

A Skincare Servicescape for Margaret Roberts

Biomimicry and Biophilia as a Model and Mentor for Design

LEANI RADEMEYER

Department of Architecture
University of Pretoria
2016

In accordance with regulations 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this dissertation which I hereby submit for the degree Master of Interior Architecture (Professional) at the University of Pretoria, is my own work and has not been previously submitted by me for a degree at this or any other tertiary institution.

I further state that no part of this dissertation has already been or is currently being submitted for any such degree, diploma or other qualification.

I further state that this thesis is substantially my own work.

Leani Rademeyer

DISSERTATION TITLE: Margaret Roberts Skincare Servicescape:
Biomimicry and Biophilia as a model and mentor for design

STUDENT: Leani Rademeyer

UNIVERSITY: University of Pretoria

FACULTY: Faculty of the Built Environment, Engineering and Information Technology

DEPARTMENT: Department of Architecture

DEGREE: Master of Interior Architecture (Professional)

RESEARCH FIELD: Environmental Potential

STUDY LEADER: Prof. Barbara Jekot

CO-STUDY LEADER: Raymund Konigk

COURSE CO-ORDINATOR: Arthur Barker

SITE LOCATION: Shop 150, Irene Mall, Pretoria

CLIENT: Margaret Roberts

Submitted in partial fulfilment of the requirements for the degree of Masters in Interior Architecture (Professional) in the Department of Architecture, Faculty of Engineering, Built Environment and Information Technology, University of Pretoria, South Africa

2016

EKSERP

Die immer veranderende aptyt van verbruikers het handelelaars genoop om tradisionele verkoopsdenke te verander en aan te pas ten einde te verseker dat “toegevoegde waarde “ ontsluit word in ‘n streng kompeterende mark.

‘n Handelsmerk word beskou as ‘n wesenlikke onderskeier maar is opsigself nie voldoende om verbruikers te oortuig om die produk te bekom nie. Verbruikers verlang meer as dit. Tendense in die kontemporêre verkoops-industrie dui op kleinhandel-volhoubaarheid asook kleinhandel-ontwerp “ondervinding” as twee van die meer suksesvolle strategieë om waarde te ontsluit. Dit plaas die kleinhandel sektor se hoë hulpbron verbruik en vermorsing onder die vergrootglas. Natuurlike hulpbronne word gebruik, nie net vir die produksie van produkte nie maar ook vir die vervaardiging van verpakking, fisiese handelruimte oprigting insluitende argitektoniese struktuur, binnehuise versierings asook bybehore. Alles net om aan die einde van hul bruikbaarheidslewe afgebreek en weggegooi te word - ‘n wesenlikke vermorsing.

Hierdie skrywe ondersoek die rol van die natuur as model en mentor in Handelontwerp met die fokus op die toepassing van Biomimetic en Biophilic ontwerpsbeginsels. Biomimicry word aangewend as ‘n ontwerpsinstrument in die ontwikkeling van volhoubaarheids Handels en Dienste-ontwerp wat doeltreffendheid en zero-vermorsing beginsels van die natuur najaag. Biophilic ontwerpsbeginsels word terselfde tyd ook aangewend om die aankoopondervinding in die handelsruimte te ontwikkel en verbeter volgens natuur-geinspireerde beginsels.

Margaret Roberts, ‘n vernaamde Suid Afrikaanse kruideskundige wat spesialiseer in kruiemedisyne, is die kliënt vir hierdie studie. Die voorgestelde ontwerp is ‘n toegepaste handelsruimte vir Margaret Roberts waar Biomimicry en Biomimetic beginsels ingespan word teneinde toegevoegde waarde te ontsluit.

ABSTRACT

The ever-increasing nature of consumer demands has forced retailers to adopt ‘added value’ strategies to ensure their competitive edge in the market. Branding is considered a market differentiator, but alone is not enough to convince consumers to make a purchase. Consumers want more. Trends in the contemporary retail industry show that retail sustainability and retail experience design are two of the most successful added value strategies employed.

This brings forth the issue of the retail sector’s resource intensive and wasteful nature. Natural resources are used to produce everything from products and packaging to the physical retail space including the architectural structure, interior finishes and fittings, all for it to be demolished and discarded as waste at the end of its life cycle.

This dissertation explores the value of nature as a model and mentor in the realm of retail design, particularly through application of Biomimetic and Biophilic design theories. Biomimicry is used as a design tool for developing a sustainable retail servicescape that emulates nature’s resource efficient and zero-waste principles. Biophilic design strategies are employed towards the development of an in-store retail experience inspired by nature.

