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Carbon Mapping Practices and Green Financial Decision-Making in the Automotive Industry under CBAM and COP 30 Climate Frameworks

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Declaration / Plagiarism Statement

I, Maham Shafiq, hereby declare that this thesis entitled “Carbon Mapping Practices and Green Financial Decision-Making in the Automotive Industry under CBAM and COP 30 Climate Frameworks” is my own original work and has not been submitted previously, in whole or in part, for any degree, diploma, certificate or other academic award.

I further declare that all sources used in this thesis have been acknowledged through proper in-text citation and referencing. I understand that plagiarism, fabrication of data, collusion, falsification of sources, or submission of work produced by another person is a serious academic offence and may result in disciplinary action under university rules.

I also confirm that the research was conducted ethically. Respondents were informed about the purpose of the study, participation remained voluntary, and organisational or respondent-level information was treated confidentially and anonymised where required.

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Abstract

The purpose of this thesis is to explore the state of carbon mapping and green financial decision making within the automotive sector within the context of CBAM and COP 30 climate frameworks. It was created to address the increasing demand from automotive manufacturers and suppliers to better quantify their operational and supply-chain emissions, reduce future carbon related compliance burden and incorporate emissions data in financial and strategic analysis and decision making. The main objective was to assess the role of carbon mapping in the CBAM implementation process, in cost management, in the preparation of green investment plans, in sustainability reporting and long-term climate preparedness. The literature review included the concepts of carbon accounting, automotive sustainability and carbon border adjustment, green finance, sustainable supply chains and sustainability reporting, and the conceptual logic was supported by the theories from the institutional theory, stakeholder theory and resource-based view.

The research design employed was a quantitative-dominant mixed methods. The survey was conducted in the quantitative phase during which 100 respondents were surveyed in the following categories: automotive manufacturing, automotive parts, supply-chain, finance, compliance, production and sustainability-related. The data of the survey were analysed using the frequency analysis, descriptive statistics, reliability test, normality test, correlation analysis, t-test and regression. Four semi-structured interviews were held with an Environmental Compliance Officer, Supply Chain Executive, Finance and Accounts Officer and Quality Assurance Officer during the qualitative stage of the study. The analysis of these interviews was a thematic analysis that explained and put the survey results into context.

The findings indicate that the majority of the respondents are aware of the significance of carbon mapping, especially with regard to the preparation of CBAM, visibility of emissions, costs, sustainability reporting and strategic preparation. The descriptive SPSS results showed good mean scores for sustainability reporting, best practices and implementation challenges and climate preparedness. The one-sample test was also significant with the climate preparedness being significantly higher than the neutral level. The results of correlation and regression, however, indicated that the statistical relationship between the composite constructs was relatively weak, so that the use of carbon mapping is considered important from managerial perspective, yet it is not a well-developed financial decision-making system. The results of the interviews confirmed this interpretation, as it was revealed that companies gather energy, fuel, logistics and waste-related data, but that there are only a few carbon accounting systems integrated in the company, few companies have visibility of the emissions of their suppliers, and their technical capabilities and capacity for cross-functional coordination are somewhat limited.

The study indicates that the practice of carbon mapping is a viable way for automotive companies to contribute, but that this contribution can be maximized using formal systems, accurate supplier information, finance-function engagement, and ongoing carbon auditing and recognised sustainability reporting. The thesis contributes by connecting the mapping of carbon with the use of green financial decision-making in Pakistan's automobile sector, where climate regulation and expectations of the international markets are increasingly gaining relevance.

Table of Contents

Abstract 5
Chapter 1: Introduction 13
1.1 Background of the Study 13
1.2 Problem Statement 16
1.3 Research Aim 17
1.4 Research Objectives 17
1.5 Research Questions 18
1.6 Research Hypotheses 18
1.7 Significance of the Study 19
1.8 Rationale for the Study 19
1.9 Scope of the Study 20
1.10 Proposed Variable Alignment 20
1.11 Structure of the Thesis 22
Chapter 2: Literature Review 24
2.1 Introduction 24
2.2 Automotive Sustainability and the Low-Carbon Transition 25
2.3 Carbon Mapping, Carbon Accounting and Emissions Visibility 27
2.4 CBAM, COP 30 and Regulatory Pressure 30
2.5 Green Financial Decision-Making and Cost Management 32
2.6 Sustainability Reporting, CSR and Climate Transparency 33
2.7 Supply-Chain Transparency and Operational Implementation 35
2.8 Theoretical Foundations 36
2.9 Comparative Synthesis and Research Gap 38
2.10 Chapter Summary 39
Chapter 3: Research Methodology 41
3.1 Introduction 41
3.2 Research Philosophy 42
3.3 Research Approach 43
3.4 Research Design 43
3.5 Research Strategy 43
3.6 Empirical Context and Population 44

