

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
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**THE EFFECT OF ORGANISATIONAL CULTURE AND ORGANISATIONAL
STRUCTURE ON PRODUCT COMMERCIALISATION BEHAVIOUR AT
BUILDING AND ROAD RESEARCH INSTITUTE (BRRI)**

By

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DECLARATION

I Winifred Prempeh, hereby declare that this submission is my own work towards the award of Masters of Business Administration and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of University, except where due acknowledgement has been made in the text’.

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DEDICATION

With much passion I dedicate this thesis first and foremost to GOD Almighty for his guidance and protection throughout the course. Secondly, I dedicate this work to my mom and dad (of blessed memory), whose pieces of advice have kept me this far.

To my children Lloyd Boateng Antwi, Sally Nana Pokuaa Boateng Antwi and Eugene Nana Prempeh Boateng Antwi

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ABSTRACT

Product commercialisation since its introduction in 1995 at BRRI as a result of dwindling government subvention has not made the needed impact it deserved. This study therefore sought to assess the effect of organisational culture and organisational structure on product commercialisation behaviour at Building and Road Research Institute (BRRI). A sample size of hundred and five (105) staffs including management was selected and self-administered with questionnaire using non-probability sampling technique with emphasis convenient sampling. On organisational culture and product commercialisation behaviour at BRRI showed that on an average the respondents did not agree that it received the needed attention it deserved at BRRI with $t(101) = 51.442$, and $p < 0.05$. Again the study revealed that management should get all employees to become committed to their work, feel a sense of ownership, and have input especially R&D and Marketing departments. The consistency trait gave out a $t = 38.750$, $df = 101$, (2-tailed) or the $P\text{-value} < .000$ and a mean difference of 3.252 meaning that on an average most of the respondents did not agree that it received the needed attention it deserved. Therefore, BRRI should have a “strong” culture that is highly consistent, well coordinated and well integrated as far as organisational structure and product commercialisation behaviour is concerned. BRRI should pay attention to adaptability trait like organisational learning, scan their external environment well and respond to the ever-changing needs of its customers and other stakeholders, and be more proactive in dealing creating change and organisational learning issues. The study recommended that BRRI should build its internal capacities in machinery and equipments to address customer-oriented, innovation oriented and competitor-oriented behaviours.

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CHAPTER ONE

GENERAL INTRODUCTION

1.0 Background of the Study

The past three decades has seen the growth in the establishment of Research and Technology Organizations (RTOs) in many developing countries. Originally, these RTOs were mostly structured to function alongside other state-owned parastatals as fully government subsidised agencies. As such, they operated as state-controlled non-profit making agencies, mostly offering free products and services to Small and Medium Enterprises (SMEs). Starting from the mid 1980s, however, the orientation of these RTOs as fully subsidized government agencies started to change. Along this line of change, most of them experienced technological transformations in a bid to provide them with the capacity to start generating supplementary income to cater for the reduction in the level of government subsidy they receive to support their operations. The rationale behind the changed images of the RTOs is related to the fast-changing environment in most developing countries due to economic recession with capital taking a higher surplus of wealth. As it is noted in an Asian Development Bank (2001) report, the privatization of public sector enterprises in most developing countries has been a recurrent theme on the international development agenda since the early 1980s. Assistance for this purpose from international aid agencies has been cautious, placing priority first on supporting stabilization programmes and improving existing operational efficiencies. Assistance has also taken the form of technical and financial support for institutional strengthening, enhancing autonomy, and price reforms. The consequence of this was that most

governments in the developing countries were compelled by institutions⁶ such as the World Bank and other international donor agencies to pull back from their roles as the redistributors of income. This development led to key aspects of the economies of most developing countries being reformed to align with the free and competitive market economy paradigm. In this regard, as noted by Davis et al. (2000), the concept of enterprise was promoted in these developing economies and these were marked by the privatisation and deregulation of government agencies.

The consequences of these reductions in subsidies were the emergence of continued pressure from governments for the RTOs to become self-income generating. This situation resulted in most developing countries making several efforts to improve the technology capacity of their RTOs. This was based on the conviction that the RTOs would possess the ability to provide effective services and products to potential clients, and hence be able to generate an equivalent income to compensate for the cuts in government's financial support to them. With this, the Council for Scientific and Industrial Research (CSIR) in Ghana was asked to commercialize, as a result of the significant reductions and future withdrawal of subvention they were receiving from the government. These efforts towards commercialization were in response to the government's pursuance of an economic recovery programme (based on the free market concept) in the mid 1990s based on the advices of both the World Bank and the International Monetary Fund.

Product commercialization therefore is so important that currently many research and academic institutes have formalized commercializing technologies through offering consulting services and conducting research projects and the number of such consulting services centers is increasing by day in developed countries such that since 1980's until

now the number of technology transfer offices in America has increased from 25 to 200 offices (Dilcher, 2002).

According to Fetterhoff&Voelkel (2006), product commercialization is seen as the process that is recognized as playing a key in helping many institutions which hitherto were dependent on the government for their subventions for almost everything that has to be done. There is the growing need for most organisations to become self-reliant in terms of funding their own commercialization activities. It has become very necessary for stakeholders to pursue mind-set preparations to live up to the challenge in raising enough funds to supplement the subventions that come from the government.

The idea of commercialization by the Building and Road Research Institute (BRRI) under the Council for Scientific and Industrial Research (CSIR) started in 1995 as indicated in the 1995 strategic and Business Plan for the Institute which marked the first step towards conscious commercialization of activities in the Institute, with the dawn of commercialization of Scientific Research output in Ghana becoming a reality. The Institute's involvement in this process has given the end-users the rare opportunity of receiving a one-stop shop of efficient services of all the core competencies needed for effective human settlement infrastructure development.

In a dynamic business environment an effective commercialization process of innovation, meant to secure the survival of many businesses and to also provide benefits such as growth of turnover, higher profits and higher market share (Nevens et al. 1990).

In Ghana many state institutions are encouraged to embark upon commercialization so that they can raise funding for their activities. In the case of the Building and Road Research

Institute (BRRI) which is an appendage of CSIR is mandated to undertake research into all aspect of building and road design and construction industry to be more efficient safe and economical. Over the years the institute has geared its activities towards some guidelines for research commercialization under some critical conditions. The efficiency and effectiveness of the operations of the public Sector research Institutes is noted to be the most important considerations to promoting Science and Technology. The problem associated with such institutions is varied, but significantly the lack of attention given to income generation to ensure the viability of these institutions is noted, with the CSIR, of which BRRI is one of its institutes, is no exception of this problem.

To commence Product commercialization, the CSIR commissioned Messrs. John Young and Associates under CSIR-South Africa in September 14, 1994/95 to prepare Business Plan for BRRI's Commercialisation. In addition, a workshop organized by the CSIR Scientists, Private Sector agencies, Policy makers and Commonwealth Partnership for technology Management(CPTM) on the subject of Research and Development Commercialisation. The CSIR Institutes of which BRRI is part, built on the broad guidelines establish to develop its Manual for Research commercialization. The report analyzed the strengths, weaknesses opportunities and threats facing the institute and also indicated areas, which might be capitalized on the drive towards commercialization.

Finally, the BRRI undertook commercial activities in the past generating some revenue after the 1995 strategic and Business Plan for the Institute which marked the first step towards conscious commercialization of activities in the Institute, with the dawn of commercialization of Scientific Research output in Ghana.

According to Owusu-Adade J. & Ofiri-Attuahene J.B (2003), Commercialization in the BRRI therefore aimed at making the Institute to operate business-like and customer-oriented services, and establish the marketing possibilities of the existing products and services for enhanced private and public sector performance in the building and road sectors.

1.1 Problem Statement

Globally, the importance of product commercialisation of research institutions activities have been widely recognized (Candell & Jaffe 1999) as a critical components for national development from innovations. Product commercialisation is one of the major contributors to the generation and sharing of knowledge for policy direction within the nation.

Most often product commercialisation from research findings with Intellectual Properties that have commercial potential and numerous avenues for commercializing are however, often only small percentages of the product commercialisation output get commercialized; most are treated as just another academic exercise. Thus, the challenge is the drive of the researchers into commercializing their research products to ensure that their product commercialisation do not end up as publication of findings only, but rather flows continuously into commercialisation which requires the creation of commercialisation behaviours. One of the things that distinguishes one institution from the other is its culture and it is most often seen as one of the major constraints as managers' exercise their discretion in an organization, Mullins (2006).

In an institution where there is a strong culture, the workers or people within the institute are at liberty to share their views and values meant for the betterment of the institute and

also become an environment in which people thrive and learn. This strong culture again encourages transfer and sharing of knowledge through effective communication among members of the organisation leading to creativity and innovation. Organizational culture and organisational structure therefore plays a major role thus; management has to handle them properly towards its product Commercialisation (Ahmed, 2012).

The Building and Road Research Institute since its inception of its product commercialization activities in 1995, had been charged to raise enough revenue to supplement government subventions, however, it has not been able to make the needed impact in fulfillment of this requirement. The declining trends in donor support underscore government's concern, for the generation of additional resources by state institutions where BRRI is not exempted to supplement the direct government funding.

The study therefore sought to investigate how organisational cultural dimensions and Organisational structural dimensions affect product commercialisation behaviour in terms of competitor-oriented behaviours, Customer-oriented behaviours, Innovation-oriented behaviours and communication-oriented behaviours at the Building and Road Research Institute as a case study.

1.2 Objective of the Study

The main objective of this research is a case study of CSIR-BRRI conducted to understand and evaluate the effect of Organisational Culture and Organisational Structure on Product Commercialisation Behaviour at Building and Road Research Institute (BRRI) under the CSIR of Kumasi and to determine the way forward. This is based on the conviction that CSIR-BRRI possesses the ability to provide effective services and products to potential

clients, and hence should be able to generate an equivalent income to compensate for the cuts in government's financial support or subvention to the institute.

For the objective of this thesis a conceptual model was built which showed the relationship between Organisational culture, organisational structure and product commercialisation behaviour. The specific objectives designed for this study were meant to:

- a. Assess which organisational culture dimensions affect product commercialisation behaviours and in what ways.
- b. Determine which organisational structure dimensions influence product commercialisation behaviours and in what ways.

1.3 Research Questions

In order to achieve the above mentioned objectives of this study, the researcher sought for the views of respondents so as to answer the following key questions:

- a. Which organisational culture dimensions affect product commercialisation behaviours and in what ways
- b. Which organisational structure dimensions influence product commercialisation behaviours and in what ways?

1.4 Significance of the Study

The research is expected to have both theoretical implications and empirical implications including:

- a. Theoretical. From a theoretical perspective, this research will attempt to answer the question: how do organisational culture and organisational structure affect product

commercialisation behaviour of a company? After field work is done, the expected contribution of this research would be the validation of the theoretical model and hypotheses.

- b.** Empirical. From a practical perspective, this research is expected to indicate ways to improve product commercialisation behaviour, that is, to increase the success rate and reduce the failure rate of the product commercialisation behaviour in BRRI Institute of Kumasi. After the field work is done, this research is expected to contribute to the development of recommendations and strategy guidelines for the base line directors, managers and junior staffs of BRRI Institute of Kumasi, taking into account the context of the Institute.

1.5 Overview of Research Methodology

In order to gather the needed information useful for the analysis of data and to make effective recommendations after an assessment on the effect of Organisational Culture and Organisational Structure on Product Commercialisation Behaviour at Building and Road Research Institute (BRRI) under the CSIR of Kumasi, desk and field research methods were used. The research methodology looked at the necessary processes pursued to achieve the objective of the study. It focused on the data collection, population, sampling procedures and sample size, research instruments, administration of questionnaires, data analysis and also looked at ethical issues together with a brief profile of the BRRI Institute of Kumasi.

1.6 Scope / Delimitation of the Study

The study was conducted within the framework of assessing the effect of Organisational Culture and Organisational Structure on Product Commercialisation Behaviour at Building and Road Research Institute (BRRI) under the CSIR of Kumasi.

The study was focused on the Building and Road Research Institute (BRRI) under the CSIR, Kumasi-Based Institute based on its significant role as far as product commercializations are concerned. The researcher hoped that the result would reflect the true reflection of what pertains in the BRRI and CSIR forming good bases for generalization.

1.7 Limitation of the Study

The following were identified as limitations encountered during the study. They include; unwillingness of some staff and management of BRRI, Kumasi Based Institute to have enough time to share information with the researcher which could have enriched the study and to establish a strong validity and reliability.

Again, this research only focused on organisational culture and organisational structure and specifically used only certain dimensions of organisational structure and organisational culture which were related to product commercialisation.

The unit of analysis of this research is product commercialisation in BRRI institute under CSIR, instead of universities, companies or banks.

Finally, this research discusses product commercialisation behaviour from the business point-of-view and not from the product or scientific point-of-view.

1.8 Organization of the Study

The study is structured into five (5) chapters as follows: Chapter one is the introductory chapter and gives the background to the study, states the problem statement, objective of the study, research questions, and significance of the study, Overview of Research Methodology, Scope/delimitation of the study, limitation of the study and finally the Organization of the Study.

Chapter two is on the review of literature relevant to the study especially in the field of Strategic Management. Chapter three dealt with the specific steps, tools, and procedures employed to collect data needed to address the research problems. Chapter four was dedicated to the presentation and analysis of data collected and discussions made in relation to the field surveys and existing literature. Finally, Chapter five was the final chapter that captured the summary of findings, conclusions and recommendations from the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This section reviewed previous literature in order to provide basis upon which research is built to validate, compliment, counteract or establish any new trend that possibly might have emerged. This chapter on the literature review examined literature that is relevant to the research topic under discussion.

2.1 Related Definitions

2.1.1 Concept of Organisational culture

The word “Organisational culture” has been defined in various ways (Kroeber and Kluckhohn, 1963; Oreilly and Chatman, 1996; Sudarsanam, 2010. Schien, (1990) explained that this is based on the existence of ambiguity in the concept of organisation and the different understandings of what culture is (Brown (1995). The culture of an organisation according to Sudarsanam, (2010) can be defined as the embodiment of its collective systems, beliefs, norms, ideologies, myths and rituals. They can motivate people and can become valuable source of efficiency and effectiveness Davidson,(2003) also indicated that there can be a clear distinction made between those who think of culture as a metaphor which allows for the understanding of organisations in terms of other complex entities such as the machine and organism. In the view of Van de Post et al, (1998) others think of culture as an objective entity with personality. While there is no consensus on the components of organisational culture, most authors agree that it is: holistic, inter-subjective

and emotional rather than strictly rational (Christensen, and Gordon, 1999); historically determined and needs to be taught to new members as the “correct way” to perceive things (McGregor, 1960; Schein, 1990); related to anthropological concepts (McNamara, 2000); a collective phenomenon, socially constructed and shared by members of groups (Davis 1984; Segiovanni and Corbally 1984); primarily ideational in character, having to do with meanings, understandings, beliefs, knowledge and other intangibles which govern peoples’ lives and behaviour patterns (Kennedy, 1982; Kotter and Haskett, 1992; Pettigrew, 1979). The culture of an organisation is difficult to change since it forms the foundation for the organization’s management system (Ouchi (1981, Denison, 1990), provides meaning to the members of the organisation (Denison, 1990; Hofstede et al, 1990; Trice and Beyer, 1993) and outlasts organisational products, services, founders and leadership and all other physical attributes of the organisation (Schein 1992).

2.1.2 Models of Organisational Culture

Different organisational culture exists in literature. Famous among these models are Schein (1992), Kotter and Haskett (1992), Hofstede et al (1990), Cameron and Quinn (1999) and Denison (1990). Schein (1992) argue that culture exists at three successive levels. The visible of culture is its artefacts and creations, consisting of its constructed physical and social environment. At the next level down are the values that drive behaviours. The third level consists of basic underlying assumptions which evolve as solution to problem. Cameron and Quinn (1999) developed an organisational culture framework built upon a theoretical model called “Competing Values Framework”. This framework refers to whether an organisation has a predominant internal or external focus and whether it strives

for flexibility and individuality or stability and control. The framework is based on six organisational dimensions and four dominant culture types (i.e. clan, adhocracy, market and hierarchy).

2.2 The Importance of Product Commercialisation

According to OECD (2007), the Australian government extensively provide funding to support Research and Development activities. This funding is spent through the R&D activities of government laboratories and universities. Data from OECD (2007), shows that Australia's expenditure on R&D in 2007 was around 1.8 % of its gross domestic product. This percentage is lower than expenditure in Japan, the United States, and Canada, but higher than expenditure in New Zealand. However, it is believed that product commercialisation activities in Australia lag behind R&D activities compared to the same activities in US. Australia has an excellent research capability, but the commercialisation of the research results is less than might be expected. While Jones (2007, p.1) stated that there is little doubt that Australia's research capabilities are generally judged as world class on a global scale, he added that, However, the most frequently voiced problem is that too little of the research results in commercial products or services, or forms the foundation for the development of new dynamic growth firms. The report shows that Australia has a negative product balance of payments and lags behind Japan, United Kingdom and the United States. The performance of Australia's product commercialisation activities thus still requires improvement.

2.2.1 PRODUCT COMMERCIALISATION

2.2.1.1 Organisational Success Factors in the Product Commercialisation Process

Many organisational factors influence the product commercialisation success including: hiring and training of skilled scientists, engineers, managers and production workers (Brown, 1997); the organisational culture, core group expertise, core group drive / motivation (Davidson and Klofsten, 2003); team building processes, organisational structures, reward and penalty structures, human resources support (Large et al., 2000); putting someone in charge (Parker and Mainelli, 2001); excellent management in which a competent, balanced and motivated team of technical, commercial and management staff are assembled (Raine and Beukman, 2002); career experiences and research skills of inventors and the involvement of researchers in the process (Sharma et al., 2006); a skilled workforce (Singh, 2001); and high level of management support (Wonglimpiyarat, 2007).

From the many organisational factors above, organisational culture has been selected because it drives and motivates people in an organisation to have commitment and to work hard for developing innovative products and commercialising them. Organisational structure has also been selected because it relates to ways of organising the people in the organisation. Furthermore, it influences the flow of information sharing and the flow of decision-making in the organisation and influences the speed of decision-making as well as the scope of power, job description and resources (people) available. It also influences how people behave based on their positions as well as their job descriptions. Through organisational structure and culture, people become connected and cooperate to achieve their common goal.

2.2.1.2 Product Commercialisation Behaviours

Organisational behaviour refers to organisational members' work-related activities (Olson et al., 2005). In this research, organisational behaviours that have the potential to create superior performance in commercialisation behaviours are examined below:

- a. Customer-oriented behaviours.** Customer orientation is defined as the degree to which a firm focuses on getting closer to its customers to identify their desires in order to provide higher levels of quality of service and products (Koufteros et al., 2007, p. 471). Companies with a strong customer orientation pursue competitive advantage by placing the highest priority on the creation and maintenance of customer value to anticipate customer needs evolution and to respond to market change (Olson et al., 2005).
- b. Competitor-oriented behaviours.** Companies with a strong competitor orientation see competitive advantage as simply defeating the competition and their behavioural goal is to match, if not exceed, competitors' strengths (Olson et al., 2005).
- c. Innovation-oriented behaviours.** Deshpande and Farley (2004) defined innovativeness as being first to market, avoiding late entry and stable markets, and being at the cutting edge of technology. Companies with a strong innovation orientation build competitive advantage through radical or discontinuous innovations and enhance the likelihood of developing radically new products (Olson et al., 2005).
- d. Communication-oriented behaviours.** The “level of communication” is the degree to which vertical and horizontal communication is slow, difficult, and limited

versus fast, easy, and abundant (Nahm et al., 2003, p. 287). Communication is important as organisational members need to communicate to accomplish their tasks effectively and efficiently (Koufteros et al., 2007).

2.3 RELATIONSHIP BETWEEN ORGANISATIONAL CULTURE AND COMMERCIALISATION BEHAVIOUR

Organisational culture according to Schein (1999, p.7) is defined as: A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems. It has long been known that organisational culture impacts organisational performance and much of the literature has tried to analyse the relationship between organisational culture and behaviour. To investigate the relationship between organisational culture and commercialisation behaviour, organisational culture has been organised into three categories:

- a. *Organisational Culture Dimension.*** In some previous research, various researchers such as (Nahm et al. (2004), Koufteros et al. (2007), Gordon and Ditomaso (1992), Marcoulides and Heck (1993), Pothukuchi et al. (2002), Reynolds (1986), Tsamenyi (2002), Sengupta and Bushman (1998), Sin and Tse (2000)) the relationship between organisational culture dimensions and behaviour was investigated using a variety of organisational culture dimensions.
- b. *Organisational Culture Typology.*** Various papers (Balthazard et al. (2006), Corbett and Rastrick (2000), Deshpande and Farley (2004), Dwyer et al. (2003),

Øgaard et al. (2005), Rashid et al. (2003), Henri (2006), Rondeau and Wagar (1998), Mallak et al. (2003), Hartog and Verburg(2004), Bititci et al. (2006) and Joiner (2001)) explored the relationship between different types of organisational culture and commercialisation behaviour using organisational culture typology.

- c. ***Specific Aspects of Organisational Culture.*** Various papers focused on the relationship between specific aspects of organisational culture and performance: organisational error management culture (Dyck et al., 2005), market-oriented organisational culture (Homburg and Pflesser, 2000), temporal elements of organisational culture (Onken, 1999), informal organisational culture (Pyoria, 2007), and organisational learning culture (Skerlavaj et al., 2007).

This research used Denison's (1990) organisational culture dimensions which was further modified by Denison and Mishra (1995) which used four cultural traits to measure organisational culture (involvement, consistency, adaptability, and mission) with each trait consisting of three component indexes. These traits can be changed, flexible environment and also can have stability and a sense of direction which is necessary in the context of product commercialisation behaviours. Involvement and adaptability are also indicators of change, flexibility, openness and responsiveness, Denison and Mishra, (1995). The Mission and Consistency traits are indicators of stability and direction, Davidson,(2003). The Denison's Model of Culture and Effectiveness (Denison, 1990) presents the inter-relations of an organisational culture, its management practices, its performances and its effectiveness.

2.3.1 The Denison's Model of Culture

The values and beliefs of an organisation give rise to a set of management practices, which are concrete activities usually rooted in the values of the organisation. These activities stemmed from and reinforce the dominant values and beliefs of the organisation. The model posits that there are *four* cultural traits: involvement, consistency, adaptability and mission as shown:

Figure 2.1: The Denison's Model of Culture and Effectiveness

Point of Reference	External	Adaptability	Mission
	Internal	Involvement	Consistency
		Change and Flexibility	Stability and Direction

Source: Davidson (2003:p49)

2.3.2 Involvement Trait:

Involvement Trait according to writers such as Becker, (1964; Lawler, 1996; Likert 1961)), is the degree to which individuals at all levels of the organisations are engaged in pursuit of the mission and work in a collaborative manner to fulfill organisational objectives. Employees are committed to their work, feel a sense of ownership, and have input. Organisations empower their people, build their organisations around teams and develop human capability at all levels. Involvement traits consist of building human

capability, team-effort, and ownership and responsibility. Below are the attributes of the cultural trait;

- a. Capability development:* The organisation continually invests in the development of employees' skills in order to stay competitive and meet ongoing business needs.
- b. Team orientation:* Value is placed on working cooperatively towards common goals to which all employees feel mutually accountable. The organisation relies on team effort to get work done.
- c. Empowerment:* Individuals have the authority, initiative, and ability to manage their own work. This creates a sense of ownership and responsibility towards the organisation.

2.3.3 Consistency Trait

Saffold (1988) defined Consistency as the organization's core values and internal systems that support problem solving, efficiency and effectiveness at every level and across organisational boundaries. Organisations also tend to be effective because they have "strong" cultures that are highly consistent, well coordinated and well integrated. The fundamental concept is that implicit control systems, based upon internalized values, are more effective means of achieving coordination than external control systems which rely on explicit rules and regulations (Pascale, 1985; Weick 1987). Behaviour is rooted in a set of core values, and leaders and followers are skilled at reaching agreement even when there is diverse point of views (Block, 1991). This type of consistency is a powerful source of stability and internal integration that result from a common mindset and a high degree of conformity (Senge, 1990). When agreement is lower than core values and coordination,

this tend to indicate that the organisation have good intentions, but may become unglued when conflict or differing opinions arise. The result is that nothing tend to get resolved and the same tend to arise time and time again.

2.3.4 Adaptability Trait

According to Denison, (1990), adaptability is the ability of the company to scan the external environment and respond to the ever-changing needs of its customers and other stakeholders. Organisations hold a system of norms and beliefs that support the organization's capacity to receive, interpret, and translate signals from its environment into internal behaviour changes that increase its chances for survival and growth. Kanter, (1983) also stated that, ironically, organisations that are well integrated are often the most difficult ones to change. These organisations are driven by their customers, risk-taking, learning from their mistakes and capability and experiences of creating change (Nadler1998, Senge 1990, Stalk1988). When customer focus is higher than creating change and organisational learning, this signifies that the organisation may be good at meeting their demands currently, but is unlikely to be planning for future customer requirement or leading customers to what they may want in the future. However, when organisational learning and creating change are higher than customer focus, there is indication that the organisation is good at recognizing the best practices and creating new standards in the industry, but has difficulty in applying their learning to their own customers.

The attributes of the adaptability trait are as follows:

Creating change: The organisation is able to create adaptive change. The organisation is able to read the business environment, quickly react to the current changes, and anticipate future changes.

Customer-focus: The organisation understands and reacts to the customer, and anticipates their future needs. It reflects the degree to which the organisation is driven by a concern to satisfy the customer.

Organisational learning: The organisation receives, translates, and interprets signals from the environment into opportunities for encouraging innovation, gaining knowledge, and developing capabilities.

2.3.5 Mission Trait

Mission is the degree to which the organisation and its members know where they are going, how they intend to get there and how each individual can contribute to the organisation's success. Successful organisations have a clear sense of purpose and direction that defines organisational goals and strategic objectives. They express the vision of how the organisation will look like in future (Mintzberg, 1987; Hamel & Prahalad, 1994). When an organisation underlying mission changes, changes also occur in other aspect of the organization's culture. When strategic direction, intent and vision are higher than goals and objectives, this indicated that the organisation may have a difficult time executing or operationalising its mission. There may be brilliant visionaries who have a difficult time translating dreams into reality. When goals and objectives are higher than strategic direction, intent and vision, this often indicates that the orgnisation is good at

execution but lacks a real sense of direction, purpose or long-range planning. The focus is usually a short term, bottom-line focus with little forward planning.

Thus, the four traits of Denison's Model of Culture and Effectiveness have been expanded by Denison & Neale (1996), Denison & Young (1999) as well as Fey & Denison (2003) to include sub-dimensions for each trait for a total of 12 dimensions. The following are the four main culture traits with their sub-dimensions:

- ***Involvement trait*** (*Attributes: capability development, team-orientation and empowerment*);
- ***Consistency trait*** (*Attributes: Core values, agreement and coordinated and integration*);
- ***Adaptability Trait***(*Attributes: creating change, customer focus and organisational learning*);
- ***Mission Trait*** (*Attributes: vision, strategic direction, and intent, and goals and objectives*).

2.4 RELATIONSHIP BETWEEN ORGANISATIONAL STRUCTURE AND COMMERCIALISATION BEHAVIOUR

Organisational structure is the way responsibility and power are allocated, and work procedures are carried out among organisational members (Koufteros et al., 2007; Nahm et al., 2003; Ruekert et al., 1985). According to Meijaard et al. (1985), organisational structure concerns work division and coordination mechanisms. Much research has already been done on the relationship between organisational structure and corporate performance

in which organisational structure is presented under three categories below:

- a. *Organisational Structure Dimension.*** Some papers (Jennings and Seaman (1994), Koufteros et al.(2007), Lin and Germain (2003), Meijaard et al. (2005), Nahm et al. (2003), Olson et al. (2005), Randolph et al. (1991)) discuss the relationship between structure at the organisational level and performance using various dimensions to represent organisational structure.
- b. *Organisational Structure Typology.*** Several papers (Ezzamel and Watson (1993), Ingham (1992), Weir (1995), Ivancevich and Donnelly (1975), Malone and Smith (1988), and Pleshko (2007)) have investigated the relationship between organisational structure and performance using different perspectives to represent organisational structure. They used organisational structure typology, instead of organisational structure dimension.
- c. *Specific Aspects of Organisational Structure.*** Several papers focus on the relationship between specific aspects of organisational structure and performance, as follows: matrix organization structure (Kuprenas, 2003; Laslo and Goldberg, 2001), marketing organisation structure (Olson et al., 2005; Ruekert et al., 1985), and organisational communication structure (Visser, 2000). The literature review above makes clear that there is a gap which no previous research has investigated namely, the relationship between organisational structure and product commercialisation behaviour. Organisational structure has multiple dimensions and various researchers have used somewhat different organisational structure dimensions in their research. Among this variety of dimensions for organisational structure, the six most commonly discussed and also deemed relevant to this study

are described below. These dimensions have been selected since they may influence product commercialisation behaviour:

- a. *Centralisation/decentralisation.*** Centralisation refers to whether decision authority is closely held by top managers or is delegated to middle and lower level managers (Olson et al., 2005, p. 51). This definition aligns with Pleshko's (2007, p. 54) definition in which he refers to centralization as the degree to which the right to make decisions and control activities is concentrated.
- b. *Coordination.*** This dimension is selected based on Meijaard et al. (2005) who described coordination as the way companies organise day-to-day coordination between individuals and departments. They divided coordination mechanisms into personal coordination and impersonal coordination.
- c. *Formalisation / standardisation.*** Formalisation can be defined as the extent to which an organisation uses rules and procedures to prescribe behaviour such as the details on how, where, and by whom tasks are to be performed (Pleshko, 2007, p. 54). Contrary to above definitions, Koufteros et al. (2007, p. 475) and Nahm et al. (2003, p. 286) define the nature of formalisation as the degree to which workers are provided with rules and procedures that deprive versus encourage creative, autonomous work and learning.
- d. *Integration.*** Level of horizontal integration is the degree to which departments and workers are functionally specialised (i.e., low level of horizontal integration) versus integrated in their work, skills, and training (i.e., high level of horizontal integration) (Koufteros et al., 2007, p. 475; Nahm et al., 2003, p. 287). Highly

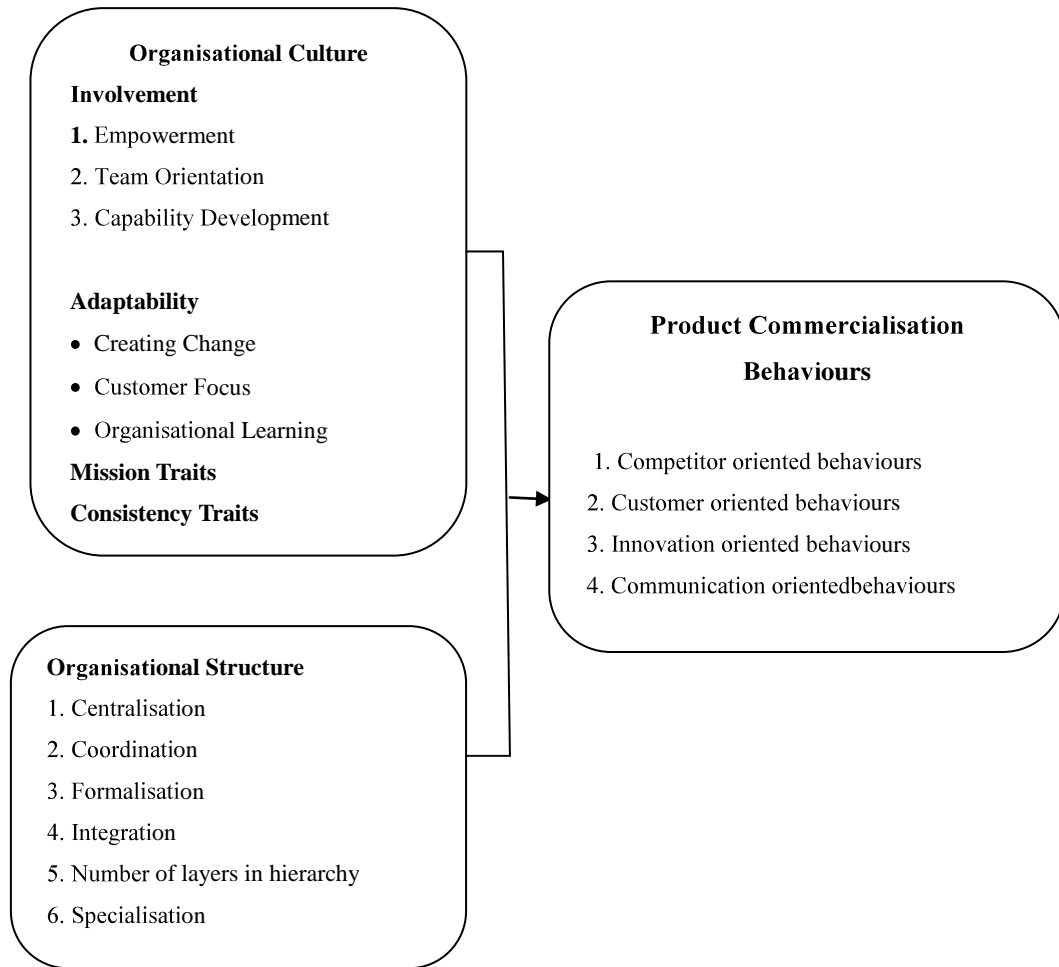
integrated companies allow contacts between the experts within each department and also with top level decision-makers (Pleshko, 2007).