Margaret Roberts; a well renowned South African herbalist - specialising in the art of healing with medicinal herbs, is the ‘client’ for this study. The proposed design intervention is the creation of a skincare servicescape for Margaret Roberts that integrates Biomimicry and Biophilia as an added value strategy.



The design of the Chapter Pages incorporates botanical illustrations from Margaret Roberts' published book *Indigenous Healing Plants (1984)*; highlighting the organic and natural influences that is manifested throughout this dissertation.

GLOSSARY

Atmospherics

The effort to design buying environments to produce specific emotional effects in the buyer that enhance purchase probability (Kotler, 1974).

Biomimicry

Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The goal is to create products, processes, and policies—new ways of living—that are well-adapted to life on earth over the long haul (BiomimicryInstitute, 2016).

Biophilia

Hypothetical human tendency to interact or be closely associated with other forms of life in nature (Merriam-Webster, 2016).

Servicescape

The environment in which the service is assembled and in which the seller and customer interact, combined with tangible commodities that facilitate performance or communication of the service (Bitner, 1992).

TABLE OF CONENTS

Abstract	iv		
Glossary	vii		
List of Figures	x		
List of Tables	xvi		
01 INTRODUCTION		03 THE PROBLEM	
1.1 Background	5	3.1 The Real World Problem	50
1.2 The Client	6	3.1.1 The Global Problem	51
1.3 The Aim	6	3.1.2 The Environmental Impact of Building Construction	52
1.4 Contributions	6	3.2 The Design Problem	54
1.5 Research Methodology	6	3.2.1 Client Analysis	54
1.6 Outline of the Study	7	3.2.2 Existing Brand Analysis	58
		3.2.3 Margaret Roberts Brand Essence	61
		3.2.4 Site Selection	62
		3.2.5 Chosen Site	64
02 THEORETICAL INVESTIGATION		04 PROGRAMMATICAL REQUIREMENTS	
2.1 Retail Servicescapes	10	4.1 Skincare Retail Precedents	70
2.1.1 Branding	11	4.2 Skincare Retail Zones	72
2.1.2 Adding Value	13	4.3 Skincare Retail Typologies	73
2.2 Biomimicry	17	4.4 Skincare Retail Zones Analysis	74
2.2.1 Defining Biomimicry	17		
2.2.2 Levels of Biomimicry	18	05 CONCEPTUAL DEVELOPMENT	
2.2.3 Biomimicry Design Spiral	20	5.1 Application of Branding Strategies	100
2.2.4 Life's Principles	22	5.1.1 Margaret Roberts Brand Identity	100
2.2.5 Resource Efficiency in Nature	24	5.2 Application of Biomimicry	102
2.2.6 Biomimicry Precedent Studies	28	5.2.1 Discovering examples in Nature	102
2.2.7 Waste as a Resource in Nature	32	5.3 Application of Experiential & Biophilia Design Theory	106
2.2.8 Biomimicry Precedent Studies	34		
2.3 Experiential & Biophilia Design Theory	36		
2.3.1 Atmospheric	36		
2.3.2 Experiential Design Tools	38		
2.3.3 Biophilic Sensory Experience	40		

06 DESIGN DISCOURSE

6.1 Biomimicry Design Application	112
6.1.1 Resource efficiency through emulation of biomimetic forms	112
6.1.2 Waste management through emulation of biomimetic systems	124
6.1.3 Energy efficiency through emulation of biomimetic processes	128
6.2 Biophilia Design Application	130
6.2.1 Experiential Design Strategy	130
6.3 Spatial Layout Design	142
6.3.1 Floor Plan Layout Iteration 1	142
6.3.2 Floor Plan Layout Iteration 2	144
6.3.3 Final Plan Layout	146
6.3.4 Section A-A	147

07 TECHNICAL INVESTIGATION

7.1 Technification of Plans	150
7.2 Material Palette	158
7.3 Services	159
7.3.1 Acoustics	159
7.3.2 Daylight Strategy	160
7.3.3 Passive Ventilation Strategy	162
7.4 Detail Investigation of Display Design	165
7.5 Environmental Potential Assessments	178
7.5.1 GBCSA Green Star Rating	178
7.5.2 SBAT Rating	180

08 CONCLUSION

List of References	186
List of Figure References	188
Appendix A	190
Appendix B	194

LIST OF FIGURES

Figure 1.1 Diagram showing thesis theoretical approach (Author, 2016)	5
Figure 2.1. Origin of Branding: Showing the process of branding cattle (Library of Congress, 1905).	11
Figure 2.2. Brand Identity Diagram (Author, 2016) compare with (Duffy, 2005)	11
Figure 2.3. Kaferer's Brand Identity Prism: Showing how a brand identity is developed (Kapferer, 2012).	12
Figure 2.4. The Four Realms of an Experience: (Author) compare with (Pine & Gilmore, 1999).	14
Figure 2.5. Succulent Garden showing Biomimicry Inspiration (Margolis, 2016)	16
Figure 2.6. Biomimicry Inspiration: Form - Collage (AskNature, 2016)	18
Figure 2.7. Biomimicry Inspiration: Process - Collage (AskNature, 2016)	19
Figure 2.8. Biomimicry Inspiration: Systems (AskNature, 2016)	19
Figure 2.9. Biomimicry Design Spiral (Author, 2016).	20
Figure 2.10. Botanical imagery of plant life (Etsy, 2007).	21
Figure 2.11. Biomimicry Life's Principles Diagrams (Author, 2016).	22
Figure 2.12. Material configuration in Nature: Wood Weave (Flickriver, 2006).	24
Figure 2.13. Biomimicry Life's Principles (Author, 2016) compare with (Biomimicry, 2014).	24
Figure 2.14. Minimum Inventory/Maximum Diversity System (Pearce, 1978: xii).	25
Figure 2.15 (Above) Form as a diagram of forces (Author, 2016) compare with (Pearce, 1978: xiv).	26
Figure 2.16 (Right) Lightweight structures in nature (AskNature, 2015)	26
Figure 2.17. Closest Packing in Nature: Triangulation grid connecting cells (Peace, 1978:3)	27
Figure 2.18. Stability of triangular structure (Pearce, 1978: xvii)	27
Figure 2.19 Eden Project (Perrin, 2007)	28
Figure 2.20. Photos of Eden Project (Perrin, 2007).	29
Figure 2.21 Biomimicry Pavilion Design by Andres Harris (Harris, n.d.)	30
Figure 2.22. 3D Printed Chair by Lilian Van Daal (Hogan, 2013).	31
Figure 2.23. Waste Equals Food: Growth of fungi (StudioChoo, 2010)	32
Figure 2.24 Biological and Technical Metabolism (McDonough & Braungart, 2002)	33
Figure 2.25. Closed-Loop Coffee Farm (AskNature, 2015).	34
Figure 2.26. Cardboard to Caviar Closed-Loop System (Bradley, 2016)	35
Figure 2.27 Atmospheric and sensory experience diagram (Author, 2016).	36
Figure 2.28. Sensory Experience Diagram (Author, 2016).	38
Table 2.3 Biophilic Design Patterns (Author, 2016) compare with (Browning, 2014).	39
Figure 2.29. Visual Sensory Experience (Browning, 2014; Pixel, 2013).	41
Figure 2.30. Lighting design influences on atmospheric qualities (Author, 2016).	42
Figure 2.41. Daylight psychological influences (Author, 2016) compare with (Gombikova, 2014).	42
Figure 2.42. Correlated Colour Temperature & Associative Meanings (Author, 2016).	42
Figure 2.43. Tree Fractal Pattern (Shiffman, 2010)	43

Figure 2.44. Influence of form on atmospheric qualities (Author, 2016).	43
Figure 2.45. Auditory Connection with Nature: Water, wind, birds etc (Kostreva, 2016).	44
Figure 2.46. Tactile Stimuli: Natural textures (Schmidt, 2016)	45
Figure 2.5.8: Non-Visual Connection with Nature: Tactile Experience (Author, 2016)	45
Figure 2.47. Olfactory Sensory Stimuli: Oil Diffuser (Gardeners, 2016)	46
Figure 2.48. Gustatory Sensory Stimuli: Fresh Herbs and Fruit (Cochrane, 2015; Verdina, 2013)	47
Figure 3.1. Environmental degradation (Fetrow, 2011)	50
Figure 3.2. Tap and Sink Analogy: Showing resources consumed and waste produced (Author, 2016)	51
Figure 3.3. Environmental impact of building construction (Author, 2016).	53
Figure 3.4. Client: Margaret Roberts (Margaret Roberts, n.d).	54
Figure 3.5. Margaret Roberts Herbal Centre (Author, 2016).	55
Figure 3.7. Margaret Roberts product range (Author, 2016).	56
Figure 3.6 Lavandula X Intermedia (Author, 2016).	56
Figure 3.8. Lavender Straw Waste (Snowy River Lavender, 2016).	57
Figure 3.9. Diagram of Lavender essential oil distillation process (Author, 2016).	57
Figure 3.10. Margaret Robert's current product branding (Author, 2016).	58
Figure 3.11. Margaret Robert's existing store (Author, 2016).	58
Figure 3.12 Margaret Roberts' published material (Roberts, 1984).	59
Figure 3.13. Margaret Roberts Herbal Centre: Lavender Walk Way (Author, 2016).	60
Figure 3.14. Margaret Roberts brand essence diagram (Author, 2016).	61
Figure 3.15. Waterkloof Corner Shopping Centre (Author, 2016; Advanced Building, 2012).	62
Figure 3.16. Southdowns Shopping Centre (Southdowns, 2016).	63
Figure 3.17. Southdowns Shopping Centre (Southdowns, 2016).	63
Figure 3.18. Irene Shopping Centre location map (Author, 2016).	64
Figure 3.19. Irene Shopping Centre (Author, 2016).	64
Figure 3.20. Irene Shop 150 (Author, 2016).	65
Figure 3.21. Irene Shopping Centre Mall Map - Indicating location of Shop 150 (Author, 2016).	65
Figure 3.22. Shop 150 Floor plan and Section (Author, 2016).	66
Figure 3.23. Shop 150 Existing facade (Author, 2016).	67
Figure 4.1 Jurlique skincare store design (Jurlique, 2016).	70
Figure 4.2 Dermalogica skincare store (Dermalogica, 2016).	70
Figure 4.3. Aesop skincare store (Aesop, 2016).	71
Figure 4.4 Aesop skincare store floor plan 1 (Aesop, 2016).	71
Figure 4.5. Aesop skincare store floor plan 2 (Aesop, 2016).	71
Figure 4.6. Skincare Retail Zones (Author, 2016).	72

Figure 4.7. Skincare Retail Typologies (Author, 2016).	73
Figure 4.8. Facade design programmatic requirements (Author, 2016).	74
Figure 4.9. Facade design visual access (Author, 2016) compare with (Panero & Zelnik, 1979).	74
Figure 4.10. Facade Design precedent study (Author, 2016; Aesop, 2016).	75
Figure 4.12. Vertical display ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1974).	76
Figure 4.11. Vertical display programmatic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	76
Figure 4.13. Vertical display precedent study (Author, 2016; Aesop, 2016).	77
Figure 4.14. Floor display programmatic requirements (Author, 2016).	78
Figure 4.15. Floor display ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	78
Figure 4.16. Aesop Floor display design drawing (Aesop, 2016).	79
Figure 4.17. Floor display precedent study (Author, 2016; Aesop, 2016).	79
Figure 4.18. Product testing programmatic requirements(Author, 2016).	80
Figure 4.19. Product testing ergonomics requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	80
Figure 4.20. Aesop product testing area (Author, 2016; Aesop, 2016).	81
Figure 4.21. Service counter programmatic requirements (Author, 2016).	82
Figure 4.22. Service counter ergonomics (Author, 2016) compare with (Panero & Zelnik, 1979).	82
Figure 4.23. Aesop and Dermalogica Skin Bar (Author, 2016; Aesop, 2016; Dermalogica, 2016).	83
Figure 4.24. Reception / point of sale programmatic (Author, 2016)	84
Figure 4.25. Reception / point of sale ergonomics (Author, 2016) compare with (Panero & Zelnik, 1979).	84
Figure 4.26. Point of sale precedent study (Author, 2016; Aesop, 2016).	85
Figure 4.27. Waiting area programmatic requirements (Author, 2016).	86
Figure 4.28. Waiting area ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	86
Figure 4.29. Waiting area precedent study (Author, 2016; Architonic, 2013).	87
Figure 4.30. Treatment area programmatic requirements (Author, 2016).	88
Figure 4.31. Treatment area ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	88
Figure 4.32. Semi-Private treatment area precedent study: Dermalogica (Author, 2016; Dermalogica, 2016).	89
Figure 4.33. Private treatment area programmatic requirements (Author, 2016)	90
Figure 4.34. Private treatment area ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	90
Figure 4.35. Private treatment area precedent study: Dermalogica & Aesop (Author, 2016; Aesop, 2016; Dermalogica, 2016).	91
Figure 4.36. Kitchenette programmatic requirements (Author, 2016).	92
Figure 4.37. Kitchenette ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	92
Figure 4.38. Kitchenette precedent study (Author, 2016; Howarth, 2015).	93
Figure 4.39. Accessible toilet programmatic requirements (Author, 2016).	94
Figure 4.40. Accessible toilet ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	94
Figure 4.41. Shower facilities ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	95
Figure 4.42. Ablution facilities precedent study (Author, 2016; Howarth, 2015).	95
Figure 4.43. Storage area functional requirements (Author, 2016).	96

Figure 4.44. Storage area ergonomic requirements (Author, 2016) compare with (Panero & Zelnik, 1979).	96
Figure 4.45. Examples of standard storage shelving (Author, 2016; Bunnings, 2016).	97
Figure 5.1. Diagram showing relationship between Retail, Biomimicy and Biophilic approach. (Author, 2016)	100
Figure 5.2. Margaret Roberts botanical sketches (Roberts, 1984)	101
Figure 5.3. Lavender triangulated cell structure (Author, 2016).	102
Figure 5.4. Al Bahar Towers (Teicu, 2012).	103
Figure 5.5. Kolding Campus (Ongreening, 2016).	103
Figure 5.6. Lavender Closed-Loop System (Author, 2016).	104
Figure 5.7. Eastgate Centre, Harare (Doan, 2012).	105
Figure 5.8. Diagram: Passive Systems (Author, 2016).	105
Figure 5.9. Experience design diagram (Author, 2016).	106
Figure 5.10. Experiential design journey (Author, 2016).	106
Figure 5.11. Diagram showing map of experiential design journey (Author, 2016).	107
Figure 6.1 Concept development sketch (Author, 2016).	110
Figure 6.2. Diagram of Design Strategy (Author, 2016)	111
Figure 6.3. Sketch of triangulation patterns in lavender cell structure (Author, 2016)	112
Figure 6.4. Triangulated grid structure (Author, 2016)	112
Figure 6.5. Triangulated grid structure - fractal patterns (Author, 2016)	113
Figure 6.6. Triangulated grid structure - display design (Author, 2016)	113
Figure 6.7. Vertical display ergonomics (Author, 2016) compare with (Panero & Zenik, 1979)	114
Figure 6.8. Triangulated vertical display configuration 1 (Author, 2016)	114
Figure 6.9. Triangulated vertical display configuration 2 (Author, 2016)	114
Figure 6.10. 3D visualisation of display system (Author, 2016).	115
Figure 6.11. 3D Printed joinery by Minale-Madea (Homeli, 2016)	116
Figure 6.12. Joinery design (Author, 2016)	117
Figure 6.13. 5 Different joinery components (Author, 2016)	117
Figure 6.14. Resonant Chambers (Furuto, 2012).	118
Figure 6.15. Human Skin cell structure (Author, 2016).	118
Figure 6.16. Triangulated membrane (Author, 2016).	118
Figure 6.17. SHIZEN Packaging (Lin, 2014).	120
Figure 6.18. Triangulated packaging design (Author, 2016).	121
Figure 6.19. Triangulated packaging design (Author, 2016).	121
Figure 6.20. Packaging die lines (Author, 2016).	122
Figure 6.21. Product packaging design (Author, 2016).	122
Figure 6.22. Product label design (Author, 2016).	123
Figure 6.23. Lavender straw to create fiber composite boards and biodegradable packaging material (Author, 2016).	124
Figure 6.24 Biodegradable Food Packaging (DesignandPaper, 2013)	124