3.7 Sampling Strategy and Sample Size 44
3.8 Data Collection Instruments 45
3.9 Data Collection Procedure 46
3.10 Data Analysis 46
3.11 Reliability, Validity and Trustworthiness 47
3.12 Ethical Considerations 48
3.13 Chapter Summary 49
Chapter 4: Data Analysis and Findings 50
4.1 Introduction 50
4.2 Response Rate and Respondent Profile 51
4.3 Descriptive Statistics and Survey Patterns 54
4.4 Reliability Analysis 59
4.5 Normality, T-Test and Group Comparison 61
4.6 Correlation Analysis 62
4.7 Regression Analysis and Hypothesis Testing 65
4.8 Qualitative Interview Findings 69
4.9 Summary of Findings 71
Chapter 5: Discussion 73
5.1 Introduction 73
5.2 Carbon Mapping and CBAM Compliance 73
5.3 Barriers to COP 30 Climate Framework Implementation 74
5.4 Strategic Decision-Making and Sustainability Reporting 75
5.5 Best Practices for CBAM and COP 30 Alignment 76
5.6 Capital Investment and Cost Management 77
5.7 Theoretical Implications 79
Chapter 6: Conclusion, Recommendations and Reflections 81
6.1 Conclusion 81
6.2 Recommendations 82
6.3 Limitations of the Study 84
6.4 Future Research 85
6.5 Researcher's Reflection 86
References 87

Appendices 93
Appendix A: Interview Questions 93
Appendix B: Consent Form 93
Appendix C: Interviews 95
Interviewee 1: Environmental Compliance Officer 95
Interviewee 2: Supply Chain Executive 97
Interviewee 3: Finance and Accounts Officer 99
Interviewee 4: Quality Assurance Officer 101
Appendix D: Survey Questionnaire 102
Appendix E: Survey Link 108
Appendix F: Survey Results 109

List of Tables

Table 1: Alignment between proposal variables, research questions and expected measurement areas 20

Table 2: Comparative synthesis of literature streams 38

Table 3: Respondent profile from SPSS frequency output 52

Table 4: Descriptive statistics for individual survey items from SPSS output 55

Table 5: Descriptive statistics for composite constructs from SPSS output 57

Table 6: Reliability statistics from SPSS output 60

Table 8: One-sample t-test for climate preparedness from SPSS output 62

Table 9: Correlation matrix for carbon mapping, implementation challenges and green financial decision-making 63

Table 10: Correlation matrix for sustainability reporting, best practices and climate preparedness 64

Table 11: Regression output predicting climate preparedness from SPSS output 65

List of Figures

Figure 1: World greenhouse gas emissions in 2021 by sector, end use and gas (World Resources Institute 2024) 14
Figure 2: CO2 emissions from fuel combustion by sector (World Bank Atlas of Sustainable Development Goals 2023) 15
Figure 3: Global CO2 emissions from transport by sub-sector in 2021 (World Bank Atlas of Sustainable Development Goals 2023) 16
Figure 4: Quarterly electric car sales, 2021-2024 ((IEA, 2024) 26
Figure 5: Overview of GHG Protocol scopes and emissions across the value chain (WRI and WBCSD, 2011) 28
Figure 6: CBAM implementation timeline. Source: European Parliamentary Research Service (European Parliament, 2023) 30
Figure 7: Research onion model applied to this thesis 42
Figure 8: Year of Experience (Survey Result) 53
Figure 9: Type of Organization (Survey Result) 53
Figure 10: Connection with Sustainability, supply chain, compliance, production/reporting (Survey Result) 54
Figure 11: Record Carbon or Emission information (Survey Result) 56
Figure 12: Lack of Technical Knowledge an Issue (Survey Result) 58
Figure 13: Carbon-Related information helps Management (Survey Result) 59
Figure 14: Histogram of climate preparedness from SPSS output 61
Figure 15: Carbon Mapping help automotive firm (Survey Result) 66
Figure 16: Carbon Mapping Support Investment Decision (Survey Result) 68
Figure 17: Emission Data from Suppliers (Survey Result) 70

List of Abbreviations

Abbreviation	Full Form
CBAM	Carbon Border Adjustment Mechanism
CO2	Carbon dioxide
COP	Conference of the Parties
CSR	Corporate Social Responsibility
EU	European Union
EV	Electric Vehicle
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
IEA	International Energy Agency
SPSS	Statistical Package for the Social Sciences
TCFD	Task Force on Climate-related Financial Disclosures
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute