

Title: The Role of Directors in Corporate Governance: Product Design Risk Management

Name: Adam Gordon Palm MEngSc, BEng(Elect), AssocDipEng(Elect)

Degree: Doctor Of Business Administration

Submission Date: 12 December 2014

I hereby certify that the work embodied in this Dissertation Project is the result of original research and has not been submitted for a higher degree to any other University or Institution.

(Signed) _____

Table of Contents

Table of Contents	iii
Synopsis.....	viii
1.0 Chapter One: Introduction	1
1.1 Overview	1
1.2 Research Catalyst.....	1
1.3 Justification of Research	2
1.5 Research Problem	6
1.6 Research Questions and Objectives	6
1.7 Research Methodology	9
1.8 Chapter Summary	10
1.9 Delimitations and Assumptions	11
2.0 Chapter Two: Literature Review	12
2.1 Directors Legal Obligations	12
2.2 Managing risk: Technical and Behavioural Factors.....	15
2.2.1. Technical Factors	15
2.2.2. Behavioural Factors and Organisational Climate	18
2.3 Product Development Process	20
2.3.1 Product Development in the UK.....	24
2.3.2 Waterfall versus Concurrent Engineering.....	25
2.3.3 Agile.....	27
2.3.4 Design methods.....	27
2.3.4.1 Tolerance design: Simple example	28
2.3.4.2 Literature and tolerance design	30
2.3.4.3 Quality Control versus Design for Quality	31
2.3.4.4 Tolerance versus Test.....	35
2.3.4.5 Design Review Processes.....	38
2.4. Organisational Climate and Unknown-Unknown Risks in PDP.....	40
2.4.1 Management and Leadership Style	40
2.4.2 Supporting the Communication of Dissenting Views	41
2.4.3 Ethics and Social Responsibility	41
2.5 The Creation of Unknown-Unknown Risks Within Projects:.....	42
2.6 The Creation of Unknown-Unknown Risks As Seen by Non-Project Members Including Directors.....	45

2.7 Summary	50
3.0 Chapter Three: Research Method	56
3.1 Research Paradigm/ Philosophy	56
3.2 Research Strategy	57
3.2.1 Case Study Research	57
3.2.2 Mixed Mode Research	58
3.2.3 Research Design	60
3.2.3.1 Purpose (Exploratory)	60
3.2.3.2 Context	61
3.2.3.3 Unit Of Analysis	62
3.2.3.4 Level Of Analysis	63
3.2.3.5 Data Collection Method	65
3.2.3.6 Sampling Design	71
3.3 Data Collection	76
3.3.1 Semi-Structured Interview Participants:	76
3.3.1.1 Coding Structure	77
3.3.2 Survey results	78
3.3.3 Artefacts	79
3.4 Data Analysis	80
3.4.1 Interview	80
3.4.2 Survey	81
3.4.2.1 Analysis of Survey Data	81
3.4.2.2 Factor Analysis of Survey Results for Organisational Climate Section of Survey	82
3.4.3 Artefacts	83
3.4.4 Triangulation	92
3.5 Ethics	93
3-5-1 Consent	93
3-5-2 Data Storage	93
4.0 Chapter Four: Findings	94
4.1 Introduction	94
4.2 Findings to the Research Questions:	94
5.0 Chapter Five: Discussion and Conclusion:	114
5.1 Contribution to Knowledge	114

5.1.1 Contributing To Knowledge By Providing Insight Into Why Do Recalls Still Occur?	118
5.1.2 Design Methods In SME OEMS In The UK	119
5.1.3 An extension Of Black Swan Theory To Product Development	119
5.1.4 Combining Black-Swan's, System Level Engineering And Designing Quality Into Product To Create Recall Resistant Design Processes.	121
5.1.5 Governance, Risks And The Intersection Of Design Methods And Organisational Climate.	122
5.2 Implications For Practice	124
5.2.1 Lessons To Be Learnt From Recent Examples Of Recalls	124
5.2.2 Improving Governance And Corporate Social Responsibility	126
5.2.3 Addressing The Black Swan Theory	126
5.2.4 The implications of this study on auditing practice	130
5.2.5 Implications Of This Study On Directors Competencies.	131
5.2.6 Principle themes extracted from results	131
5.2.7 Creation Of A Diagnostic Tool	133
5.2.8 Application Of The Diagnostic Tool	135
5.2.9 Proposed Model - Recall Risk Governance Opacity	136
5.2.10 Limitations Of Study And Future Research.	138
References:	140
Glossary and Definition of Terms:	158
Appendix A - Semi Structured Interview Questions	161
Appendix B - Report of Node Structure and Content - Extract from Nvivo.	165
Appendix C- Descriptive Statistics Applied to the Second Section of the Survey as Discussed in Section 3.3.4.2	173
Appendix D - SPSS Output Demonstrating Factor Analysis of Organisational Climate Survey Results.	179
Appendix E - Tabulated Results From Triangulation.	185