Figure 6.25. Coconut fiber composite (Sharpe, 2013)	124
Figure 6.26. Bamboo fiber composite column (Hartford, 2012)	124
Figure 6.27. Closed-loop system design (Author, 2016).	125
Figure 6.28. Lavender harvesting (VivreDemain, 2016).	126
Figure 6.29. Lavender paper making process (Author, 2016).	127
Figure 6.30. Shadow study (Author, 2016).	128
Figure 6.31. Diagram showing passive systems design (Author, 2016).	129
Figure 6.32. Biophilic sensory experience (Author, 2016).	130
Figure 6.33. Diagram showing layout of retail zones for referral with Table 6.1 (Author, 2016).	130
Figure 6.34. Diagram showing zoning of facade (Author, 2016).	132
Figure 6.35. Window display design (Author, 2016).	132
Figure 6.37. Call out of vertical display design (Author, 2016).	134
Figure 6.36. Diagram showing zoning of vertical display area (Author, 2016).	134
Figure 6.39. Precedent Study: Aesop laboratory glassware in store design (Aesop, 2016).	136
Figure 6.38. Diagram showing zoning of floor display area (Author, 2016).	136
Figure 6.45. Diagram showing zoning of floor skin bar area (Author, 2016).	138
Figure 6.46. Call out of vertical display design behind Skin Bar (Author, 2016).	138
Figure 6.41. Call out of POS/Reception area (Author, 2016).	140
Figure 6.40. Diagram showing zoning of POS/Reception area (Author, 2016).	140
Figure 6.42. Diagram of circulation through space of Spatial Layout Iteration 1 (Author, 2016).	142
Figure 6.43. Spatial layout design iteration 1 (Author, 2016).	142
Figure 6.44. Spatial layout design iteration 1 (Author, 2016).	143
Figure 6.45. Spatial layout design iteration 2 (Author, 2016).	144
Figure 6.46. Spatial layout design iteration 2 (Author, 2016).	144
Figure 6.47. Sketches of spatial layout design iteration 2 (Author, 2016).	145
Figure 6.48. Iterated Ground Floor and Mezzanine Plans (Author, 2016).	146
Figure 6.49. Section A-A Design(Author, 2016).	147
Figure 7.1. Iterated Ground Floor Plan (Author, 2016)	150
Figure 7.2. Iterated Mezzanine Plan (Author, 2016).	151
Figure 7.3. Facade Design (Author, 2016)	152
Figure 7.4 Iterated Section A-A showing relationship between zones (Author, 2016)	153
Figure 7.5. Iterated Section B-B showing vertical display (Author, 2016)	154
Figure 7.6 Perspective of Entrance (Author, 2016).	155
Figure 7.7. Air plants planting strategy (Author, 2016).	156
Figure 7.7. Perspective of point of view from Mezzanine (Author, 2016).	157
Figure 7.8. Collage of material selection (Author, 2016).	158

Figure 7.9. Diagram showing acoustic considerations (Author, 2016).	159
Figure 7.11. Solatube image and specifications (Solatube, 2016).	160
Figure 7.10. Diagram showing passive lighting strategy (Author, 2016).	160
Figure 7.12. Artificial lighting plan (Author, 2016).	161
Figure 7.13. Diagram showing passive systems design (Author, 2016).	162
Figure 7.14. Artificial lighting plan (Author, 2016).	163
Figure 7.15. Packaging within display system (Author, 2016).	165
Figure 7.16. (Left) Vertical Display Grid (Author, 2016).	165
Figure 7.17. Axonometric of Vertical Display (Author, 2016).	165
Figure 7.18. Iteration of connection joints and display panels (Author, 2016).	166
Figure 7.19. Detailing of connection joints (Author, 2016).	167
Figure 7.20. Detailing of 'Kit of Parts' (Author, 2016)	168
Figure 7.21. Axonometric of vertical display to wall connection (Author, 2016).	170
Figure 7.22. Section through vertical display (Author, 2016).	171
Figure 7.23. Detail 1: Vertical display Connection detail (Author, 2016)	172
Figure 7.24. Detail 1: Front Elevation (Author, 2016).	173
Figure 7.25. Detail 2: Vertical display wall connection (Author, 2016)	174
Figure 7.26. Detail 3: Dry wall connection (Author, 2016).	175
Figure 7.27. Section through vertical display (Author, 2016).	176
Figure 7.28. Section through vertical display behind Skin Bar (Author, 2016)	177
Figure 7.29. Green Star Rating score (GBCSA, 2016).	178
Figure 7.30. SBAT Rating Score (SBAT, 2016).	180

LIST OF TABLES

Table 2.1. Economic Differentiators (Author, 2016) compare with (Pine & Gilmore, 1999).	14
Table 2.2. Realms of Experience: Comparing the four differnt realms of experience (Author, 2016) compare with (Pine & Gilmore, 1999).	15
Table 2.3. Psychological influences of nature (Author, 2016) compare with (Browning, 2014).	40
Table 5.1 Biophilic Sensory Experience (Author, 2016).	106
Table 6.1. Summary of biophilic patterns application towards experiential design (Author, 2016).	131
Table 7.1. Green Star Rating Justification (Author, 2016).	179



INTRODUCTION

Background of Design Study

01

“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.”

– Richard Buckminster Fuller
(Pawlyn, 2011)

1.1 BACKGROUND

The environmental issues of climate change, water scarcity, waste and depletion of natural resources can no longer be ignored. Alarming, the built environment is one of the largest contributors to these issues. We as interior designers; professionals of the built environment therefore play a large role in the conservation of our natural environment. It is our moral obligation to design for a future that is environmentally sustainable, in which we become energy efficient, preserve natural resources and minimize waste.

