from AIS is done in a sustainable way with no adverse environmental effects could be a positive development





**Figure 7.3: Chestnut tannins from Slovenia**  
(Source: Author's own, 2014)

The tanneries have a diverse network of suppliers from different countries around the world. The idea of multiple suppliers ensures that the tanneries have continuous supply for their production. Quebracho extract is derived from the inner core wood of the trunk (See Figure 7.4). This extract gives the leather a special reddish colour.



**Figure 7.4: Centre of the Quebracho trunk which is where the tannin are extracted**  
(Source : Google images, 2014)



Figure 7.5: Quebracho tannin powder from Argentina  
(Source: Author's own, 2014)



Figure 7.6: *Mimosa* tannin powder from South Africa  
(Source: Author's own, 2014)

The *mimosa* tannin is produced from the bark of the plant which is harvested and pounded into powder form and then packaged for selling (See Figure 7.5 & 7.6).



### 7.3 THE VEGETABLE TANNING PROCESS IN ITALY

The vegetable tanning process has not changed much as it still requires time to gently transform the raw hides or skins into leather. Nearly forty days are required for the entire process of tanning. According to three of participants interviewed in Italy the vegetable tanning process takes “20-25 days to finished leather and another 15 days so from raw materials to finished leather is 40 to 50 days. Leather tanning is a huge investment”. The tanning still takes place in tanning vats sunken to the ground, while in some cases tanning drums are used. In some tanneries they have both the tanning vats and the drums (see Figure 7.7)



**Figure 7.7 Modern tanning vats sunken to the surface with a drying rack suspended above**  
(Source: Author's own)



**Figure 7.8: Modern vat sunken on the ground  
(Source: Author's own, 2013)**

In Italy each tannery has an archive of leather tanning recipes passed down generations. According to the participants the recipes “are a closely guarded family secret”. Moreover, constant experimentation has led to innovation and creativity. Vegetable tanning process is one that embodies the past and future as it blends tradition and innovation through expert artisans, development of technology and use of natural materials ( See Figure 7.9). The industry in Italy has managed to develop despite the labour intensiveness and time consuming nature of the industry, and this is inspiring with regards to the potential for the creation of vegetable-tanned leather cooperatives in South Africa.





**Figure 7.9: Leather tanning drum in front and tanning vats at the back of the drum  
(Source: Author's own, 2013)**

The Italian participants believe that the vegetable tanning process “is ecologically friendly and therefore has minimal effects to the environment compared to chromium tanning”. Vegetable tanning consist of four different stages which includes preservation of hides/skins through salting. When the hides arrive at the tannery they are cut into three parts, the sides - and shoulders - which are considered to be relatively stronger, thicker and more durable, and the belly (see Figure 7.10).

The hides are desalted decreased through soaking them then lowered into in wooden drums in water for two days to the restore moisture to a desirable pH level. The second stage is soaking the hides in quicklime for 24 hours to loosen hair and other unwanted materials. The de-liming process or rinsing follows which helps to remove the natural fats from the hide through the fleshing and splitting.

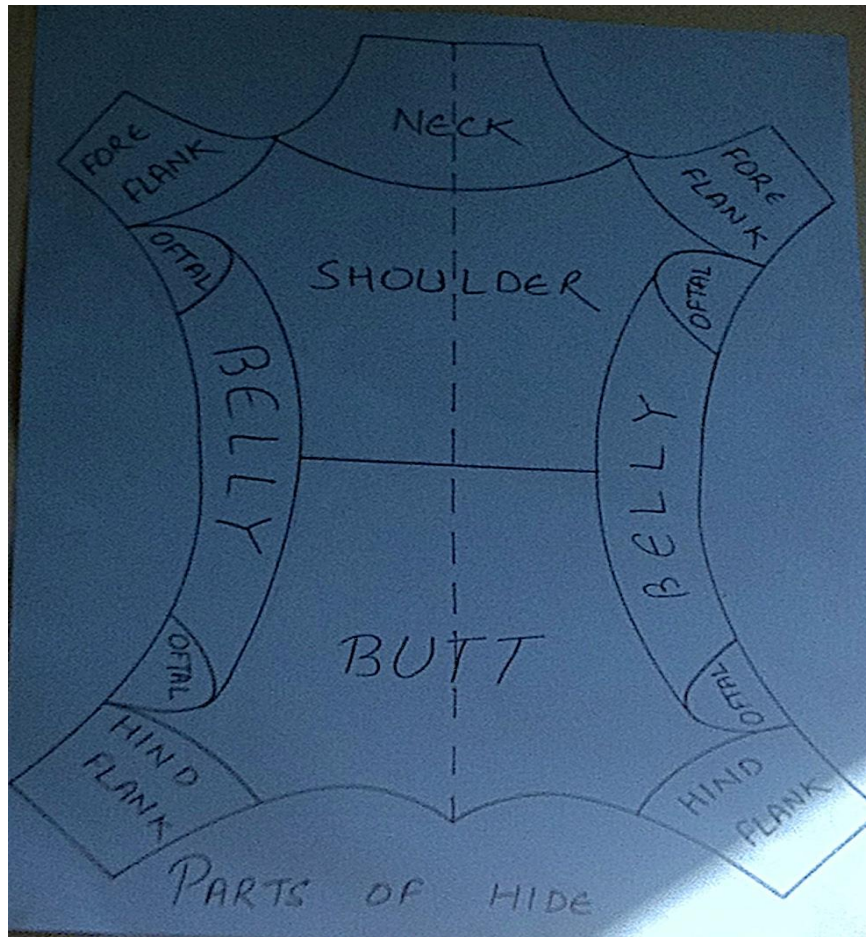


Figure 7.10: Different sections that the hide is divided into before tanning  
(Author's own, 2014)

After the delimiting process a blunt knife is used to scrape off hair and fats that might still remain on the hides. The hides are then put in the drums to rinse off all the lime and lower pH before tanning. Stage three is the tanning process, during which the master tanner determines the ingredients used to achieve the required results using either the Chestnut, Quebracho or Mimosa tannins.



**Figure 7.11: Leather that has gone through the tanning cycle**  
(Source: Author's own, 2014)



**Figure 7.12: Freshly tanned leather**  
(Source: Author's own, 2014)

According to participant (4, 2014) “Once a tannin agent is selected, master-tanners determine the different ingredients needed to produce this leather”. In the final round, leathers are soaked again in large wooden drums for several days where hides are coloured and softened. The result is leather that’s warm, bright, soft to touch, with a refined wooden fragrance. After being removed from the drums, leather is dried, shaved, and finishing operations take place to remove the excess moisture and give the leather a uniform thickness.

### **7.3.1 STRICT ENVIRONMENTAL REGULATIONS AND ENFORCEMENT**

Through the interviews with the participants it is confirmed that when new environmental regulations were introduced, because of the polluting nature of the industry, the companies were forced to oblige. There was no negotiation as the European Commission also supported the regulations. According to the Italian participants “Italy’s environmental laws means charging manufactures for the waste they produce according to quantities they produce”.

Moreover, the law has resulted in “SMEs collectively and continuously trying to find strategies of dealing with challenges as a collective”. The collective networks involve private companies as well as cooperatives. Therefore, the concept of clusters, which was discussed in chapter three, is very important for the leather industry to minimise pollution. The cluster of businesses in the region limit pollution, as control becomes easier and the industry is able to create a closed loop manufacturing system as it is currently the case with tanneries interviewed.

### **7.3.2 TREATMENT OF TANNERY WASTE IN ITALY**

According to the participants “each tannery has a system set up to read the amount of water and pollution being generated by each tannery before it is discarded in the centralised water treatment plant” (Participants 2,3,4 & 5, 2013; 2014) (See Figure 7.14). The wastewater treatment centre is managed and maintained by the collective of tanneries that use it.

Furthermore, some participants suggested that “having the waste management centre has also resulted in the establishment of companies that particularly specialise in processing the tannery sludge into various products (Participants 2 & 4, 2013; 2014).





**Figure 7.13: Leather waste management unit**  
(Source: Author's own, 2014)

According to UNIDO (2012: 5), it is best practice for many countries to organise tanning industrial districts with centralised treatment plants....to achieve economies of scale. Examples of these best practises are found in Old Cairo in Egypt, and Fez and Casablanca in Morocco where consortium –type water treatment plants have been established.

In this system, the sewage sludge is pumped into the system where it is subjected to a treatment that allows the recovery of both material and energy. Within the waste management value chain there is also a plant that treats the by-products such as fleshing. What makes the process so valuable is that all the treatment is done on site and therefore eliminates the transferring of waste from one area to another.



Figure 7.14: Wastewater receiver and meter pollution reading unit  
(Source: Author's own, 2013)

#### 7.3.4 USES FOR VEGETABLE-TANNED LEATHER WASTE

Waste from vegetable-tanned leather has many uses. Firstly, the waste needs a point of collection where all the fleshings and hair shavings are collected. Figure 7.15 shows the fleshing waste collecting system, which collects the waste for further processing into feed or fertilizers.



Figure 7.15: Fleshings storage tank  
(Source: Author's own, 2014)

Below is a diagram of the processes and stages that the leather waste has to go through to produce fertilisers and animal feed (See figure 7.16).

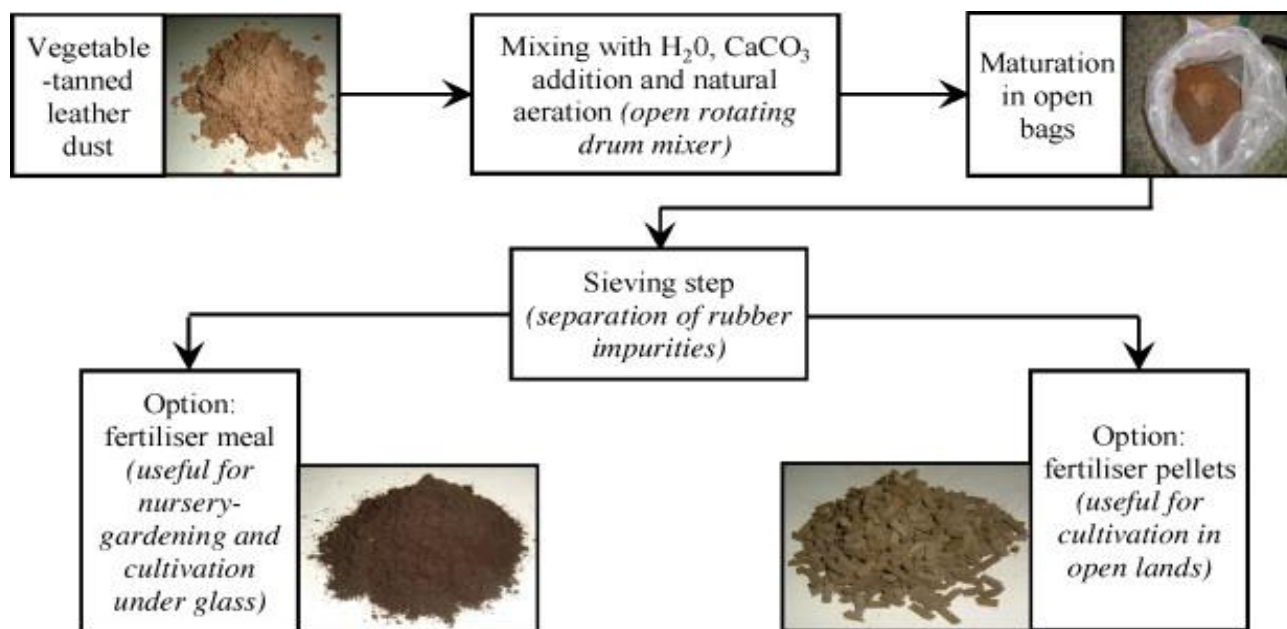


Figure 7.16: A diagram of vegetable-tanned leather waste  
(Source: Tatàno, Acerbi, Monterubbiano, Pretelli, Tombari, Mangani, 2012; Munyai, 2013)



The waste is generally processed on site so as to avoid the transfer of pollutants to other areas. The vegetable-tanned leather dust is mixed with water for thirty minutes in an open rotating drum. Static maturation is carried out in a plastic bag for fifteen to twenty-five days. The waste is then sieved to remove impurities (Tatàno, et.al, 2012).

#### **7.4 LEATHER-DRYING SYSTEM AFTER TANNING**

Drying is carried out to remove water from the leather since all the other processes are carried out with liquids, and therefore uniform drying is required. Below is an example of a large scale-air-drying system which is used to achieve uniform drying for leather (see figure 7.17-7.19).



**Figure 7.17 Large scale drying rack  
(Source: Author's own, 2014)**



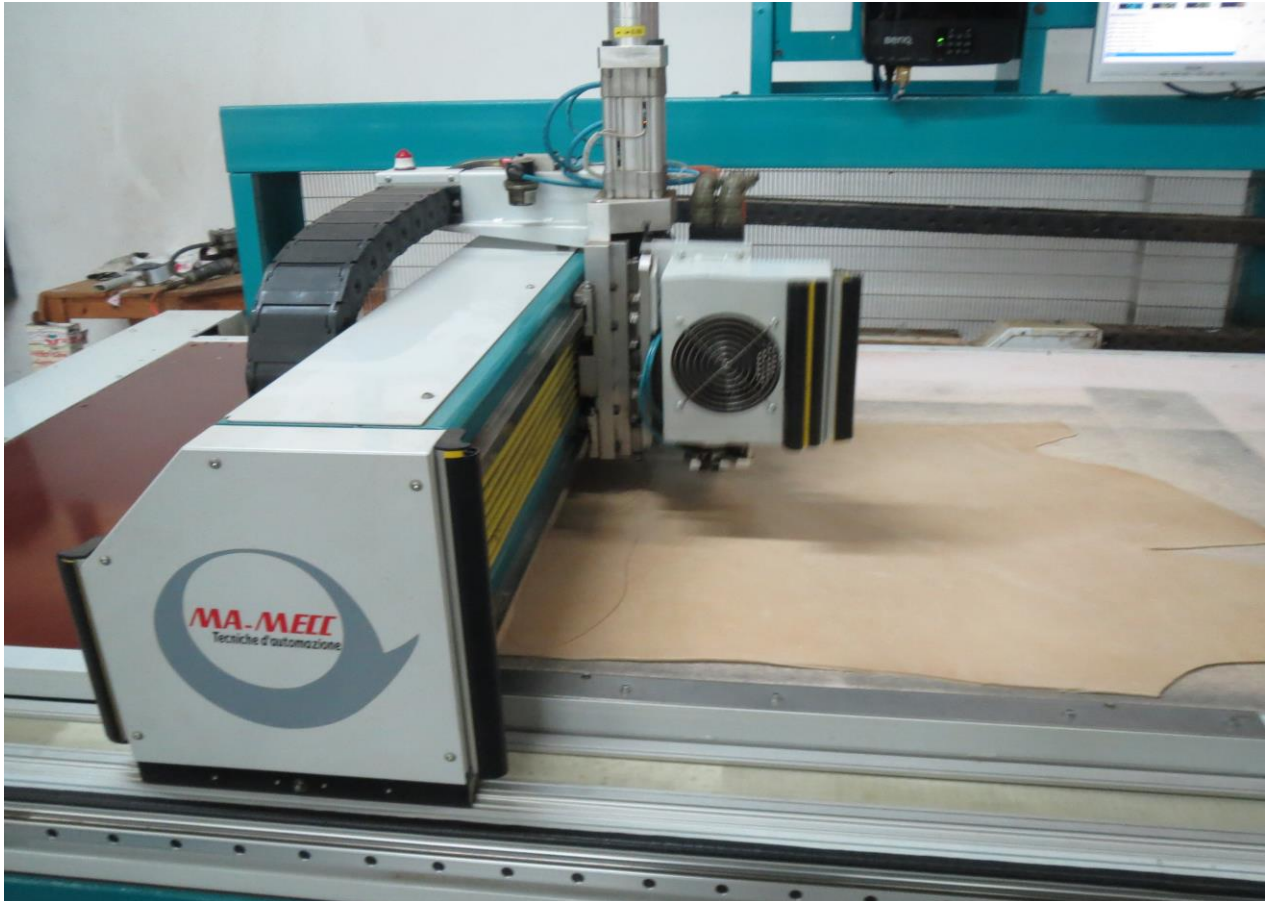
**Figure 7.18: Large scale leather drying rack**  
(Source: Author's own, 2014)

The tanneries have drying spaces where the leather is hung up on a rotating dryer to expose the leather to air. Below is an example of a small-scale basic leather drying system (See Figure 7.22).



**Figure 7.19: Small-scale drying rack**  
(Source: Aauthor's own, 2014)

However, the drying could also be achieved through temperature controlling or by vacuum (See Figure 7.20). There are also various other technologies that can be used to dry leather which are expensive and therefore not easily accessible.



**Figure 7.20: Leather drying machine**  
(Source: Author's own, 2014)

## **7.5 DYES USED IN THE LEATHER INDUSTRY**

Leather is dyed to enhance its appearance without obscuring the leather's natural appeal. The leather industry's focus when it comes to leather dyeing properties is on light and fastness. Colour stability in climate and temperature changes have also become a priority especially for the automotive and furniture industry.

Since leather is a natural product with varying compositions and differing fibre structures and porosity it is not possible to get the exact matching results. Vegetable-tanned leathers are excellent for dyeing, as they are receptive. Moreover, leather dyeing is seen as an art because



of the variations in materials and conditions. Therefore, the craftsman's touch has a direct effect on the results. Drums are used for the dyeing process. The leather is immersed in the dye and tumbling it in a rotating motion to ensure maximum penetration of the dye through out the hide or skin.

### 7.5.1 ANILINE DYES

The participants interviewed use “Aniline water based dyes also known as spirit dyes” (Participants 1-6, 2013; 2014). Aniline dye is a translucent water-based dye without added pigments. Aniline is a more preferred dyes in the vegetable-tanning industry due to the dye not concealing the natural character of the leather, including scars, scratches, growth marks and the grain which all hides or skins have (Watt 1906; Reintjes, Schafmeister & Jager, 2012). Moreover, the aniline dyes do not impair the feel of leather.

Aniline dyed leathers are highly prized due to their natural looking leather that retain its unique surface characteristics (Participants 2 & 4: 2013; 2014) (see figure 7.24). Hides and skins are dyed through immersing them in a dye bath; the surface is not coated with polymers or pigments.

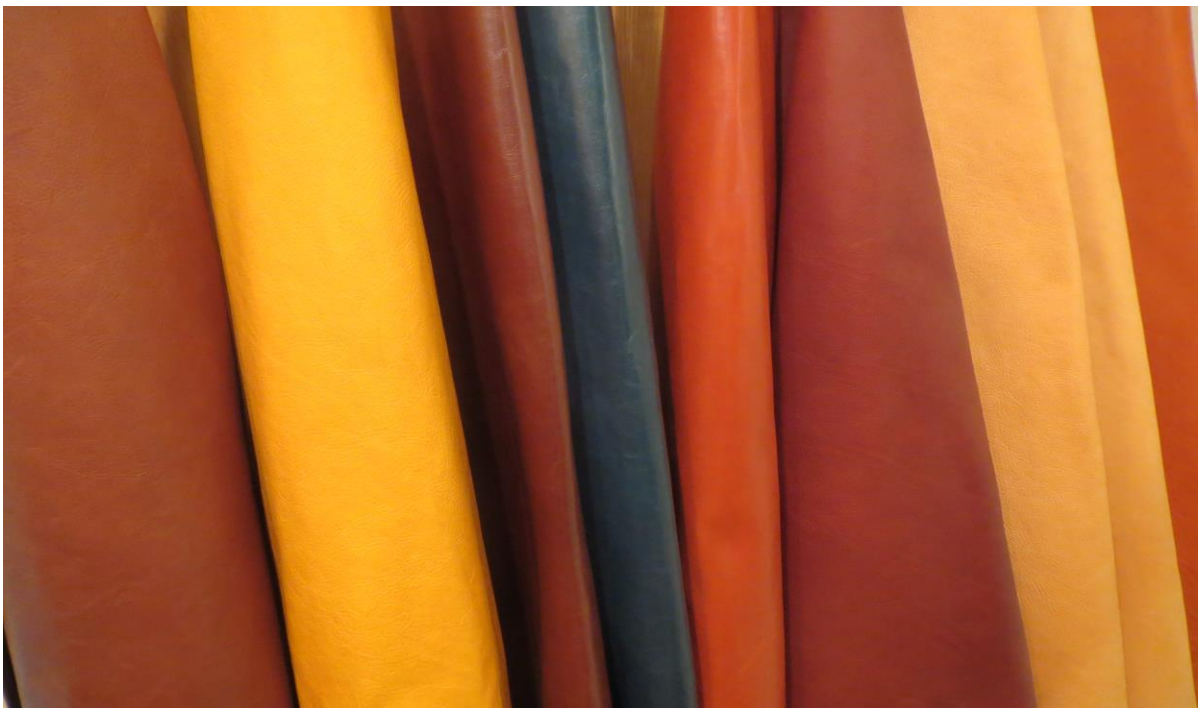


Figure 7.21: Vegetable-tanned leather that has been dyed using aniline dyes  
(Source: Author's own, 2014)

### **7.5.2 ANILINE DYES AND THE ENVIRONMENT**

WHO report (2002) on leather dyes suggest that “within a few days of contact with other chemicals and sunlight aniline breaks down in the air rapidly”. While other authors have indicated that in water aniline stick to sediment and particulate or evaporate to the air, while most of it is broken down by bacteria and other microorganisms (Hewit, 2010). Moreover, “aniline partially stick to the soil, small amounts may evaporate into air or pass through the soil to the ground water” (Constantin, Asmarandei, Harabagiu, Ghimici & Ascenzi, 2012). These statements suggest that the dyeing process still needs further research in order to identify dyes that will complement the tanning process which uses vegetation. Aniline dyes have been identified to be toxic.

### **7.5.3 ANILINE AND ITS EFFECT ON HUMANS**

Dye wastewater discharges into environmental water bodies contaminating water quality and may have a major impact on human health “due to toxic carcinogenic, mutagenic and teratogenic effects” (Constantin, Asmarandei, Harabagiu, Ghimici & Ascenzi, 2012).

There has not been a lot of research conducted to determine whether exposure to aniline can increase the risk of developing cancer in people who are either exposed to it through working in tanneries, or living near waste dumping sites with aniline waste. The International Agency for Research on Cancer (IARC) determined that “aniline is not classified as to its carcinogenicity to humans, while the EPA has determined that aniline is a probable human carcinogen” (EPA, 2002). Therefore, alternative natural dyes should be investigated for dyeing vegetable-tanned leather because there seem to be a consensus from the literature that aniline dyes have negative impact on humans and the environment.

### **7.5.4 ACID DYES**

Another alternative available to leather tanners is acid dyes are said to be water-soluble anionic dyes from neutral to acid dye baths. Salt formation assists in the attachment of the anionic groups in the dyes and cationic groups in the leather. The dyes are used commercially to dye



protein and animal fibres. “The dyes require the use of an acid such as vinegar, acetic or sulphuric acid to fix the colour on the leather” (EENPACT, 2013).

The dyes are non-caustic strong acids and are non-toxic. The value of these dyes lies in their ability to produce brighter, more uniform colours. The colours need to be applied from a neutral or only slightly acid dye bath with a pH of 6.0 to 7.0. (EUC, 2009; Gokhan, Hasan, Ebru, Mavioglu & Mete, 2012). The dyes currently available pose a challenge to entirely environmentally friendly leather production. However there are alternatives that need to be investigated, such as locally available plants and other minerals. As a result of the challenges with environmentally friendly dyes other finishing processes are being explored as discussed in the following sections.

## **7.6 FINISHING PROCESSES**

The Italian tanners are continuously innovating in order to ensure that they remain relevant to the fashion industry, which is one of the largest within the leather industry value chain. Leather finishing is the final stage in the process of leather tanning and is said to be very complex one with all the final operations carried out on the dry skin in order to change the surface for aesthetics and functional purposes.



**Figure 7.22: Pressing machine helps gives texture onto smooth surfaced leathers  
(Source: Author's own, 2014)**

Some of the available equipment includes automated high speed machinery which achieves different patterns and embossed effects on leather (See Figure 7.22). Ironing with heat and pressure helps create a clear and glossy surface in leathers and adds even more moisture resistance (See Figure 7.23).

“The machine uses a mechanical process that polishes to create a shiny surface on the leather through an ironing wheel” (Participant 4, 2014).



Figure 7.23: Ironing machine to get rid of moisture and to give leather the shiny effect  
(Source: Author's own, 2014)

A tumbling drum uses a rotating quick motion to create a grain on the surface. The ironing machine “is used to flatten and smoothen the surface of the leather” (Participant 4, 2014).

### 7.6.1 FINISHING: LEATHER PRINTING

With the introduction of various finishing techniques the leather sector has also assisted in helping bridge the finishing gap between vegetable-tanned leather and chromium-tanned leather in terms of colour variations, as it is now possible to add surface designed patterns in order for the leather to look more aesthetically appealing.

There is the age-old tradition of hand painting which is still carried out for smaller articles such as shoes or hand bags as with a hand painted piece of leather (See Figure. 7.24). This technique is often used for once off, high-end niche products due to its time consuming nature.

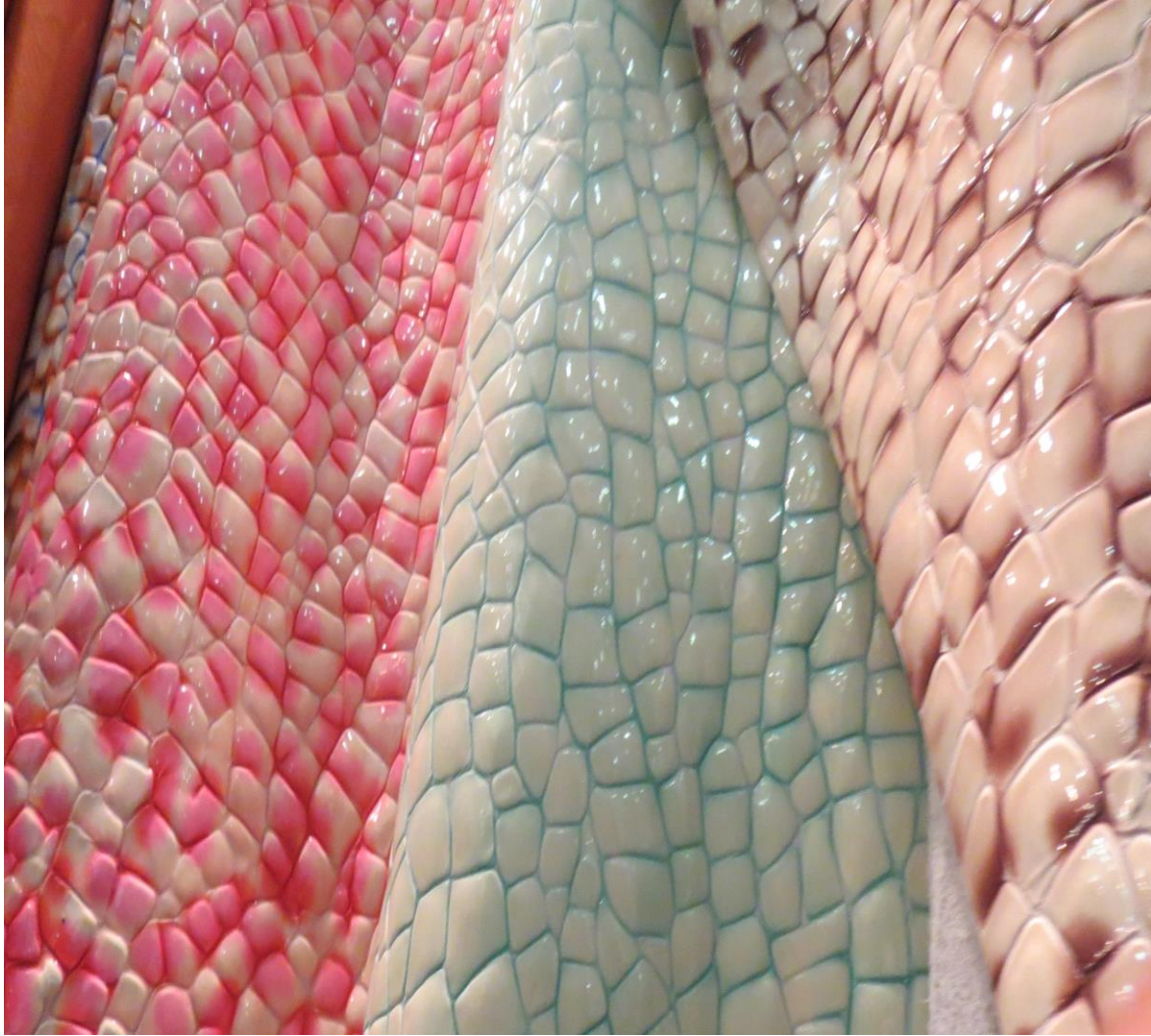


**Figure 7.24: Hand painted leather**  
(Source: Author's own, 2014)

“There are innovative developments in terms of leather finishing to ensure that the final product meets the needs of the fashion industry” (Participants, 2 & 6), and the leather goods sector. The developments include printing on leather; this new technology is considered to be more economical and has helped immensely in radicalising the industry.

“Leather finishers are able to print pattern on the surface of the leather in order to create the effect of exotic leather” (Participant 2, 2013). Below is an example of a cowhide, which has been printed in order to look like crocodile skin (See Figure 7.25).





**Figure 7.25: Cow hide printed to resemble crocodile skin**  
(Source: Author's own, 2014)

Moreover, research and development into the leather surface finishes have refined and perfected the process of printing in high-resolutions and colourfast images (See Figure 7.26). The issue of colourfastness has always been a challenge for vegetable-tanned leather. Some printing processes includes impregnating the with ink following the tattooing technique to achieve the durable and waterproof effect on the vegetable-tanned leather. The only vegetable-tanned leathers that the researcher could find that are printed using colour printers and silkscreen printing were calf skins. The skin is treated to be resistant to UV-light, heat and water and the use of PVC glues.



**Figure 7.26: Leather surface printed**  
(Source: Author's own, 2014)

Furthermore, a high-definition digital printing process with photographic results is used to apply colour onto vegetable-tanned leather. There is also a wide format versa UV printer that uses a similar process to the roll media. The leather is rolled and loaded into the printer. The printer also cuts graphics into any shape and accepts substrates. Leather printing has been embraced by the fashion industry and has been used in footwear and clothing (See figure 7.27 & 7.28).

The printing of leather helps reduce the use of aniline and acid dyes in the finishing processes of vegetable-tanned leather.





**Figure 7.27: Unfinished boot made out of printed leather  
(Source: Author's own: 2013)**

The printing can be applied to any surface using heat, water or primer.



**Figure 7.28: Different surface designs printed on leather  
(Source: Author's own 2014)**

Printing allows for unlimited designs or patterns to be developed for the leather industry, which allows possibilities endless in terms of the design industry (See Figure 7.29).



**Figure 7.29: Printed leather used to make high-end shoes**  
(Source: Author's own, 2014)

The material printing process does not change the feel and texture of the leather (See Figure 7.30 & 7.31). Leather off-cuts can be recycled and woven into one piece of leather, and can be used to add a pattern on top of the textured leather.





**Figure 7.30: examples of leather goods made out of printed leather  
(Source: Author's own, 2013)**

The printed leather is used to produce high-end fashion items that are sold to the growing middle income society and boutiques.



**Figure 7.31: Prints on leather**  
(Source: Author's own, 2014)

Leather printing opens up new opportunities for other disciplines such as surface design to design patterns that could be printed onto leather. Leather printing adds another sector to the leather value chain that requires specialisation.

### **7.6.2 FINISHING: HAIR ON DIGITAL PRINTING**

Hair-on leather means cutting out some stages in the tanning process such as liming and de-liming. The process of printing on hides with hair requires skill which the Italian leather finishers seem to have acquired and mastered. The old technique of hair-on printing included stencilling



on the hair on the hide. However, now there are digital printers that are faster and can do a better job as they can print up to eight different colours onto leather. Below are hair on cowhides and horse hides that have been digitally printed with various patterns to enhance their aesthetics (See Figure 7.32 & 7.33).



**Figure 7.32: Hair on cow hides printed using a digital printer  
(Source: Author's own, 2014)**

Hair-on digital printing helps in meeting the demand of exotic skins and hides as the design printings for these generally use the similar patterns to those of the exotic animals.



Figure 7.33: Hair on digitally printed patterns on a cowhide  
(Source: Author's own, 2014)

The hair-on printed leather has been embraced by the fashion industry as well as by interior and furniture design companies around the world.

### **7.6.3 FINISHING: LEATHER PLEATING**

Leather folding and pleating is done using a pressing machine. The pressed leather is mainly used in the fashion industry to make garments (See figure 7.34). The pressing machine offers an opportunity to create pleats.





**Figure 7.34: Sample of pleated leather**  
(Source: Author's own, 2014)

The technique allows designers to be able to combine and explore different leather textures on garments.

#### **7.6.4 FINISHING: LEATHER WEAVING**

Leather off cuts can be cut into different widths using the leather strap cutter like the one below. The images (See Figure 7.35 & 7.36) show the different types of machines that would be used

for the process of shredding pieces of leather into straps. Figure 7.37 shows an old cutting machine as well as a modern cutting machine (See Figure 7.38).



**Figure 7.38: Leather strap cutting machine**  
(Source: Author's own, 2014)



**Figure 7.39: Leather cutting machine**  
(Source: Author's own, 2014)

The leather straps are generally used for weaving pieces of leather into a single piece that can be used for making leather goods such as shoes, bags, furniture items and other leather goods (see Figure 7.40).



**Figure 7.40: Different types of woven straps**  
(Source: Author's own, 2014)



**Figure 7.41: Different types of woven leather straps and textile threads**  
(Source: Author's own, 2014)



After the straps have been cut the next step would be the process of sorting out the straps into different lengths, which can be woven and put to different uses (see Figure 7.41). Smaller pieces would usually be woven and used for footwear or for making wallets and other smaller leather goods. Longer straps would be woven into a standard size (see Figure 7.42). Skilled crafters usually do the weaving by hand.



**Figure 7.42: Woven leather off-cuts bundle**  
(Source: Author's own, 2013)

Once the woven pieces are finished the next step would be the application of the print (see Figure 6.43).





**Figure 7.43: A woven piece of leather using leather strips then digitally printed (Source: Author's own, 2013).**



**Figure 7.44: Leather skirt made out of woven leather (Source: Author's own, 2014)**

The leather weaving technique allows designers to explore different leather textures and woven techniques. Moreover, the leather weaving process creates an opportunity for many skilled crafts people to add value to the leather-finishing process.

### 7.6.5 FINISHING: LEATHER EMBOSSING

Embossing is another mechanical process which is used to create a three-dimensional effects on the leather surface. Chemical finishing involves the application of natural or synthetic film is applied either by using either roller coating or spraying it on the surface of the hides.

There are different techniques used to emboss leather. Manual tools using low-tech equipment or high-tech equipment are used. Basic tools are used to decorate vegetable-tanned leather. The tools are made out of pieces of metal which have sharpened edges that can cut through leather by placing a piece of leather in between the two metal pieces. One side of the metal piece has a sharp edge, while the other side has hollow holes that fit with the upper side (See figure 7.45).

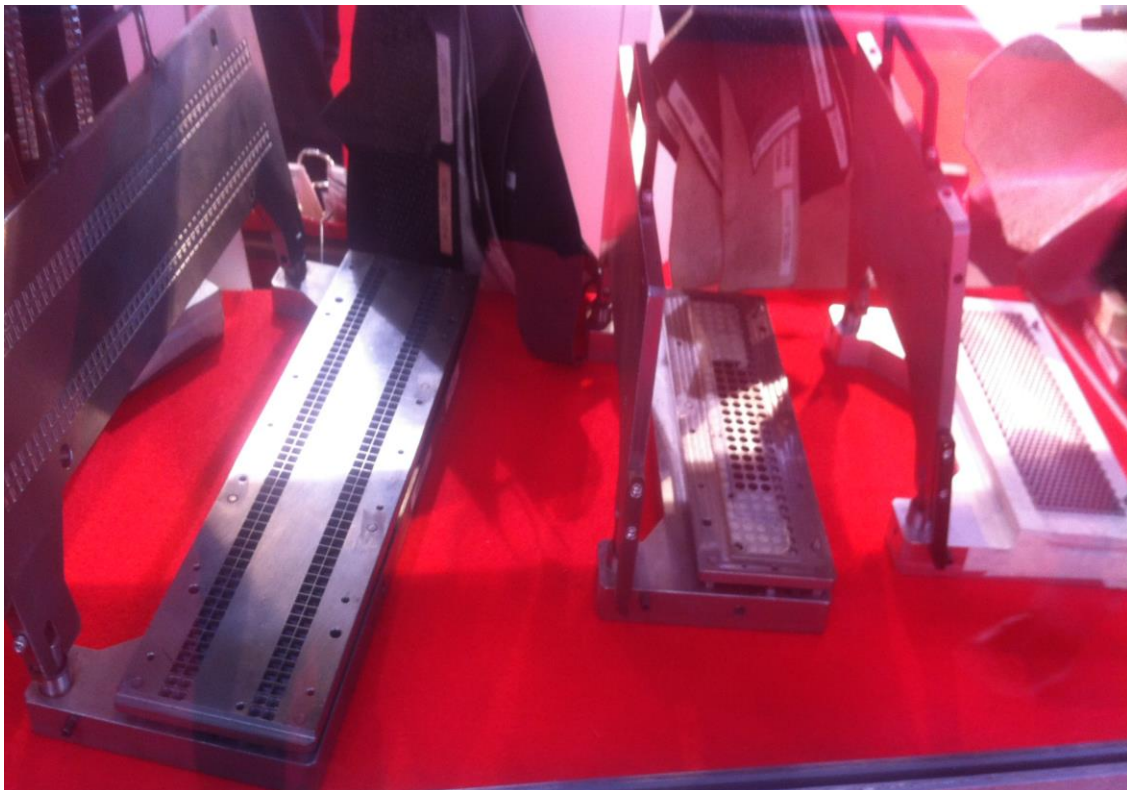


Figure 7.45: Low-tech leather embossing and cutting tools  
(Source: Author's own, 2014)



A similar tool can be used for embossing - a piece of metal with blunt patterns leave a pattern on leather surfaces (See figure 7.46).



**Figure 7.46: Leather embossing and cutting tools**  
(Source: Author's own, 2014)

High-tech embossing equipment has been developed over time in order to achieve the effect faster. A crusting machine helps reinstate the crusty feel of the leather after tanning. Due to the growing demand for exotic leathers as well as their high cost for the high-end niche market,

some tools or equipment have been developed to emboss cowhide in order to create the patterns that imitate the skins of exotic animals such as crocodiles, snakes, ostrich and others.

## 7.7 OTHER LEATHER-FINISHING TECHNIQUES

The Italian tanneries have years of experience in hand staining and other techniques such as embroidery and embossing. Printing as well as folio-metallic effects on vegetable-tanned leather are just some of the innovative processes that the companies that specialise in finishing processes have come up with (see Figure 7.47).



**Figure 7.47: Metallic-folio finish**  
(Source: Author's own, 2014)

The top on the above image is an example of a metallic folio finish which can now also be applied to vegetable-tanned leathers.

### 7.7.1 FINISHING: CUTTING TECHNIQUE

There are two methods that are currently used to achieve the cutting effects on the leather. One is by hand cutting the leather using basic tools. Secondly, it is through the use of laser cutting machines. Below is an example of leather that has been decorated by means of cutting to give the leather a different effect.



**Figure 7.48: Hand decorated vegetable-tanned leather with a cutting and scratching effect  
(Source: Author's own, 2014)**



Vegetable tanning has a four-week turnaround time. The hides need to be air-dried and in most cases the leather is hand stained and decorated (see Figure 7.49). The above-mentioned leather would usually be used for products such as shoes and bags.



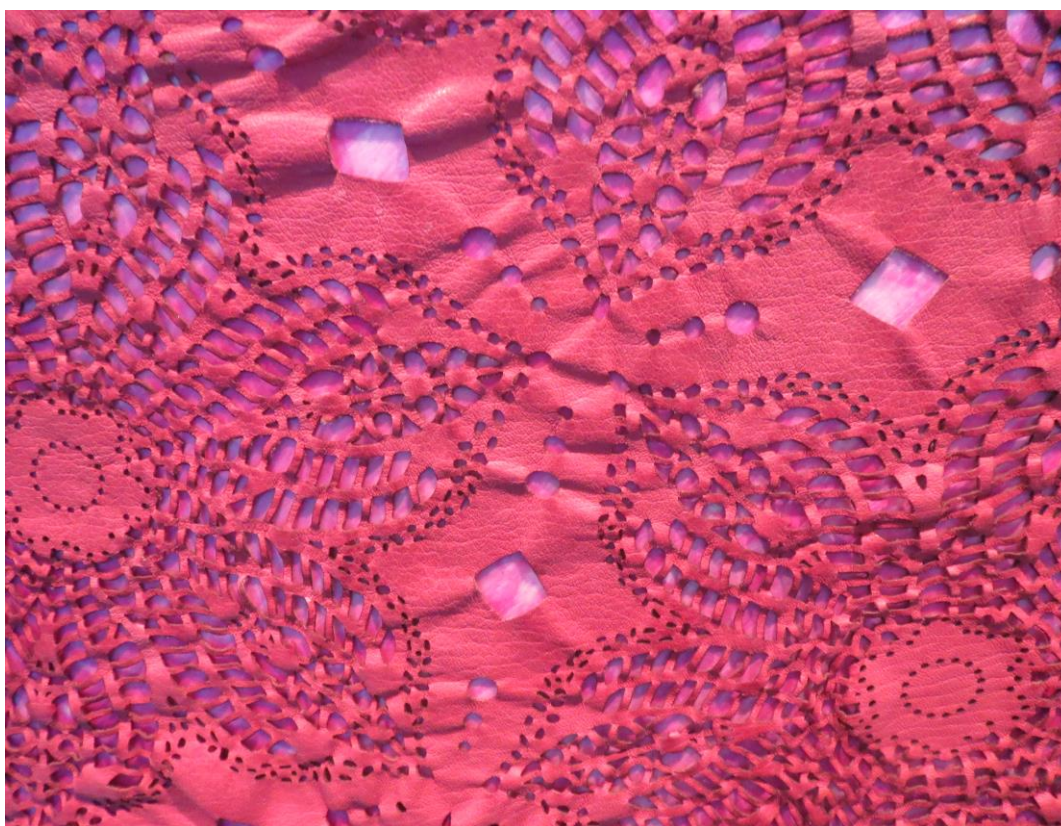
**Figure 7.49: vegetable-tanned leather hand decorated by pocking holes  
(Source: Author's own, 2014)**

Above is an example of leather that has been decorated by adding holes to the hide (see Figure 7.50). The leather decoration above makes it possible to use leather that has individual imperfections.

The above vegetable-tanned leathers challenge designers to use their creativity and create products from imperfect naturally renewable materials. With all the imperfections that a hide or skin has, it does not mean that it has not got tactile quality.

### **7.7.2 FINISHING: LASER-CUTTING**

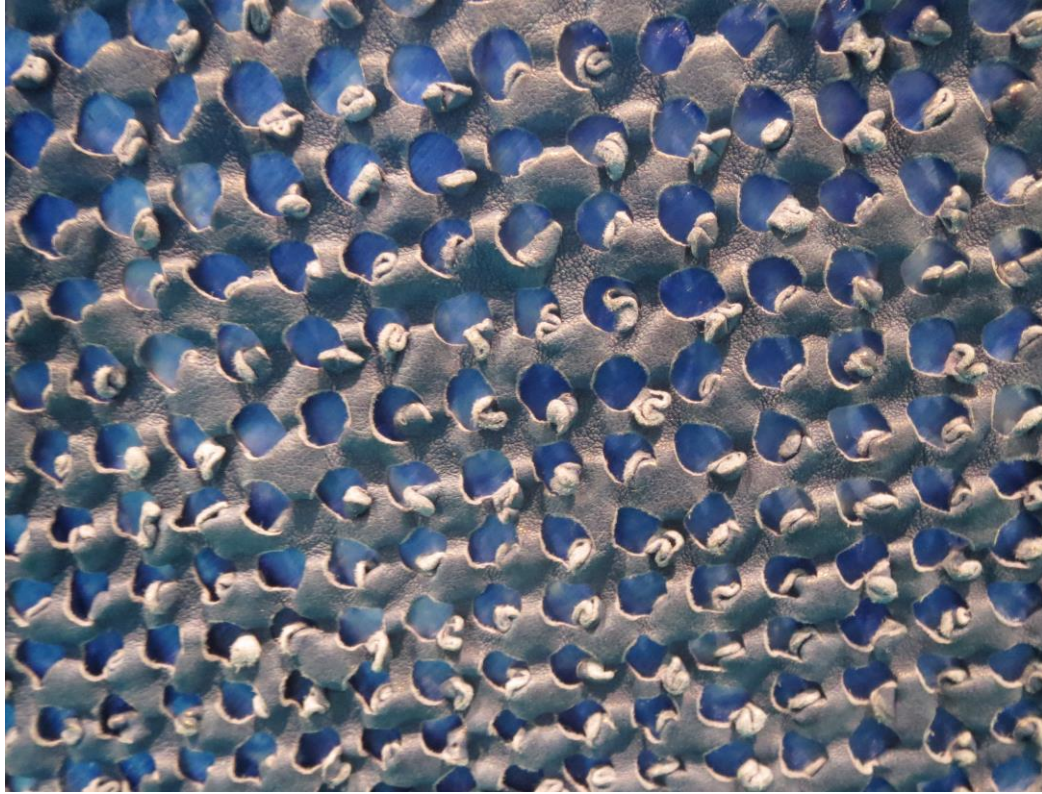
Laser-cutting machines have revolutionised the leather finishing process. The laser-cutting process offers endless patterns and textures for the footwear and the fashion industries to help increase the value of leather goods (See figure 7.51-54).



**Figure 7.51: Laser cut leather pattern**  
(Source: Author's own, 2014)

The fashion industry is the biggest user of laser-cut applications on vegetable-tanned leather. As shown in Figure 7.51-54. Currently the trends indicate that there is a growing demand for these applications, particularly by the high-end leather goods manufacturerers.





**Figure 7.52: Laser-cut leather pattern**  
(Source: Author's own, 2014)



**Figure 7.53: Laser-cut leather which used to make high-end footwear**  
(Source: Author's own, 2013)





**Figure 7.54: Laser cut leather footwear range by Baldinini  
(Source: Author's own, 2013)**

The laser cutting technology allows for hair on leather to be aesthetically enhanced through the creation of various patterns and designs that meet the needs of various consumers' needs (see Figure 7.55 and 7.56).



**Figure 7.55: Hair-on leather laser-cut pattern  
(Source: Authors own, 2014)**





Figure 7.56: Hair on leather laser-cut pattern after dyeing  
(Source: Author's own, 2014)

### 7.7.3 LEATHER FINISHING: EMBROIDERY

Leather embroidery has a very long-standing tradition in the European community. There is an indication that leather embroidery in Italy was already widely utilised in the 15<sup>th</sup> century as a finishing process to make leather goods aesthetically appealing. Items such as “*forzerini* and *cofanetti* that were intended as gifts that held a precious dowry objects such as cosmetics, combs and sewing tools were made out of embroidered leather. According to the Heilbrunn timeline of art history (2000) embroidery became highly developed art form by the 16<sup>th</sup> century in

Europe, generally embroidery design were derived from printed books”. The embroidery was by highly skilled craftsmen and the process was entirely done by hand.

However, today there are technologies that are utilised to embroider on leather goods to transfer patterns and various motifs.



**Figure 7.57: Embroidered leather for high-end fashion wear by Christopher Kane (Source: Google images.com, 2014)**

According to the Italian participant (1, 2013) the oldest leather craft school in Italy has noticed a revival of leather crafts in Europe: “Culture is being revived. There is a move in Europe, particularly northern Europe where more young designers are developing an interest in knowing how to manufacture as well, rather than just designing leather goods and relying on big companies to do the manufacturing”. Generally designers often find it difficult to find a place that is able to turn their ideas into a product using cost effective processes.

By reviving the tradition of leather handcrafting designers are able to turn their good ideas into products that are economically sustainable.

In order to meet the demand for more sustainable production systems, we have to deal with the worldwide need for schools that offer the required training. In the school craft leather school “highly skilled craftsmen teach leather production but also produce high-end leather goods”(Participant 1, 2013). This also serves as their way of not only transferring knowledge but also generating income.

## 7.8 VARIOUS FACTORS THAT CONTRIBUTE TO A SUSTAINABLE SYSTEM OF VEGETABLE TANNING IN BOTSWANA

Botswana has no strong family culture when it comes to leather production. The majority of the artisan vegetable leather tanners work individually and in some cases they employ people to work with them.

Leather tanning in Botswana is very much linked to the traditional crafts market partly due to the leather tanners having no access to equipment and training that would assist them to improve the quality of the leather they produce. There is still no connection between the leather produced locally and the local creative industries as a raw material.

### 7.8.1 TECHNOLOGICAL INNOVATION

Botswana leather industry requires the support of the academic institutions, design schools, government and interested parties in order to improve and move the industry forward in terms of producing high-quality leather that can contribute towards the establishment of a footwear industry and leather goods market of high quality. Basic technology such as a tanning drum would help increase the capacity as well as reduce the dust on the skins/hides, while working tables, mixers, as well as drying tools would make a difference in the artisan tanneries' final product.



Figure 7.58: Leather artisans defleshing the hide to get rid of excess flesh and fat from the floor  
(Source: Author's own, 2014)



In some cases the artisans have a dedicated space for tanning which helps in keeping the leather away from dirt.

### **7.8.2 TANNING EQUIPMENT**

The tanning equipment used by artisan tanners in Botswana is very basic. It is mainly made out of found objects, in some cases using easy to assemble techniques as shown in the following sections.



**Figure 7.59: Fleshing board used by some artisan tanners in a demarcated tanning space  
(Source: Author's own, 2014)**

Currently the artisan tanners “use garbage drums or any plastic drum for tanning” (Participants, 3 & 4, 2014). They use very minimal tools or equipment for their production process, partly due to the fact that they live in very remote areas where they only have access to the found objects they use.



**Figure 7.60: Garbage bin used as a tanning drum  
(Source: Author's own, 2014)**

According to the participants the “fleshing board is used along with the slicker to remove flesh from the skin/hide”(Participant 1,3,4 & 5, 2014). The fleshing board is a basic functional product that serves the purpose of laying the skin/hide for scrapping. The board is made out of wood from the surrounding areas. The fleshing board design requires that the artisan be at a bending position during the duration of the scrapping process, which could be a challenge for many older artisans.

The slicker that is used along the fleshing board is a metal knife for scraping with a wooden handle. The scraper was designed by some of the master tanners who offer training to the artisans from the Ministry of Agriculture.



Figure 7.61: The slicker with a wooden handle  
(Source: Author's own, 2014)

### 7.8.3 SUPPLY OF VEGETABLE TANNINS

The tanners mainly use indigenous plants such as *elephantorrhiza* (Mositsane) and *terminalia cericea* (mogonono) that are widely available in Botswana as well as mimosa from South Africa. Most participants mentioned using the *elephantorrhiza* plant and the mimosa as the main plants for tanning their leather. The roots of the *elephantorrhiza* produce tannins. The roots are harvested and air-dried and then pounded into powder, which is used in the tanning process. The plant also has medicinal values. The plant produces a reddish colour similar to that of the mimosa plant.





**Figure 7.63: *Mositsane* plant**  
(Source: Author's own, 2014)



**Figure 7.64: Air dried *mositsane* roots**  
(Source: Author's own, 2014)

The roots are “pounded into powder after air drying, the powder is generally mixed with water to create a tanning mixture” which is where the hides and skins are soaked and stirred for a couple of days until the tannin has properly penetrated the hide/skin.

#### 7.8.4 SUPPLY OF HIDES\SKINS

The Botswana tanners are known in their respective communities for their craft and therefore community members usually “offer their hides/skins to the tanners for free”(Participants 1-5, 2014). This significantly reduces the cost of production for the tanners as the only cost they have to cover is the buying of the commercial *mimosa* tannin from South Africa. The production process takes place in their back yard and since the government only charges an annual standard fee for services; the cost of water usage is not accounted for.

#### 7.9 INDIGENOUS TANNING PROCESS

The artisan tanners collect skins/hides from their communities from animals that have been slaughtered for various ceremonies and traditional rituals. The skin/hides are generally salted after the animal has been skinned. After the skin/hide has been “thoroughly washed to remove salt and impurities it is then placed into a drum, which contains a mixture of lime and water” (See Figure 7.65). The lime “helps loosen the hair” from the skin/hide the mixture is gradually stirred using a wooden stick (Participants 1-5, 2014).



Figure 7.65: The liming process to remove hair from hides/skins  
(Source: Author's own, 2014)

Once the hair has been removed the skin/hide is washed off to remove the lime, and then placed in a drum which contains a mixture of water and bran waste from sorghum which is then covered and left to ferment (See Figure 7.66 & 67).



**Figure 7.66: Bran and water mixture being covered to start the fermentation process**  
(Source: Author's own, 2014)

Once the fermentation process has started the skin/hide is then washed again and unwanted materials are scraped off.





**Figure 7.67: A skin being fermented in a water and bran mix to de-lime it  
(Source: Author's own, 2014)**

Once this process has been completed the hides/skins are then ready for the next stage which is the tanning process which usually takes longer than the aforementioned stages.



**Figure 7.68: Skin being soaked in a water and bran mix after being limed  
(Source: Author's own, 2014)**

Another drum filled with water is used to put the clean skin in and the tannin powder is gradually introduced while the mixture is constantly stirred to ensure that it does not separate and the powder does not sink to the bottom of the drum (See Figure 7.69).



**Figure 7.69: Kudu hide being stirred to ensure that the vegetable tannin is mixed  
(Source: Author's own, 2014)**

It is important to note that due to the crafters having received the same training from the same organisation. Their tanning techniques are the same. However, there are variations when it comes to finishing the leather as well as the quantities of tannins used and the duration of the process.

## **7.10 INDIGENOUS LEATHER-FINISHING PROCESSES**

The finishing process of the leather is very basic and follows an indigenous recipe which every artisan tanner has tweaked to meet their own needs, depending on the type of leather they produce and its final use.

Figure 7.70 above shows an image of finished leather that has been used to make a book cover. The Botswana artisan tanners also create other leather goods such as pouches, wallets, bags and shoes.





**Figure 7.70: Finished vegetable-tanned leather used to make leather goods from Botswana (Source: Authour's own, 2014)**

## **7.11 WASTE MANAGEMENT**

The waste produced by tanners is disposed of using various indigenous methods and techniques. The wastewater from washing hides/skins to get rid of impurities and blood are “disposed of in a pit that is been dug especially for that purpose” (Participant 3 & 4, 2014). Hair that has been removed from the skin/hide is “generally used to stuff cushions” (Participant 3, 2014).

The fleshing from the hide/skin is used as manure in the garden. Due to the artisan tanners use vegetable tannins to tan the leather, the wastewater from tanning is also poured in areas that are generally used for plants because they were found to be very good for “helping plants grow” (Participant 3, 2014).

## **7.12 SUMMARY**

In this chapter the data that was collected on the vegetable tanning processes in Italy and Botswana is presented. The participants' responses, based on the questions that were posed to them as well as observations of their practice, were discussed. The chapter focused on the practices employed in both Botswana and Italy by the vegetable tanners, their contribution to development as well as their waste management practices. The tools and equipment which are used in Botswana and Italy and their origins were discussed. The chapter also looked at the finishing processes which are an important part of leather tanning and strategies employed by artisan tanners to manage the waste they produce. Moreover, the support in terms of policies and government structures that are put in place by the two countries also formed part of the findings from the participants' responses. The following chapter presents a discussion of the research findings.



# CHAPTER EIGHT

## DISCUSSION

### BRINGING TRADITION AND MODERNITY TOGETHER THROUGH LOCAL KNOWLEDGE

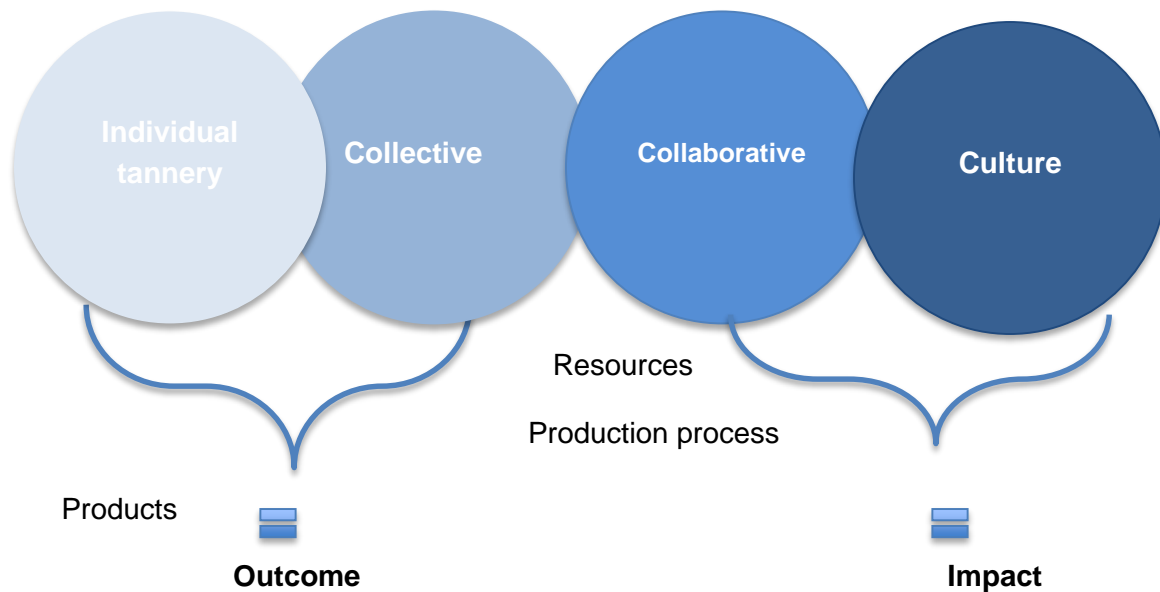
#### 8.1 INTRODUCTION

The previous chapter focused on outlining the findings of the research, which were established in the field of vegetable tanning in the two selected sites. This chapter will discuss the findings and their importance in the establishment of small-scale collective efficient systems in vegetable tanning, in order to contribute to economic development and sustainability, focusing on best practices that will be of benefit to developing countries. The findings of this study pertain to how collective efficiency contributes to the development of sustainable small-scale leather production systems. Local knowledge forms foundations for the development of other forms of knowledge and therefore contributes towards the development of labour-intensive manufacturing industries that contribute to sustainable employment and promoting the use of renewable resources.

The chapter also examines the support systems that have been put in place by the government to ensure the economic development of the communities based on local knowledge and expertise.

#### 8.2 COLLECTIVE EFFICIENCY

As discussed in Chapter 4, collective action does not focus on everyone who would benefit, rather on the resourceful people who provide collective benefits to their network (Olson, 1971). Efficiency relates to the relationships between resources, processes and products (Bassi, 2013:83). Collective efficiency speaks to how small firms achieve efficiency and competition by tapping into their local social strengths and linking their production systems to local skills, resources, and local processes. This has been found to be the case within the small-scale vegetable tanning sector in Italy.



**Figure 8.1: The collective framework  
(Source: Author's construct, 2014)**

The actions of the tanneries' production processes have an impact on the communities in which they are situated, whether these are environmental, economical or social. The effects of the tanneries can now be seen and even measured because the tanning industry within the community has a very long-standing tradition (see Figure 8.1).

The concept also speaks to the notion of collective resourcefulness, which contributes to small businesses becoming competitive and able to compete in the global markets without compromising their traditional knowledge and their social norms. This implies that the participants in Italy apply the same cultural everyday practices in the business environment.

In contrast in Botswana the notion of collectivism in the business environment is not considered due to lack on trust on others when it comes to money. The lack of trust has resulted in artisan tanners working individually and never interacting with other tanners to discuss processes or collaborate on finding solutions to common problems.

### 8.2.1 A VEGETABLE-TANNED LEATHER CONSORTIUM TO PROMOTE COLLECTIVE-EFFICIENCY

Tuscan vegetable tanners came together in 1994 to set up the *pelle conciata al vegetale* or Genuine Italian Vegetable-Tanned Leather Consortium linked to their common passion to produce high quality natural leather (See Figure 8.2). The purpose of the consortium was to keep alive the ancient techniques of vegetable-tanned leather production and communicate the essential characteristics of vegetable tanning, which are achieved through a perfect marriage of natural material, tradition and technology.

The consortium regulates, and aims to preserve and guarantee the production of vegetable-tanned leather made in the Tuscany region through the trademark of quality. The trademark bounds tanneries to production technical sheet that gives a definition of vegetable-tanned leather and that all phases of the production process should take place in Tuscany. All members of tanneries are bound to adhere to and respect this commitment.



Figure 8.2: Pelle conciata al vegetale in Toscana trademark  
(Source: Pelle Conciata, 2014)

The consortium uses a democratic process amongst the member tanneries to make decisions. Belonging to the consortium also helps the tanneries work as a collective towards dealing with challenges they face.

There is no doubt that association and regulatory bodies are required to protect the interests of its members while ensuring that the members adhere to environmental and trade policies, and the government is responsible for ensuring that these are adhered to. The association also serves as a link between government and the members, while fostering the culture of collective decision making and problem solving.

### **8.3.1 FAMILY CULTURE**

The family is at the centre of the Italian social structure it provides stability and plays an influential role to its family members. The family provides both emotional, and financial support and guidance required for its members. Applying the same principles and values in a business environment and keeping local cultural practices has assisted in creating the culture of resilience in the vegetable tanning industry.

However, the same practice and belief does not apply among the Batswana artisan tanners. They work as individuals and only involve family and relatives when needing advice or help.

### **8.3.2 STRONG FAMILY CULTURE AND ITS CONTRIBUTION TO SOCIAL CAPITAL**

Ljunge (2013: 26) suggest “family ties are a huge compliment to social capital in the social domain of social civic virtues”. Social capital is linked to networks. The values and networks are instrumental in the creation of work communities whose foundations are linked to the society to which the workers belong. The interaction among the people helps generate a greater sense of community and belonging. Bourdieu and Wacquant (1992:119) define social capital “as the sum of resources, actual or virtual that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalised relationships of mutual acquaintance and recognition”.

Fundamentally, effectively functioning networks enables societies to benefit based on the social capital and cultural capital. Social capital consisting of one's family, friends and associates, and constitutes an important assets for support (Woolcock & Narayan, 2000b). All the vegetable tanning SMEs that formed part of this study in Italy are family-owned which is a tradition that is deeply ingrained in the Italian culture.

The tanneries qualify to be called SMEs because of their general size, which was fewer than 20 employees, and in most cases even less than 10. These companies are more than 40 and 50 years old and are still owned or run by descendants of the founder. Stronger family ties are associated with less tolerance of exploitative practices for personal gain, and the children in the families are taught to respect others. The family interaction allows for intergenerational transmission of knowledge for social values and customs, which leads to stronger social values within the family networks.

Italian tanneries are mainly SMEs that were set up as a response to the devastating post-war society. These tanneries are linked to social systems, which include community, which result in trust among those involved in the business. Furthermore, interpersonal relations are in the realm of everyday exchanges (Bassi, 2013). According to Bourdieu and Wacquant (1992:118-9), "a general science of the economic practices is not limited to socially recognised as economic act but, must endeavour to grasp capital, social physics in all different forms and present itself under three different forms, which are economic capital, cultural capital and social capital". Families reciprocate their mutual obligation of care and respect across other aspects of their lives. The strong family culture has also become a valuable social capital through the high-level obligation and expectations based on trust. The family tradition remains a dominant and cohesive force in Italian culture and has been used to initiate and develop strategies for survival, which have been passed down generations.

Like the family the community does not simply represent a socio-cultural referent but an economic quasi-organisation that can be analysed or even described in its own right due to "the dynamism of the family that depends on various members inputting skills and resources" (Manfra, 2002: 106). The growth of the district depends on the success of the individual family business's success and its contribution to other's competitiveness. Manfra (2002: 106) further states that "the family in its function as an entrepreneurial unit blurs and overcomes occupational division and social statues so the community stretches across different economic

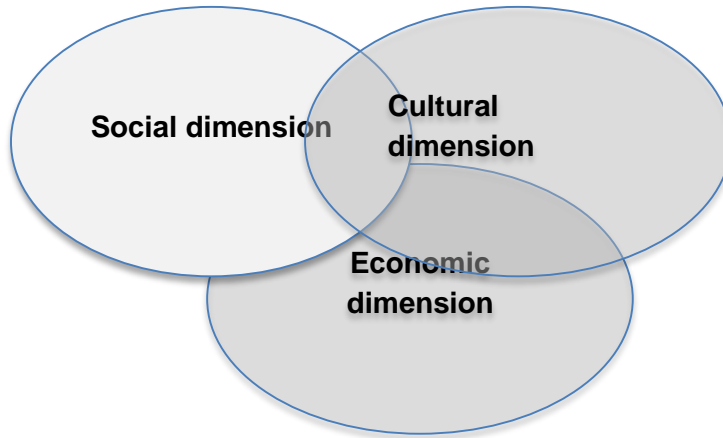
activities". The strong sense of respect for family and family endeavours to keep family together such as starting a business are highly valuable.

### **8.3.3 THE CULTURE OF NETWORKS**

The researcher found that the vegetable tanners in Italy have a network apart being from the same community, and in some cases being from the same family, where they all share experiences, discuss policies and other challenges as well as the developments in the industry. The networks are a communal organisations under which small firms find association in order to build permanent, mutual constructive networks of joint support and resource sharing (Loveman & Sengenberger 1991).

The networks are also used as a tool for quality check and promote good quality production processes among the members of the network. However, there is another criterion which has been set by the consortium which is the production process has to take place entirely in Italy. This ensures that every step of production can be checked and therefore certified as using traditional methods through the network. The networks are strong because they are both internal and external. Internal networks are based on family traditions; external networks are business to business. The inter-organisational relations create an environment where exchange among SMEs and community takes place. The networks also contribute to the intersystematic relations where there is exchange between second or third-level organisations and among collective trans-sector players (Bassi, 2013).

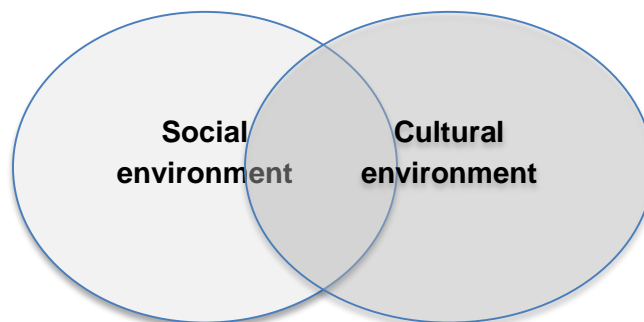
Because the value of family is instilled from a very young age it is important for the younger generations to want to keep family tradition alive and carry on the legacy of the family. However, the process is not easy, as the small businesses have to deal with constantly changing policies and customer demands. It is therefore only natural that the culture of family, which has also been transferred into the business environment, would work as a collective to try and resolve the challenges or find coping strategies together (See Figure 8.3). In the Italian context, the same culture and level of respect in a cultural context and family context is accorded in work relations. Therefore, there are overlaps in the three dimensions which create a strong culture of working together and support.



**Figure 8.3: overlap in the social, cultural and economic dimensions within the vegetable-tanning sector (Author's construct, 2014)**

The power of many speaking with one voice has more impact than each individual business pursuing their own agenda separately, particularly in light of governments in developing countries who are often faced with the challenge of implementing policies. When the small-scale manufacturing sector works together they are able to find favourable solutions even to the strictest environmental policies which in turn benefits the small-business, the community, and the government in terms of the tax revenues they receive from the sustainable businesses that remain active.

However, in Botswana the case was different. The social and cultural dimensions are very strong, however, they do not apply in the business environment (See Figure 8.4). The artisan tanners that were interviewed worked as individuals and did not include family members in their business.



**Figure 8.4: The two strong dimensions of the Batswana artisan tanners without the business dimension (Source: Author' construct, 2014)**



In Italy the idea of leaving the finishing processes to companies that specialise in the processes allows the leather tanners to focus on their core business, which is the process of converting animal hides/skins into leather using vegetable tanning. The network is based on a reciprocity based on norms, which offer support for the redistributive systems.

Social capital is based on local institutions, relationships and norms that shape the quality of society's social interactions. For societies to prosper economically and develop sustainably social cohesion needs to be the driving force of the process (Hack, Hoy, Poutziouris, Steier, 2008). The redistributive systems also offer support when it comes to dealing with problems within the industry. This also shows that there should be no distinction between the business and social environments, because as soon as we create a distinction we run the risk of creating a divide. As already mentioned in chapter three businesses are within a society and therefore should consider and tap into the social values and practices in order to achieve success. The local knowledge is one of the biggest contributors to social capital, which is moulded by family.

#### **8.4.2 COLLECTIVE PROBLEM SOLVING**

Collective problem solving is not a new concept, problem solving is like a system where agents are playing the same role against the same challenges and therefore the lessons learned have implications, for not only for the leather tanneries, but the industry, community, society and other industries within the value chain (Lazer, Zeniel, Esterling & Neblo, 2011). The leather industry's challenges are very complex and therefore require interaction among knowledge sets in order to find solutions to some of the challenges. Moreover, it is critical for tanneries to collaborate as opposed to cooperate in problem solving as this requires the need and commitment as well as a desire for change which in essence represents the embedded economic strategic goals of the companies (Mora, 2006).

Furthermore, in Italy because of the company size it being a family business problems are shared and employees and employers help to come up with solutions collectively. The culture of sharing is prevalent due to the environment being informal and more personal. In other words the ability to participate in problem solving is shaped by the environments in which they work. Social processes have a big influence on the family business and how the employer employee relations are maintained. In a small family business conflict and production problems are

resolved through participatory processes where all those involved in the business discuss and come to a resolution.

Some of the notable problems related to vegetable tanning are that the wastewater is the main problem which the Italian sector has dealt with by setting up a top-of-the-range wastewater treatment centre. The rest of the waste is dealt with by recycling and other uses which forms part of the network that processes the waste to come up with products such as fertilisers for the farming sector.

This means that the farming sector becomes part of the closed-loop production system of the vegetable tanning industry. The leather tanners have a very strong sense of communal living, and therefore some of the practices of the community and values of local knowledge are also applicable in the family businesses.

The local knowledge in the case of vegetable tanning is coupled with the use of basic technology to enhance the process without losing the tradition or forsaking it. The findings also reveal that the traditional/indigenous systems can be used in conjunction with technology in order to meet modern demands.

Social relationships play an important role in facilitating the evolution of traditional knowledge. The evolution happens at network level, and at the social level and is based on trust. There has to be a good level of trust among the people who are trying to solve a common problem.

## **8.5 IMPORTANCE OF MAINTAINING GOOD REPUTATION WITHIN THE BUSINESS NETWORK**

In Italy things such as ethics in the way the company conducts its business and interacts with other businesses, its employees and its suppliers are important in terms of building a good reputation. This results in the business being trusted and respected in business dealings. The workplace environment, in terms of the way the employees are treated even those that are not related to the family is important and makes the company appealing to employees. Growth prospects in terms of financial performance are also an important aspect of a company reputation (Carter & Rogers, 2008). Leadership is important in creating good reputation. It was

found that most vegetable tanneries are open to innovation and collaborate in order to ensure the sustainability of the industry and preservation of their tradition (Hamann & Thwaites, 2013).

The management with clear vision for the future of the company is just as important to building good reputation. Social responsibility is important, in the case of the tanneries creating employment and contributing towards the preservation of the region's culture and resources and the environment.

Customer focus is also an important aspect of the reputation and the Italian and Botswana tanneries placed emphasis on the fact that they had good working relations with their customers. The quality of products that the companies produce and services that are offered by the company are important. Reliability of the company to its customers and those involved in the value chain is important. Emotional appeal is also important in the companies.

From an Italian point of view it is much preferred to conduct business with people who are known and trusted, hence the strong community, family and business networks within the region.

## **8.6 APPLYING LOCAL KNOWLEDGE IN A BUSINESS ENVIRONMENT**

Traditional knowledge is linked to the traditional way of life of a society based on the accumulated understanding man's place in relation to the ecosystem and the universe and is deeply rooted in heritage, while also being open to drawing on other forms of knowledge (Legat, 1991).

Participants interviewed all alluded to the value of local knowledge in helping not only with the day-to-day running of the business but also helping the business become sustainable. Incorporating family values, cultural practices and traditions help in sustaining the business and makes it become more resilient to external influences and challenges.

Valuing one's culture can play a significant role in individual development, family development, and community development which in turn can be transferred to other spheres of life including economic development. Finding a balance between development and the promotion of tradition can be a challenge, however, as already seen in the previous section, the Italian vegetable tanners have succeeded in marrying the two. The industry can certainly be viewed as an

example for many leather-producing countries with a long-standing tradition of tanning to help them move towards more sustainable best practices.

### 8.7 TRADITION AND PASSION FOR THE PROCESS

Amongst the Italian participants involved in vegetable tanning or leather goods manufacturing, the notion of long standing tradition of vegetable tanning is always highlighted. Most people in the region were born into the tradition of the leather-tanning family business. Vegetable-tanned leather goods are precious, hence the move by the tanneries to form a consortium whose main purpose is to raise awareness of the process and the products. Passion drives most participants to get involved in the preservation of their heritage and tradition of vegetable tanning.

### 8.8 DECENTRALISED SMALL-SCALE PRODUCTION SYSTEMS IN CONTEXT

Decentralised production systems of networks helps with regional development through flexible manufacturing of small firms who belong to networks. The networks maintain scale, independence, flexibility, innovation, and specialisation through shared production systems. The key features of the system is that it allows the small companies to concentrate on high quality production, which places their products at an international quality level.

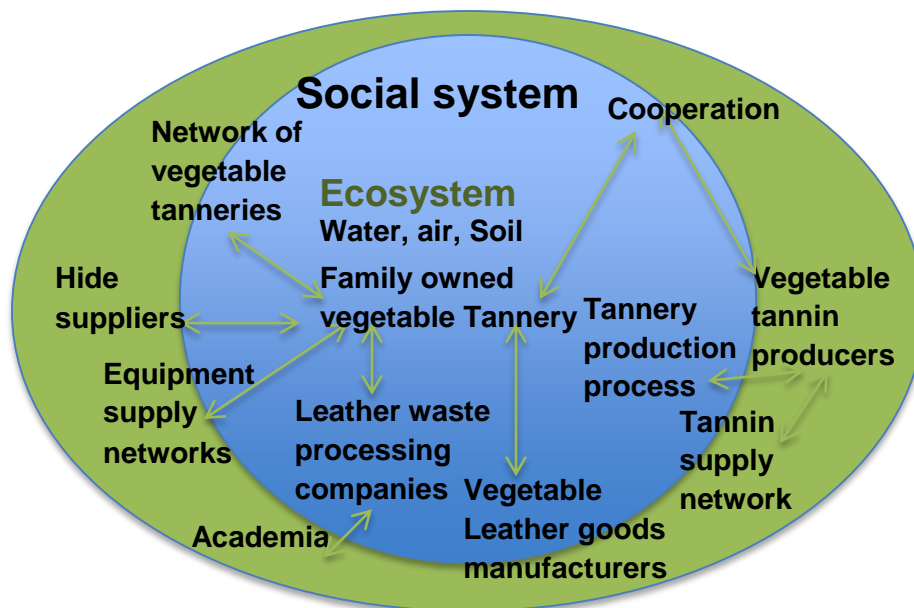


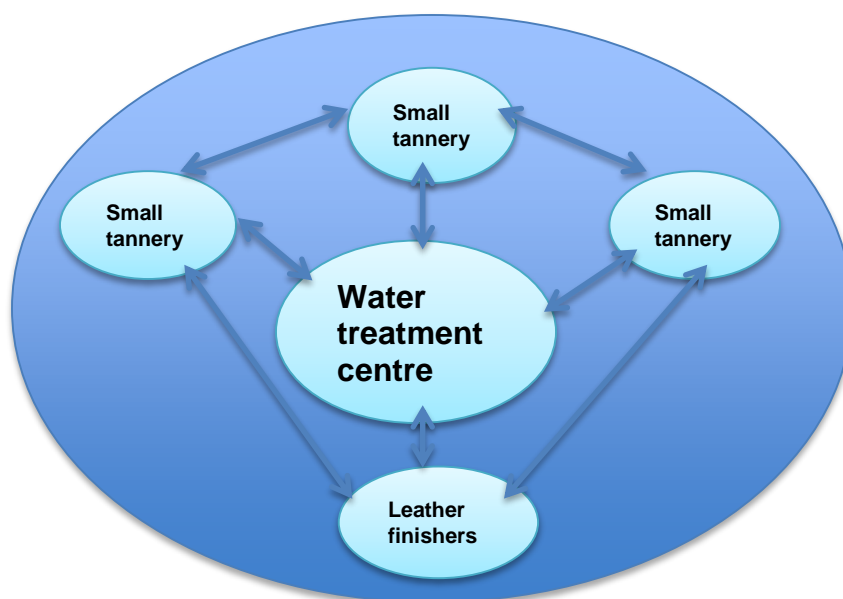
Figure 8.5: The interaction of the vegetable tanning system and its social system and network system (Source: Author's own, 2014)

The social system which consists of many key role players that belong to the network, such as suppliers of tannins and suppliers of skins and hides, suppliers of tanning equipment and academic institutions that conduct research which helps improve the production (See Figure 8.5).

The manufacturing network typically subcontracts certain elements of their production process to individual firms that specialise in one aspect of the production cycle, all the members of the network are known to each other and have long social as well as economic relationships. They share the waste treatment services and leather finishers (See Figure 8:6).

The SMEs are flexible in terms of machines that are used in the production process and material handling are adaptable to changes and therefore were able to survive changes and new environmental regulations, which seem to affect larger organisations more (Restakis, 2000). The SMEs reduce the cost of setting up and per unit production costs, have higher labour productivity, improve the quality of the products; have greater efficiency, and increases the reliability of the production system.

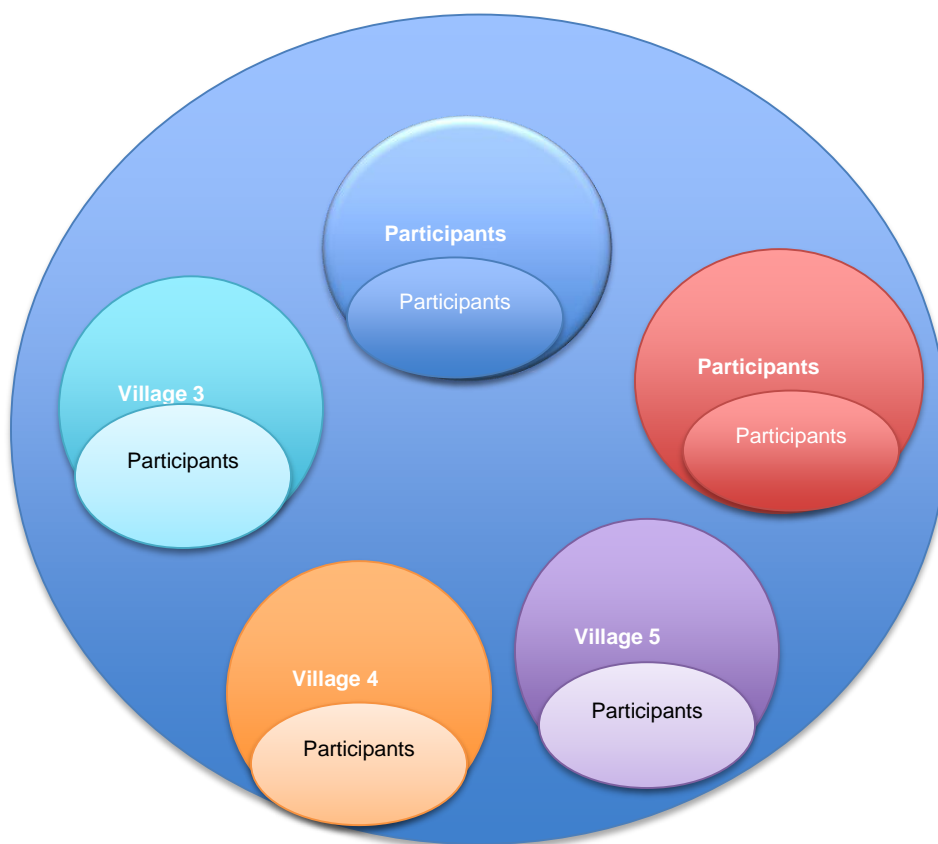
Moreover, as already mentioned in the previous section, some large manufacturers have very good relationship with smaller manufacturers. Vegetable tanning requires skilled craftsmen who can produce small-scale custom-made orders for their clients. However, in order for the companies to be able to gain recognition and make their mark in the industry they need to build a good reputation within the network, which is very competitive.



**Figure 8.6. Frame work of vegetable leather tanners network**  
(Source: Author's construct, 2014)

How the firm behaves is of critical importance in Italy's vegetable-tanning industry. Therefore, producing high-quality leather is actually based on the interaction of sub-systems that are governed by varied reasoning and motivation. The motivation is also driven by market rationality as well as reputational behaviour.

However, in Botswana leather-tanning activities are fragmented, as there is currently no current large-scale commercial tannery (see Figure 8.7). There are no strong leather tanning networks that assist in ensuring that the artisan tanners work together to solve challenges that face their sector and work towards ensuring improved production to meet the leather goods industry standards.



**Figure 8.7: The artisan tanners framework in Botswana  
(Source: Author's construct)**

The networks make it possible to organise the industry in order to ensure that all challenges and strengths of the sector are well understood through the establishment of communication channels between the tanneries and the policy makers using representatives from the network

that understand the industry, its challenges and the required solutions to address the challenges.

## **8.9 POLICY SUPPORT FOR LEATHER SMEs**

Italy has the largest number of SMEs in the EU, 31% of these are in the manufacturing sector and only 11% of SMEs are high-tech. Italy's knowledge intensive sectors is much higher than the rest of Europe (European Commission, 2012). The success of the Italian SMEs demystifies the notion of innovation and development being linked to high-tech.

There are efforts by lawmakers to support the development and financing of SMEs. The Sabatini law of 1965 was introduced in Italy which allows SMEs acquisition of equipment through subsidies at a very low interest rate, which are usually payable over 5 years (Belussi, & Sammarra, 2010). The subsidies can be used to purchase or lease equipment for the production process.

However, it is important to note that this support is only given to SMEs or entrepreneurial initiatives that correspond to community parameters, which include social inclusion, poverty alleviation and economic development. Law 317 of 1991 of the constitution promotes the development, innovation and competition amongst SMEs (*ibid*). The law also promotes a strong organised higher education system to support industry through the leather tanning technical schools, which are situated in all four regions with leather activities. Moreover, leather entrepreneurs and public administrators created the incubator in 2001 based at the University of Pisa, in order to give support to the industry in the Tuscany region. It can therefore be said that the supportive structures in place help with filling the skills gap as the employees have no leather tanning background when they joined the companies.

Furthermore, *Unione Artigiani Italiani* which is a federation established in 1990 to support SMEs, particularly craftsmen and merchants, protecting their interests as well as developing of the sector. *Unione Artigiani Italiani* offers support service and consulting which is aimed at enhancing the craftsmen's work. The federation also facilitates paths in legislative regulatory management systems, legal services and facilitates access to credit, easy financing, administrative and tax consulting in environmental health, safety, quality certification,



engineering services as well as offering-refresher training services and access of local and international markets.

Additionally, in 2012 a decree was signed by policy makers known as 'Save Italy', the aim of the decree is to "overhaul Italy's production system and its economic growth through minimising structural problems that affect SMEs". These include low capitalisation, limited liquidity, borrowing constraints, and limited exposure to international markets outside of EU (European Commission, 2012).

In 2001 the SA8000 standard was adopted as a key corporate social responsibility (CSR) tool to promote and support SMEs in Tuscany. "CSR is a concept in which companies integrate social and environmental concerns in their business operations in their interaction with their stakeholders on a voluntary basis" (Carey, 2008: 8). The Tuscan regional government promoted the adoption of SA8000 and developed an industrial policy that support innovation, competitiveness of SMEs and social cohesion while also recognising the valuable connection of SMEs to local communities. The government also linked the CSR to ethics. In May 2006 the Tuscan regional government adopted regional law 17 on Corporate social responsibility article 3 which offers "favourable tax reduction for enterprises that voluntarily adopt international standards on certifiable and accountable systems, and corporate management systems, as well as standards on products or service certification, guaranteeing transparency and credibility of socially-responsible practices" (Carey, 2008: 9).

In 2009 the government of Botswana introduced an environmental policy which saw the closure of tanneries which used to operate without any regard to environmental pollution due to not having strategies in place for dealing with waste. These tanneries use to produce wet-blue leather which was semi-processed and exported to other countries for further processing.

The move by government has now opened a gap for local role-players to come up with strategies of dealing with the by-product of the meat industry, which is skins and hides. Currently, LEA is lobbying government to consider the leather industry as one of the priority sectors with a great potential for creating job opportunities thus contributing to the local economy. The government is also in negotiations with the largest slaughterhouses who want to set up tanneries to put up a waste treatment centre which will help ensure that there is no environmental pollution or water contamination (Participant 1, 2014).

## 8.10 VALUE-ADDING CHAIN OF VEGETABLE-TANNED LEATHER PRODUCTION

In the process of vegetable tanning there is a strong relationship between the resources, process and products. The sector has established itself as using production systems and materials that are in line with nature. The process of vegetable tanning use plant matter, while the process of production is done by hand and goods made out of vegetable-tanned leather are generally made by hand by highly-skilled craftsmen and women.

The researcher also found through interactions and observations with the participants that the vegetable tanning process has a long value-chain which begins with plant harvesting, processing, and distribution to tanneries.

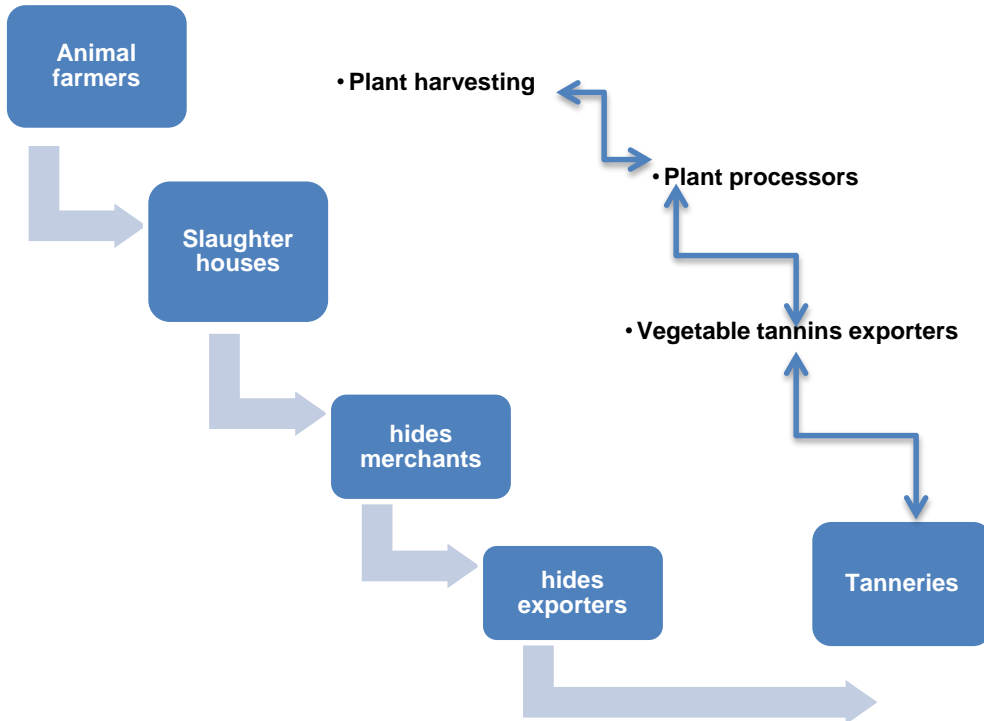


Figure 8.8: The vegetable tanning value chain  
(Source: Author's construct, 2014)

The process of value creation in vegetable tanning has many different stages, which include resources, process, products, results and impact, put, activities and outputs. Loveman & Sengenberger (1991:35) suggest, "Both private and public policies have an important role to play in promoting SMEs. Leather tanning SMEs need good support systems to grow. Passion

accompanied by the importance of family and family culture drives most of the participants to get involved in leather tanning.

## **8.11 SUPPLY OF TANNINS NETWORK**

There are countries that are endowed with the renewable plants used in the process of vegetable tanning and many of these countries are developing countries. These countries also have the potential of establishing small-scale processing industries based on the resources they have. Supplier networks are an important part of the strategy to optimise transaction focus procurement for improving supplier relationships. Most participants (2,3 & 4, 2013) “believed that getting tannins from various countries helps break the monopoly of one country to supply tannins”. All the different tannins offer different results and therefore their use mainly depends on the demand for specific leather. “We use all of them depending on the colour and what we want to achieve and the relation of the price” (Participant 2, 2013).

### **8.11.2 THE GROWING DEMAND FOR VEGETABLE-TANNED LEATHER GOODS**

According to some of the participants the leather they produce is supplied to some of the high-end fashion brands such as Gucci, Giorgio Armani, Prada, Luis Vuitton, Tod’s, Dolce and Gabbana, Sergio Rossi, Fratelli Rossetti, Polo, Ralph Lauren use vegetable-tanned leather for some of their creations (Participant 2,3 & 4, 2013; 2014).

The growing consumer demand for environmentally-friendly products as well as strict environmental regulations and policies in developed countries is prompting industry leaders to reconsider their production systems as well as their role in society. Furniture and upholstery and other luxury products manufacturers are also taking into sustainable production processes. However, it is still slow as 90% of the world leather is still produced using chromium.

Through the interviews it was established that some chromium tanners have “introduced vegetable tanning to the production process at the request of big name brands such as Balenciaga, Gucci and others to start producing vegetable tanning” (Participant 5, 2014).

However, this seems to suggest that the tanneries that are introducing vegetable tanning process could be those acquired by the company to supply their leather goods manufacturing

sector. The above information also suggests that the leaders in the clothing and leather goods manufacturing are also taking a lead in trying to introduce changes in the industry. Continuous changes are introduced in order to curb environmental pollution and health hazards (Daddo, De Giacomo, Testa & Tessitore, 2012). Large tanneries are particularly affected by the continuous changes due to their large setups. On the positive note the regulations have also resulted in larger manufacturers creating networks, which ensures that they have a continuous supply of goods.

According to the participants the process has not been easy due to the labour intensiveness as well as having to get equipment that is suitable for vegetable tanning. Furthermore, the participants indicated that “despite the challenges and the changes the vegetable tanning process is worth it and therefore we are working on it patiently” (Participant 5, 2014). The above statement indicates what some manufacturers and goods producers are interested in producing goods sustainably in order to ensure continuity for the future generations.

#### **8.12 SKILLS REQUIRED FOR VEGETABLE TANNING**

As indicated in the previous chapters, the vegetable tanning process does not require formal education, but rather basic training. The process is not recorded and therefore cannot be taught, it can only be learned through practice. Therefore, the argument of the leather industry suffering in Africa partly due to unskilled labour cannot be validated or proven by this research. Many people who are currently involved in the process of vegetable tanning in both the countries that were studied have had no formal education, but have undergone short courses to get the basic handling and tanning knowledge. Vegetable tanning is linked to local knowledge and therefore is often based on knowledge that has been passed down through generations. Recipes for the tanning process are usually kept within families.

#### **8.13 THE SIGNIFICANCE OF TECHNOLOGICAL INNOVATIONS TO SUPPORT VEGETABLE TANNING AND MEET MARKET DEMANDS**

The findings indicate that there is a symbiotic relationship that exists between the vegetable tanners and technology innovators. Within the supplier network it was found that there is some kind of collaboration taking place - particularly with those involved in leather tanning equipment-

supply as they are in the same region as the tanneries. The collaboration is in order to develop new technologies and new processes of tanning that are more efficient and in line with environmental regulations.

Moreover, there is also collaboration between vegetable tanners and leather finishers as they constantly need to find ways to improve the finishing processes of vegetable tanning which is constantly being criticised for producing a limited number of colours, hence the development of processes such as printing, embossing, and laser cutting techniques. Vegetable tanning is a traditional process that has seen little or no changes in the actual process of converting animal skin/hides into pliable leather. However, technology plays an important role in terms of the tools and equipment used in the process without taking away from tradition, which needs to be preserved for sustainability to become a reality.