LIST OF TABLES

TABLE 1: SUMMARY OF THE GAPS WITHIN THEORY AND LITERATURE AND HOW THIS STUDY RESOLVES THESE	5
TABLE 2: DESCRIPTION OF HIGH LEVEL PROCESSES USED IN A PRODUCT DEVELOPMENT ENVIRONMENT AND THEIR CONSTITUENT METHODS.....	21
TABLE 3: SUMMARY OF GAPS WITHIN LITERATURE.....	55
TABLE 4: INTERVIEW PROTOCOL BASED ON INSTRUMENTS PROPOSED BY BOYCE & NEALE (2006).	68
TABLE 5: GROUPS INVITED TO PARTICIPATE IN SEMI-STRUCTURED INTERVIEWS.	75
TABLE 6: SEMI STRUCTURED INTERVIEW RESPONSE RATE.....	76
TABLE 7: BREAKDOWN OF SEMI-STRUCTURED INTERVIEW RESPONDENTS BASED ON DEMOGRAPHICS.....	76
TABLE 8: CODING STRUCTURE DERIVED FROM LITERATURE AND MODIFIED DURING INTERVIEW PROCESS.	78
TABLE 9: BREAKDOWN OF SURVEY RESPONDENTS BASED ON DEMOGRAPHICS.	79
TABLE 10: ORGANISATIONAL ARTEFACTS AND THEIR APPLICATION WITHIN STUDY.	86
TABLE 11: STATISTICALLY RELEVANT RESPONSES FROM DESIGN PROCESS SECTION OF THE SURVEY SHOWING DIFFERENCE BETWEEN MANAGEMENT AND NON-MANAGEMENT OPINIONS.	96
TABLE 12: STATISTICALLY RELEVANT RESPONSES FROM DESIGN PROCESS SECTION OF THE SURVEY SHOWING DIFFERENCE BETWEEN LESS THAN COMPANY AVERAGE TENURE AND MORE THAN AVERAGE TENURE OPINIONS.....	97
TABLE 13: SUMMARY OF PROCESSES AND METHODS EMPLOYED COMPARED TO DIRECTORS AWARENESS OF THEM.	99
TABLE 14: SUMMARY OF HOW HIDDEN RISKS EMERGED AS RECALLS, WHY THEY EMERGED AND DIRECTORS AWARENESS OF BOTH.	103
TABLE 15: STATISTICALLY RELEVANT AGGREGATED SCORES PER DIMENSION, COMPARING MANAGER, NON-MANAGER , LESS THAN AVERAGE TENURE AND GREATER THAN AVERAGE TENURE SCORES.	106
TABLE 16: SUMMARISING THE MANNER IN WHICH DIRECTORS HAVE INFLUENCED DESIGN AND RISK MANAGEMENT STRUCTURES, AND THEN ENSURED THEIR EFFECTIVENESS:	107
TABLE 17: AGGREGATED SCORES PER DIMENSION, COMPARING MANAGER, NON-MANAGER , LESS THAN AVERAGE TENURE AND GREATER THAN AVERAGE TENURE SCORES.....	111
TABLE 18: AGGREGATED SCORES PER DIMENSION, COMPARING MANAGER, NON-MANAGER , LESS THAN AVERAGE TENURE AND GREATER THAN AVERAGE TENURE SCORES.....	111
TABLE 19: AGGREGATED SCORES PER DIMENSION, COMPARING MANAGER, NON-MANAGER , LESS THAN AVERAGE TENURE AND GREATER THAN AVERAGE TENURE SCORES.....	112
TABLE 20: AGGREGATED SCORES PER DIMENSION, COMPARING MANAGER, NON-MANAGER, LESS THAN AVERAGE TENURE AND GREATER THAN AVERAGE TENURE SCORES.....	112
TABLE 21: SUMMARISING THE MANNER IN WHICH DIRECTORS HAVE CULTIVATED AN ORGANISATIONAL CLIMATE AND SOCIAL FACTORS THAT CONSTRUCTIVELY IMPACT ON GOVERNANCE STRUCTURES. ..	113
TABLE 22: THE 6 RISK MANAGEMENT MISTAKES PROPOSED BY TALEB ET AL. (2009), CROSS REFERENCED TO DATA DEMONSTRATED IN STUDY.....	129