In order to protect our natural environment, we need to learn from it. Biomimicry is an approach to sustainable design that looks for examples in nature to solve human problems. One of the major problems we are currently faced with in the built environment is the lack of resource efficiency (Pawlyn, 2011). Nature has mastered the art of sustainable design over 3.8 billion years (Benyus, 1997) and has developed the ability to design and construct large ecosystems using minimal energy and natural resources whilst producing zero waste in the process. So the question is:

How can we as interior designers use nature's design principles to become more resource efficient and produce less waste through the process of design?

This question highlights the real world problem, which will be addressed through the application of retail design. The interior design and construction of retail stores are often subject to seasonal changes in order to keep up with the latest trends. As a result of this, in-store shop fittings are commonly removed and discarded as waste to make room for the new concept designs, proving to be a highly resource inefficient and wasteful practice. Due to this, an opportunity was recognized to address the environmental issues through retail design.

The retail sector is highly dependent on branding and differentiation/added value strategies for success. Sustainability and experiential design are two of the leading added value strategies employed in the contemporary retail sector. Biophilic design is an eco-paradigm that mimics experiential qualities of nature in the built environment with the aim of reducing stress, improving well-being and expediting healing of occupants (Browning, 2014). This differs from Biomimicry, which mimics forms, processes and structures in nature as a means to create sustainable design solutions in the built environment. Biomimicry and Biophilic design, both nature-inspired design tools will be used to formulate an added value strategy that addresses sustainability and experiential design in the retail sector. This brings forth the design problem and question:

How can Biomimicry and Biophilic design be used as an added value strategy that deals with sustainability and experiential design in the retail sector?

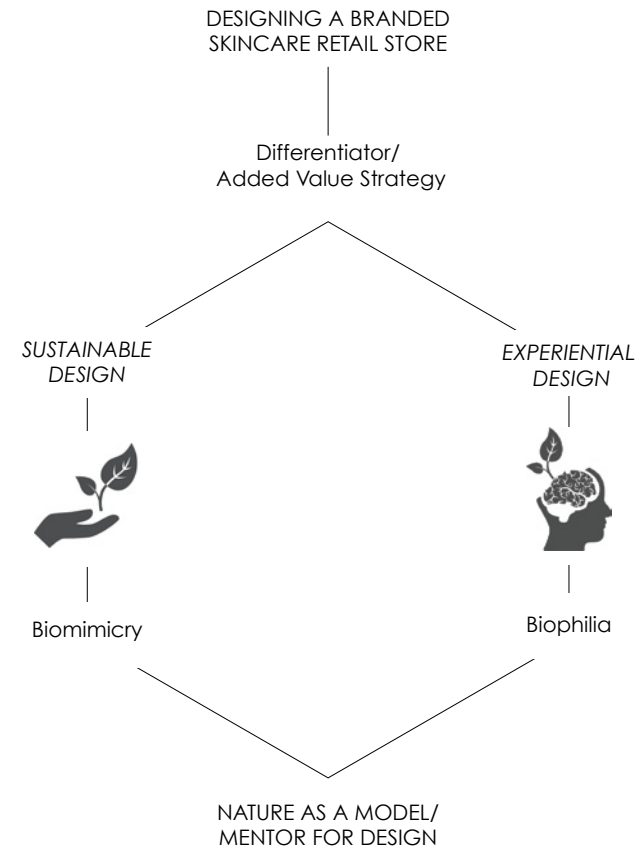


Figure 1.1 Diagram showing thesis theoretical approach (Author, 2016)

1.2 THE CLIENT

Margaret Roberts, a well-known South African herbalist has been chosen as the ‘client’ for this study. She manufactures a series of skincare products; all produced with organic medicinal herbs, which she sells at her Herbal Centre store in Hartbeespoort.

Working with Margaret Roberts as the client also provides an exciting design challenge, which is to re-brand and commercialise her products and in-store design whilst retaining the authenticity and original character about her brand image. It is evident that her current product and in-store brand image is outdated and poorly executed, which is why it is applicable for an interior design intervention to take place.

Margaret Roberts was chosen as the client for the purpose of this study since her current brand has a strong connection with nature and is in favour of sustainable practices. Therefore, the idea of designing a Biomimicry and Biophilic inspired brand and retail servicescape for Margaret Roberts is very fitting.