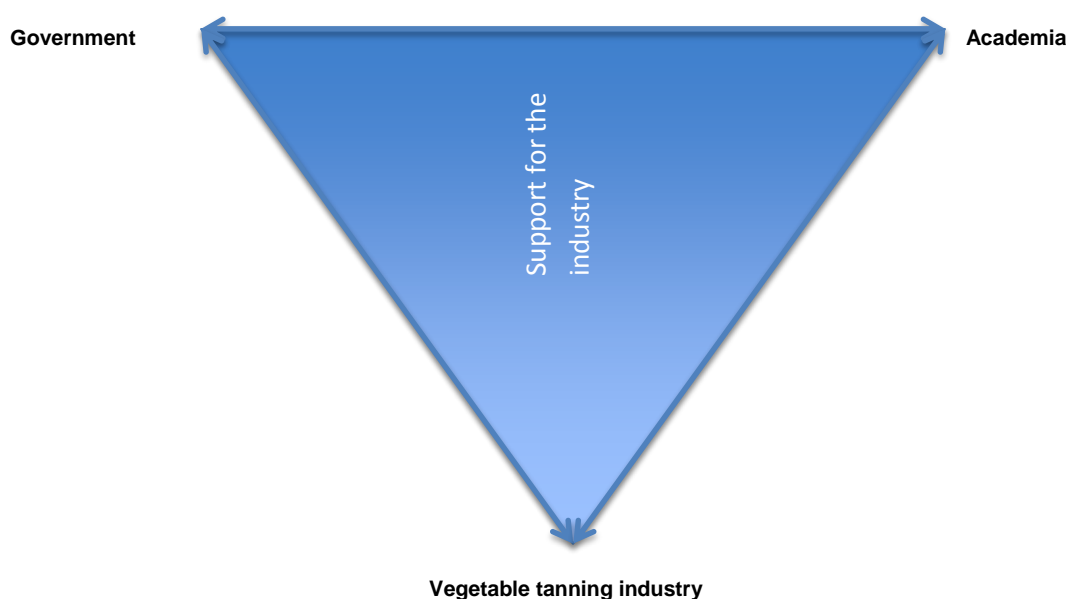
**Figure 8.9: Wooden leather tanning drum**  
(Source: Author's own, 2014)

In Italy the equipment is a tool to help increase capacity, not to take away from the human action. Craftsmanship in vegetable tanning is far more important than the equipment, the equipment does however assist in terms of capacity. Much of the activity is still done by hand. Innovation and development of suitable equipment for the industry is done in consultation with

the industry and therefore meets the industry's needs, which is why it has been supported by the industry.

The support that assisted the SMEs to continuously innovate because of the platform they have for testing new ideas. The research support and training from government and academia has contributed to the continued innovation and sustainability of the sector.

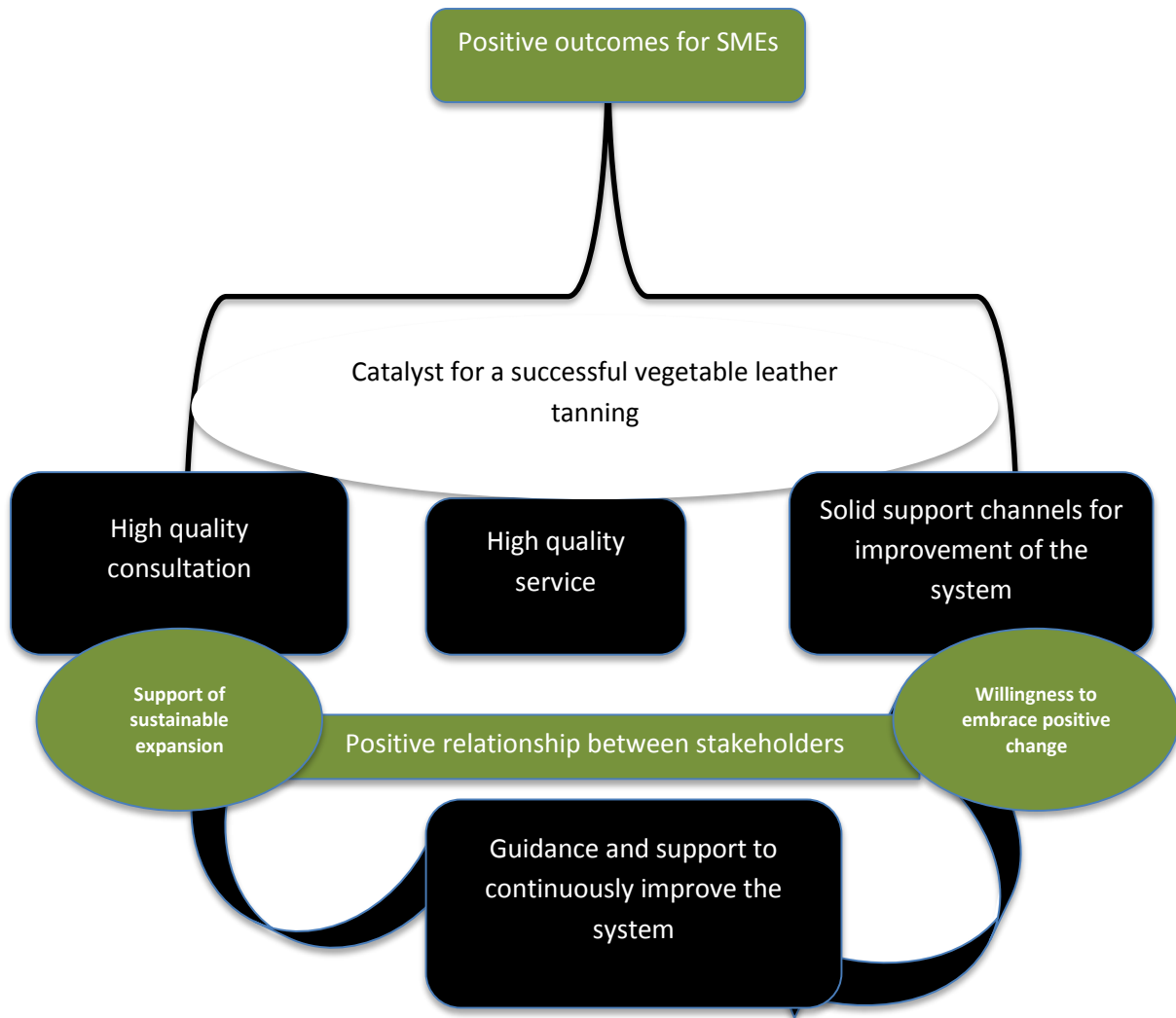
Moreover, the support for the industry involves a consultative process in which all stakeholders participate in trying to find working solutions in keeping Italy's heritage of leather tanning alive (See Figure, 8.10).



**Figure 8.10: The triangle of support for sustainable leather tanning**  
(Source: Author's construct, 2014)

The support trickles down to industry through continuous engagement, consultative approach and dialogue has contributed to SMEs following regulations and getting registered (Carey, 2008).

The outcome of the consultative framework has key features that contribute to effective development and support for the sector. Those include solid support channels, a high quality and level of consultation, high-quality services offered by the different stakeholders, support for improvement and sustainability of the sector, and guidance for continuous quality improvement in the production system (See Figure 8.11).



**Figure 8.11: Outcomes of an SME consultative framework.**  
 (Source: Authors construct, 2014)

The support and high quality consultative process results in new innovations and developments which help improve the production system. Below are examples of equipment that has been developed in consultation with the manufacturers. Technological innovation is an important part of the value adding process, which has made the industry strong.

Some tanneries are semi-automated, meaning only certain aspects of the production use machinery. The equipment requires manual operation in most of the companies that were interviewed. Figure 8.12 and 8.13 shows a tanning drum with a capacity of 400 hides. This means small tanneries are still able to achieve greater output.





**Figure 8.12: Semi-automated tanning drum**  
(Source: Author's own, 2014)



**Figure 8.13: Semi-automated drum**  
(Source: Author's own)

The participants believe that Italy is the leader in the development of tanning equipment and leather goods. The equipment used in the production process of leather goods is developed in the surrounding areas, boosting the local economy.

Leather finishers test different techniques, to create innovative effects on leather. A biodegradable finishing film made from maize is also used to give a shine glaze effect on leather. The industry is continuously innovating to come up with the best solutions to help meet customer demands. The industry has researchers who are continuously trying to explore the best ways to finish vegetable-tanned leather. Vegetable-tanned leather has traditionally been used in creating products such as belts, shoes and other small leather goods. However, in recent years the tanneries have started producing leather for upholstery and interior design products such as floor tiles, and wall coverings.

#### **8.14 DESIGN AS A CATALYST FOR INNOVATION**

Innovation is as a result of a long-term complex interaction between many individuals (Rampino, 2011). Design innovation complements technology innovation and market-driven innovation. Innovation may also refer to the introduction of new technology into a manufacturing process in order to improve performance, its usability and to minimise its cost (Baglieri, 2003 in Rampino 2011). The research found that in Italy the manufacturers of equipment design and innovate to come up with technology that improves the production process. Design innovation has also been evident in terms of the leather finishing process as already discussed in chapter 7.

Furthermore, innovation in the leather finishing sector takes place at different levels, at a tanning-method level which focuses on aesthetics for use, and at a technology level which focuses on the process and the finishing for use level. The design innovation contributes to the finishing processes that focus on the aesthetics according to different uses of the final leather.

## **8.15 SUMMARY**

This chapter discussed the findings of the research based on the data that was collected. The findings are based on the process of vegetable tanning that is employed in Italy and Botswana, the tools and materials being used as well as strategies of managing the waste being generated in the process. Italy has strong family culture which overlaps with the social and the economic environment, resulting in strong networks. The finding also reveal that Italy has policies and strategies to support the growth of manufacturing SMEs. The findings also revealed that in Botswana the small scale vegetable tanning activities are fragmented which makes it difficult for any coordinated collective action to take place. The chapter also gave an indication of what is required in order to create an enabling environment for communities to economically develop.

The following chapter will look at the conclusions that were drawn, the contribution to knowledge, the limitations of the study as well as the implications for future research.

# **CHAPTER NINE**

## **CONCLUSION**

### **9.1 INTRODUCTION**

This chapter relooks at the purpose of the study and the research questions that the study wanted to investigate. The contribution of this study to the design field is new knowledge in terms of theory, practice and the unpacking of the IPAP policy regards to its potential to help develop and sustain the leather manufacturing sector. Finally the chapter looks at the implications for further research within the design discipline, tannery sector and the South African context.

### **9.2 REVISITING THE PURPOSE OF THE STUDY**

The purpose of this study was to critically examine how vegetable leather tanning in rural South Africa using a collective-efficiency approach can contribute to sustainable development, economic development through social entrepreneurship, basic technology development and preservation of natural resources. The research took into consideration the function of local knowledge to complement Western knowledge by adapting elements of the different knowledge in a unique way for leather production processes (Munyai & M'Rithaa, 2012). The study benchmarked best practices from Botswana, as an industrially developing country with a well established artisan tannery sector in Italy, as a global leader in vegetable tanning to invigorate the local South African leather industry.

### **9.3 REVISITING THE AIMS AND OBJECTIVES**

One of the key objectives of the study was to investigate the notion of decentralised production process as envisaged by the IPAP policy framework to be the potential key to developing even those parts of the country that have been neglected. The study aimed to critically examine the decentralisation of leather production in an industrially developing (or majority world) context in order to gain an understanding of its potential contribution to job creation and sustainable economic development based on the sustainable use of renewable resources.

Furthermore, another objective of the study was to demonstrate the benefits of incorporating methods of production that consider local knowledge and concepts that specifically contribute to the collective efficiency of small-scale leather tanning. That included investigating the efficacy of indigenous knowledge systems in response to present-day challenges. Indigenous knowledge systems are made out of old practices that have been passed down generations to encourage respect of the environment as well as fellow humans. It is about valuing and protecting our environment and those who live in it - both humans and non-humans. These are elements that link indigenous knowledge to the global concept of sustainability.

The study also sought to foreground sustainable vegetable tanning within the design for sustainability discourse. The study was envisaged as contributing towards informed manufacturing policies with a bias towards the sustainable vegetable-leather production industry. Finally, the aim of the study was to make a specific contribution towards the documentation and dissemination of indigenous knowledge application in vegetable-leather production. This is based on the fact that South Africa has wide available resources and knowledge which can be used to develop and promote vegetable tanning as a more sustainable and ecologically-friendly method of leather tanning.

#### **9.4 RESEARCH QUESTIONS**

The first question that this study wanted to interrogate was the reason for vegetable tanning being promoted as an ecologically-sustainable production process. This question was answered through interrogating literature on the topic as well as interviewing and observing participants who have been involved in vegetable tanning for a number of years. The study found that vegetable tanning uses natural materials and the solid waste generated from the process has various uses such as animal feed, fertilisers, tiles and flooring boards. The wastewater on the other hand is recycled and reused in the tanning process.

The second question was in terms of policies that are in place in relation to economic development. The investigative question was what policies are currently driving production and trading of vegetable tanned leather in South Africa. This question was investigated through IPAP policy framework, the NDP and the NGP which are policies that the government plans to use to drive the economic development of the country. The two policy frameworks are in place, however, it is not clear how government is planning to implement them. The study policies and

strategies in place in Italy that are directed at supporting the manufacturing of leather and leather goods and the growth of SMEs (as discussed in detail in Chapter 8).

The third question was how can decentralising of leather production contributes to the rural development in an industrially developing and developed context? This question was probed through literature, interviews and observations. The study found that flexible manufacturing has been key to success of the leather industry in Italy. Clusters of leather tanning, and leather goods manufacturing have a strong network culture which helps in meeting large quantities of orders without having to increase the size of the business.

The fourth question was regarding the role that IK can play in the development of sustainable leather production that contributes to a knowledge-based economy. Literature reviews as well as interviewing of participants was used as a strategy to interrogate this question. The study found that local knowledge played an important role in the development of a sustainable vegetable tanning system. The production process is linked to local heritage and traditions. Since most of the participants belonged to family run and owned SMEs knowledge is transferred and passed down generations.

The last question was how can small-scale production through CE be appropriated in leather production to contribute towards the development of local VT industry? This question was answered through interviews as well as literature review. Strong family culture, and social culture has been instrumental in the establishment of strong networks and cooperatives. SMEs cooperate to built strong clusters that can supply on the large-scale.

## **9.5 CONCLUSIONS DRAWN**

Based on the answers that the study found, the following conclusions have been drawn:

- The leather industry has a potential of contributing immensely to sustainable development in South Africa based on the fact that it uses renewable resource that are a readily available by-product from the agricultural sector.
- Promoting vegetable tanning of leather would contribute to the sustainable development of many rural communities.

- The leather industry has a long value chain that could benefit from the development of a sustainable locally-based leather industry.
- The vegetable tanning process has the potential to be a green industry in South Africa based on the use of a closed-loop production system and the use of vegetable tannins to convert animal hides/skins into leather.

## **9.6 LIMITATIONS OF THE STUDY**

A significant amount of time was spent in Italy investigating the vegetable tanning process that has a very long-standing tradition. Its value-chain and other connected industries were also studied. However, due to significantly less time spent in Botswana, the study might not have delved deeply enough into the vegetable tanning industry in Botswana despite the small size of the industry. However, all the key role-players including government officials were consulted in order to get their perspective on the potential role of vegetable tanning, regarding strategies that are currently in place and future plans for the industry.

The other limitation is that the scope of the study cannot include a comprehensive or definitive analysis on the environmental effects of the black wattle on the environment.

## **9.7 CONTRIBUTION TO KNOWLEDGE**

The study makes a contribution in three different ways that are all critical in the process of developing sustainable strategies for economic development, sustainable development community development and technological development. The three main areas identified were the contribution to practice, the contribution to theory and finally the contribution to policy.

### **9.7.1 CONTRIBUTION TO PRACTICE**

This study's contribution to practice is in the field of product and manufacturing systems design. The implication of this study, in terms of practice in the field of design for sustainability, is the consideration of small-scale manufacturing systems whose processes are often socially linked



(as indicated in the findings in Chapter 7 and 8). The study looked at sustainable materials such as vegetable tannins, the sustainable tanning process, finishing processes, and sustainable waste management practices in the vegetable-tanning sector. South Africa is endowed with various plants that produce tannins, but the most important one is the *mimosa* that produces a higher quantity of tannins than any other plant available in the country (as discussed in Chapter 3). The plant is available in most parts of the country and is considered an AIS category two according to the environmental classification. This category means even though the plant is considered undesirable, because of all the benefits it can still be utilised.

The process of vegetable tanning covers all elements of sustainability. The vegetable tanning process is linked to local traditions, knowledge and practices. Furthermore, vegetable tanning promotes local technological innovation that leads to the improvement of the production process and the development of communities (as indicated in the findings in Chapter 7 and 8). The process of vegetable tanning does not require formal education as most knowledge is gained through practice after basic training. It is therefore a good option for creating a decentralised trade that can be practiced in rural areas where access to good formal education is currently limited.

In Italy the manufacturing system is made out of small-scale manufacturers who cooperate in order to improve the system. Typically, such a system relies on the cooperation of small companies that belong to the same social network and share the same strong cultural values. Moreover, these cooperating companies formed a network which is supportive and shares a common goal of preserving tradition while adding value to materials using renewable resources. This business model could be adopted in African countries such as Botswana and South Africa. Theoretically the family-business model in Italy would work well in Africa if it is aligned with the values of *Ubuntu*.

This study detailed the value of collective efficiency in the drive for development. Working as a collective has enabled the Italian SMEs to drive change within their network so as to benefit their communities and their families. What is important to note as well is that the practice of collectivism can be found in many cultural practices in many of the local communities in South Africa and yet the practice is rarely mentioned in the business environment. Looking at the local practices will assist in bringing the previously marginalized forms of knowledge to the fore, which in turn contributes to the development of many communities.

As a collective the Italian tanneries were able to implement stringent environmental policies, which would have otherwise resulted in most companies closing down as it is the case in Botswana. As a collective they managed to establish a closed loop system of production through the network. There is a strong value chain of production which is all linked to a centralised waste management system which ensures the processing of all effluents. The waste management treatment centre monitors the amount of waste generated by each company and the company becomes liable for its treatment depending on the amount of effluents accumulated. All network members have a responsibility to ensure that rules and regulations are followed; this practice removes responsibility from government to the companies giving government time to focus on other aspects of the country.

Also critical to the development of a sustainable leather tanning sector in Italy is the collaboration of higher education institutions which are the centers of research and excellence that are taking the lead in researching and testing new innovations in collaboration with industry.

### **9.7.2 CONTRIBUTION POLICY**

This study contributed to the unpacking of the IPAP policy which attempts to promote and drive industrial and economic development in the South African manufacturing sector through decentralisation and promotion of labour intensive production (as discussed in Chapter 3). The study unpacked the IPAP policy by elaborating on its potentialities in relation to supporting a more resilient culture of SMEs through the cooperative model in the manufacturing sector. Moreover, the decentralisation of production which the policy seeks to establish is linked to locational flexibility which increases the ability of enterprises to relocate parts of their production process to different locations within the country or world.

This study unpacked the model of regional development and the social cooperative models of manufacturing which were found to be more inclusive and community driven with strong supportive policies and academic institution support (Chapter 3 and 4). The social cooperative model is a possible solution for a country like South Africa that needs to move away from social welfare and dependency model to a people driven economic development and empowerment. The cooperative production model is about solidarity and is connected to values of economic democracy, participatory governance, social capital and stability.

Small companies working in the cooperative network within the Italian industrial districts operate within the principles of cooperation, and the adoption of reciprocity and mutual benefit for economic objectives, which form the philosophical and social bases of the system. Another fundamental view is that of cooperative members who logically tend to opt for enterprise strategies that respond to local community needs as they are members of the community. Therefore, they often aim to satisfy, maintain and create jobs, and develop production, as those are often key critical issues that motivate them to cooperate (Perrini & Vurro, 2006; Euricse, 2013). This is a very critical issue that the IPAP policy seeks to address by placing job creation at the centre of all the issues that the framework aims to achieve (as discussed in Chapter 3). Most importantly, cooperatives are linked to resilience that is a building block for societies. Due to the cooperative's links to social cultures, are more resilient in times of crisis resulting in community empowerment. As already discussed in Chapter 4 the culture of mutual support in Italy links to the local fundamentals of *Ubuntu* – a philosophy of many indigenous communities.

### **9.7.3 CONTRIBUTION TO THEORY**

The study makes a contribution in terms of sustainable development and related concepts which are often not looked at from a manufacturing sector point of view, as well as collective efficiency. Prior to this study there was very little research done on the collective efficiency approach of SMEs, and achieving sustainable development through using local knowledge. The approach helps in explaining the dynamics and the competitive advantages of small-scale manufacturers by virtue of being part of a specialised collective that can sustain competitive demand through local joint actions and the use of renewable natural resources in the production process (Baleiras, 2011). Collective efficiency also promotes collaboration and interaction between various key stakeholders and is linked to the social capital. This is defined by social norms and networks that enable people to act collectively through social networks and civic associations which are in a stronger position to confront poverty and vulnerability, resolve disputes, and take advantage of new opportunities (Rabellotti, 1998).

Doing things collectively is linked to social sustainability and enables small manufacturers to solve problems as a collective and innovate while sustaining their tradition. This study also contributed to the concept of sustainability and its links to local practices of IKS and LK. These are elements that are already evident in local concepts such as *Ubuntu* which have governed

many indigenous communities for generations. Considering these concepts in the business environment and in the process of economic development for a country like South Africa that has endured the psychosocial trauma of segregation and marginalisation might help in ensuring inclusive economic participation and create confidence in local knowledge that is critical to development.

CE also puts emphasis on the importance of local-level governance through the coordination of economic activities through non-market relationships, and promotes interaction between producers that leads to incremental upgrading and improving of production activities. The CE strategy is a set of consistent strategically justified initiatives that are integrated into the action program. The management of resources by the community has many positive implications as the community will benefit, but the success of the community's good practice is then replicated as members of the community move around the country with the knowledge, and ultimately development spreads. With the growth of the community's involvement in the practice, the competition becomes high which forces the members to innovate.

Economic development should therefore, focus on local knowledge to heighten the use of resources to form part of the CE strategy which is aimed at redressing the vicious development circle faced by developing countries, to stimulate local, human, social and regional communities to make use of local resources as capital.

Currently, job creation is attributed to SMEs that have the ability to adapt to change, more often than not relying on local skills, knowledge and support (as discussed in Chapter 4 and discussed in the findings in Chapter 7 and 8). These chapters indicate that collective efficiency puts emphasis on less complicated innovation program or strategy; it requires a structure that will drive change in a scalable way.

## **9.8 RECOMMENDATIONS**

Based on the research findings that the data has provided and the evidence that the different sources of information provided the researcher has come to the following recommendations for government, academia and communities:

- Encourage the government to consider the cooperative model as one of the key alternatives to society driven economic development;
- Establish environmental policies that are enforceable to all those involved in production processes that generate toxic and non toxic waste as this will ensure that the rights of citizens to a clean air and environment is not infringed upon with no consequences;
- Collaborate with industry, education, and society in terms of developing supportive policies and laws for the manufacturing sector that will help it develop not at the expense of the society.
- Invite businesses to see themselves as part of a system – they operate within communities and generally employ people from communities, and therefore tapping into the communities values, culture and practices that will not only help strengthen the relations, but will also help in creating a sense of ownership and value to those who are involved in the business as well as the community in which the business operate;
- Encourage institution of higher learning that are located within leather-tanning regions to establish research units whose focus is to research and generate new knowledge in collaboration with the industry.
- Support government efforts to enhance its role as the creator of an enabling environment for development to take place instead of trying to impose everything on the citizens. This will only happen if government were to give support through policies that allow communities to drive their own development and empowerment. Sustainable development of industries can only be realised through the exploration of economic models that are community driven.
- Reinforce the government's efforts of promote a people-driven economy and development strategy as this will help create sustainable communities that are capable of developing and empowering themselves for the better, therefore reducing the burden from the state.

## **9.9 PROPOSED STRATEGIES**

The first and most important strategy is that the government should put support measures in place for society-driven economic development through proper policies and good support structures without interference. To do so effectively, the government would need to have a deep understanding of society's innate capabilities in problem-solving and the latter's ability to develop themselves and a supportive environment for that to happen. This could be achieved

through the proper engagement between a community, higher education and policymakers. Business should take cognisance of the fact that it is part of the society and therefore its activities should be aligned with social empowerment and development, not exploitative of these.

#### **9.10 IMPLICATIONS FOR FURTHER RESEARCH**

This study has diverse implications for further research into the field of design for sustainability and its links to local concepts such as IKS, LK and manufacturing processes. Further research should look at basic indigenous technology that can be produced locally in order to improve the vegetable leather tanning process in terms of capacity and quality. Further research onto this topic should look at the impact of small-scale leather tanneries to the development of their areas in which they operate, both from an economic and social development point of view.

Furthermore, the study proposes that this model of a production system that is based on cooperation is prototyped and tested at some point in order to validate its efficacy. Moreover, the study indicates the necessity of finding an industrial design partner to test the efficacy of the findings who will assist in designing manufacturing tools that could be used in the small-scale leather tanning system. This process will require doing research on what already exists and the materials used to create what already exists and identify gaps for innovation and improvement.

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# APPENDIX 1

## LETTER OF INFORMATION FOR CONSENT TO PARTICIPATE IN RESEARCH

### TITLE OF STUDY: SMALL-SCALE SUSTAINABLE VEGETABLE-TANNED LEATHER IN RURAL SOUTH AFRICA: A COLLECTIVE-EFFICIENCY APPROACH

You are asked to participate in a research study conducted Keneilwe Munyai, from the Department of Design at the Cape Peninsula University of Technology.

If you have any questions or concerns about the research, please feel free to contact Professor Mugendi K. M'Rithaa (study supervisor) at (021) 4691027- or [MugendiM@cput.ac.za](mailto:MugendiM@cput.ac.za).

### PURPOSE OF THE STUDY

In this study we are exploring the use of local knowledge in the small-scale vegetable leather tanning through collective-efficiency. We are also interested in how the collective-efficiency contributes to economic sustainability, environmental sustainability and sustainability of culture, as well as the reasons for not using vegetable tanning which is more labour intensive and time consuming than chromium tanning.

To investigate and critically examine the decentralisation of leather production in an industrially developing context. To demonstrate the benefits of incorporating into methods of production that specifically contribute to the collective-efficiency of small-scale leather tanning. To investigate efficacy of LK in response to present challenges. To foreground sustainable vegetable tanning within the eco-design discourse. to make a contribution towards the documentation and dissemination of indigenous knowledge applications in leather production.

### PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

You will be asked to answer a few questions that includes questions about general demographic information, and several self-report measures regarding your practices, knowledge, and attitudes towards the environment, working as a collective, and sustainability of the tanning methods you use. It is estimated that the interview will take on average anywhere from 20 to 30 minutes per session. Anyone who is involved in vegetable tanning, produces products out of vegetable-tanned leather is eligible to participate.

**POTENTIAL RISKS AND DISCOMFORTS**

There are no anticipated risks or discomforts associated with participating in this study.

**POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY**

You may become more aware of your attitudes, strengths and limitations with regards to computer and Internet use, and conducting on-line research. This can provide you with a greater awareness of areas for improvement regarding these topics. You will also be provided with the answers to the Internet knowledge quiz after submitting your survey, and links to resources for conducting on-line research that may be useful.

**CONFIDENTIALITY**

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

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Participants' anonymity. All responses received through interviews and observations will be stored on a secured space.

Only the researchers directly associated with this study will have access to this information for the purposes of analysis and conducting the study. Any reports of this study made available to participants or sent to a scientific journal for publication will contain information that reflects group results and not information about specific individuals.

**PARTICIPATION AND WITHDRAWAL**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

**FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS**

Once the research is complete a brief report explaining the findings from this study will be available for those interested. The report will be available to the participants via email.

**SUBSEQUENT USE OF DATA**

This data will be used in subsequent studies.

**RIGHTS OF RESEARCH SUBJECTS**

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, Cape Peninsula University of Technology, Cape Town, Roeland street; Telephone: 021 4691012, e-mail: [naidoove@cput.ac.za](mailto:naidoove@cput.ac.za)

**SIGNATURE OF INVESTIGATOR**

These are the terms under which I Keneilwe Munyai from the Department of Design Cape Peninsula University of Technology will conduct the research.

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**It is recommended that you print out a copy of this letter of information for your records.**

**Do you wish to continue?** To acknowledge that you have read and understood this information and would like to continue with the interview, please sign below.

\_\_\_\_\_ ||

**I agree.**

\_\_\_\_\_ |



## APPENDIX 2



### INTERVIEW SCHEDULE

Nome.....  
Name of the organization.....  
Designation.....  
Sesso .....  
Eta.....  
Indirizzo.....  
Data.....

Included below are the guiding interview questions:

#### Section A: Leather tanning

How long have you/your school been involved in teaching leather tanning?

What methods of leather tanning do you specialising in?

What is the motivation for specialising in the above mentioned methods?

Do they involve vegetable tanning?

Why do you think it is important to keep the traditional methods alive?

What is the leather produced used for?

Where do the tannins and equipment used in the process come from?

How do you deal with the waste generated from the tanning process?

Does your school teach issues of sustainability in relation to leather tanning?

Does the training involve tanning waste management?

Does your production system require any high-tech/low-tech equipment?

Does your school have any working relations with leather producers elsewhere?

What happens to your students after the training? Do they start their own companies or are they absorbed by the local tanning industry?

Could you please give an overview of the demographics of your students?

**Section B: Local knowledge**

What role has local knowledge played in the development of your school?

What role does your local knowledge play in the teachings at your school?

**Thank you once again for your willingness to participate.**

## APPENDIX 3



### **PROGRAMMA DI INTERVISA PER I PRODUTTORI DI PELLETERIA**

NOME.....  
NOME DELL'ORGANIZZAZIONE/DITTA  
RUOLO.....  
Gender .....

SESSO.....  
ETà.....  
INDIRIZZO.....  
Date.....  
DATA.....

**INCLUSO SEGUITO LE DOMANDE DELL'INTERVISTA GUIDA:**

### **SEZIONE A: PROCESSO DI PRODUZIONE**

1. Da quanto tempo la vostra ditta produce pellame?
2. Quanto è grande la vostra ditta? Quante persone ci lavorano?
3. Che tipo di pellame utilizzate?
4. Pellame trattato con tinture vegetali o a base di cromo (cromate?)
5. Per quale motivo utilizzate quel tipo specifico di pellame?
6. Di quale provenienza è il pellame che utilizzate
7. Durante la produzione si tiene conto dei vari problemi di sostenibilità?
8. Su quali aspetti si focalizza la vostra produzione?
9. Quale tipo di attrezzatura utilizzate?
10. Da dove proviene la vostra attrezzatura?

11. Come smaltite i rifiuti della lavorazione?

## **SESSIONE B**

### **CONOSCENZA LOCALE**

12 quale ruolo ha svolto la conoscenza del territorio nello sviluppo della vostra ditta?

13 quale ruolo svolge la conoscenza del territorio nel vostro processo di produzione?

**GRAZIE MILLE PER LA COLLABORAZIONE**

## APPENDIX 4



### Questionnaire for cooperatives role players

Name.....  
Name of the organization.....  
Designation.....  
Gender .....  
Address.....  
Date.....

1. What kind of a cooperative are you involved in?
2. What are the gender demographics of the people involved in the social cooperatives that you work with?
- 3.
4. What is the role of your cooperative in society?
5. Do you know of any cooperatives that are involved in the manufacturing sector? In particular the leather tanning and leather goods manufacturing?
6. Who are the key role players?
7. What kind of support if any do you get from government as cooperatives?
8. How long have you been involved in the social cooperative sector?
9. What business models do community cooperatives follow?
10. What do you see as the potential future of community cooperatives?
11. What is the approximate success rate of the community cooperatives that you are involved in?
12. Any other comments?

**Thank you for agreeing to be part of this research**