List of Figures

FIGURE 1: GRAPHIC REPRESENTATION OF A GENERIC PRODUCT DEVELOPMENT PROCESS SHOWING TYPICAL AND SIMPLISTIC VIEW OF RISK MANAGEMENT.	23
FIGURE 2: SIDE VIEW OF A ROD OR SHAFT ABLE TO ENTER A HOLE IN A PIECE OF METAL DUE TO SUFFICIENT GAPS. THE DIAMETER OF A HAS A TOLERANCE OF X, THE DIAMETER OF THE HOLE (B) HAS A TOLERANCE OF Y.	28
FIGURE 3: SITUATION 1: COLLISION BETWEEN PARTS CAUSED BY A LARGE ROD AND/OR A SMALL HOLE. (I.E. X BEING TOO LARGE AND/OR Y BEING TOO SMALL.)	28
FIGURE 4: SITUATION 2: EXCESSIVE GAP BETWEEN PARTS CAUSED BY A LARGE HOLE AND/OR A SMALL ROD DIAMETER. (I.E. TOLERANCE Y BEING TOO LARGE AND/OR TOLERANCE X BEING TOO SMALL.).....	29
FIGURE 5: SITUATION 3: COLLISION BETWEEN PARTS CAUSED BY ROD DIAMETER ENLARGEMENT AND/OR A SHRINKING HOLE AFTER ROD INSTALMENT. (I.E. TOLERANCE X BEING TOO LARGE AND/OR TOLERANCE Y BEING TOO SMALL.).....	29
FIGURE 6: DEMONSTRATING THE RELATIVE LOCATION OF ROD DIAMETER DISTRIBUTIONS, THE LOCATION OF AN UNKNOWN DEFECT ZONE.....	32
FIGURE 7: A GRAPHICAL REPRESENTATION OF A GENERIC PDP DEMONSTRATING THE PHENOMENA, ORGANISATIONAL CLIMATE AND GAPS WITHIN LITERATURE LEADING TO STUDY'S RESEARCH QUESTIONS.	51
FIGURE 8: FIGURE OF THE GROUPS AND LAYERS WITHIN THE RESPONDENT ORGANISATION.	64
FIGURE 9: SAMPLE WORD CLOUD EXTRACTED FROM NVIVO.....	80
FIGURE 10: THE CYCLIC MANNER IN WHICH SPECIFIC ORGANISATIONAL CLIMATE CHARACTERISTICS, SUPPORT SOCIAL PHENOMENA TO TRANSITION KNOWN RISK TO UNKNOWN-UNKNOWN RISK.	118
FIGURE 11 PROPOSED WHIRLPOOL MODEL DEMONSTRATING RECALL RISK GOVERNANCE OPACITY CONCEPT DEVELOPED WITHIN THIS STUDY.	137

Synopsis

Company directors are obliged to ensure effective operational risk management governance to protect shareholder wealth. Product recalls are a risk to profitability (Davidson and Worrell 1992). This study adopts a broad conceptualisation of *product recall*, involving the return of products due to fault/ defects. “Product recall” may include formal recalls enforced and recorded by regulatory bodies, informal recalls that may be initiated by a company but not recorded as such and/ or return of products by customers due to defects.

Not all risk can be foreseen, which is aptly referred to as unknown-unknown risks (Dombret 2012). Design methods impact product reliability and safety. Some methods, such as tolerance analysis (Singh, Jain and Jain 2003), may comply with company standards as defined by management, but still create unreliable product.

Thus, the research problem pertains to the ubiquitous presence of unknown-unknown risks of product recall due to unknowingly inadequate product design processes, reporting structures and potentially incompatible organisational climate that creates an impediment to directors in the fulfilment of their legal obligations to ensure effective operational risk governance.

By evaluating a typical case, this study will adopt a holistic approach starting with directors and their evaluation of their company’s risk management structures, methods, internal controls and risk management climate. Agency theory, whistle blowing, bounded rationality, and other theories will underpin the investigation. This facilitates an exploration of directors’ understanding of product recall risks and how they ensure their company employs suitable operational risk governance and product design methods in mitigating unknown-unknown risks.