1.3 THE AIM

The aim of this masters study is to design a Biomimicry and Biophilic inspired skincare servicescape for Margaret Roberts that uses sustainable practices and experiential design qualities as a differentiator in the retail market.

Research Questions as Identified in Introduction

1. How can we as interior designers use nature’s design principles to become more resource efficient and produce less waste through the process of design?
2. How can Biomimicry and Biophilic design be used as an added value strategy that deals with sustainability and experiential design in the retail sector?

1.4 CONTRIBUTIONS

The application of Biomimicry in the built environment is often manifested through engineering, architecture and product design and is not well established in the discipline of interior design. This thesis will therefore contribute to developing an understanding of how Biomimicry as well as Biophilic design can be applied in the discipline of interior design.

1.5 RESEARCH METHODOLOGY

LITERATURE REVIEW

An in-depth study of Biomimicry as well as Biophilic and experiential design strategies is carried out.

PRECEDENT STUDIES

Precedent studies are used throughout this thesis as a reference point that provides examples of successful design solutions, which can be studied and analysed to support the concept design and technical development process.

MODEL BUILDING

Model building helps to develop an understanding of the three-dimensional qualities of an object or space. Since this study is largely concerned with design solutions found in nature, model building will provide a platform for dissecting these solutions and understanding the underlying structures of the design solutions.

BIOMIMICRY DESIGN SPIRAL

The Biomimicry design spiral provides two alternate methods; *Challenge to Biology* and *Biology to Challenge* that can be applied as a guideline when using Biomimicry to solve a design problem. The Challenge to Biology method is used when a human problem is identified, which then looks at examples in nature for a solution to the problem. Alternatively, the Biology to Challenge method is used when a brilliant example of design is identified in nature, which can then be applied to solve a human problem (Benyus, 1997). The **Challenge to Biology** method (see page 20) will be used for the purpose of this study since a human problem has been identified that will be addressed through finding examples of design solutions nature.

The **Challenge to Biology** approach to Biomimicry is carried out in 6 steps, namely;

DEFINE IDENTIFY INTERPRET DISCOVER ABSTRACT

These 6 steps of the Biomimicry design method will formulate the structure of this thesis and will be explained through the 1.6 *Outline of the Study*.

1.6 OUTLINE OF THE STUDY

CHAPTER 1: Introduction

Introduces the scope of this study and highlights the real world problem and design problem that is addressed.

CHAPTER 2: Theoretical Approach

This chapter discusses the application of Biomimicry in the field of design, specifically looking at the Biomimicry Design Spiral, Life's Principles and case studies of successful Biomimicry design. The theoretical approach to Biomimicry is further discussed in Chapter 5 in relation to concept development. Furthermore, Chapter 2 examines theories regarding branding, experiential and Biophilic design.

CHAPTER 3: The Problem - DEFINE

The first step of the Biomimicry Design Spiral is to Define the problem and design challenge. Therefore Chapter 3 will address both the real world problem as well as the design problem. A client analysis and site analysis is carried out as part of the investigation into the design problem.

CHAPTER 4: Programmatical Requirements - IDENTIFY

Step 2 of the Biomimicry Design Spiral is to Identify the key functions that need to be carried out by the design. Therefore, Chapter 4 defines the programmatical requirements for the Margaret Roberts skincare servicescape. This includes analysis of precedent studies as well as an in depth investigation into each of the programmatical functions.

CHAPTER 5: Conceptual Development - INTERPRET/DISCOVER

Step 3 and 4 of the Biomimicry Design Spiral is to Interpret the design problem into biological terms and to Discover examples in nature to address the design problem. For the purpose of this study, these two steps are combined into one investigative chapter, which supports the development of the design concept. Theories on resource efficiency and waste management in nature are consulted in this chapter.

CHAPTER 6: Design Development - ABSTRACT

Step 5 of the Biomimicry Design Spiral is to Abstract the elements of nature that provide a solution to the problem; as discovered in step 5, and apply them to a design solution. Chapter 6 therefore applies the theories discussed in Chapter 2 and Chapter 5 in order to formulate a design concept.

CHAPTER 7: Technical Resolution - EMULATE

The final step of the Biomimicry Design Spiral is to Emulate the design concept and to test the success of the design against Biomimicry's Life's Principles. Chapter 7 therefore involves technical investigations and iterations of design as well as the final design solution that will be tested against the Biomimicry and Biophilic design strategies.

CHAPTER 8: Conclusion

Final conclusions from the master study will be drawn and presented in this chapter.