- e. ***Number of layers in the hierarchy.*** Number of layers in the hierarchy is the degree to which organisation has many versus few levels of management, Koufteros et al., 2007, p. 475; Nahm et al., (2003, p. 286).
- f. ***Specialisation.*** Specialisation refers to the degree to which tasks and activities are divided in the organisation and the degree to which workers have control in conducting those tasks, Olson et al., (2005, p. 52). Meijaard et al. (2005) used specialisation to describe how tasks that involved task diversity and employee specialisation are distributed among company members.

2.5 THEORETICAL AND CONCEPTUAL FRAMEWORK

In Figure 1 below, the conceptual framework which will be used in this research is described. Appropriate organisational culture and organisational structure, dimensions are likely to influence product commercialisation behaviours. To describe organisational culture and organizational structure, dimensions are selected rather than typologies. The reason for this is that organizational dimensions are likely to give more detailed explanation on organisation than organizational typologies. From figure 2.2, the conceptual model was adapted from Wawan Dhewanto, Professor Micheal Vitale and Professor Amrik Sohal (www.anzem.org).Some hypotheses were drawn as presented by Figure 2.2 below.

Figure 2.2: Conceptual Framework for the Study



Source: Researcher Own Construct (August, 2016)

2.5.1 Organisational Culture and Product Commercialisation Behaviours

H1: Organisational culture can have an influence on product commercialisation behaviours. This hypothesis can be explained as follows:

- Empowerment.** The empowered employees tend to work harder and have more commitment to the company. Employees in the R&D department will work harder to develop good products. Marketing department employees will put their best

efforts into understanding the market and commercialising products that meet market needs.

- b. *TeamOrientation.*** In a team-oriented culture, employees from across departments work as a team to achieve company goals. Team-orientation will increase the exchange of information and communication among employees.
- c. *Capability Development.*** A company with a capability development culture views employee skills as an important factor in increasing the company's performance. Employee skill development will increase employee capability to understand customers and to innovate.
- d. *Creating Change.*** A culture of creating change is required to anticipate market change and technology change. These cultures will allow the company to handle customer and competitor change behaviour by adapting the products provided and the way the company runs its business.
- e. *Customer Focus.*** A company in which a customer-focused culture becomes its daily way of life will result in customer-oriented behaviour. In such a culture, most employees will believe that all business activities should be conducted to satisfy the customer.
- f. *Organisational Learning.*** An organisational learning culture is important to increase the innovation capability of a company. Learning from failures and mistakes can improve a company's innovation capability.

2.5.2 Organisational Structure and Product Commercialisation Behaviours

H2: Organisational structure can have an influence on Product commercialisation behaviours. This hypothesis is proposed based on the following explanation:

- a. ***Coordination.*** Good coordination will lead to intense communication among employees. Good coordination will also make it easier for employees to share information and have the same level of information regarding markets, competitors and customers.
- b. ***Centralisation.*** The innovation literature generally assumes that centralisation is negatively related to innovation, Damanpour, (1991). However, lines of communication and responsibilities which are relatively clear in centralised organisations generally cause implementation to be straight forward after the decision is made, Olson et al, (2005).
- c. ***Formalisation.*** Companies with fewer formal procedures (organic companies) encourage horizontal and vertical communication and tend to have a rapid awareness of, and response to market changes, Olson et al, (2005). However Koufteros et al. (2007) who define nature of formalisation as the degree to which employees are provided with rules and procedures that encourage creative, autonomous work and learning, argue that formalisation can be conducive in adapting to customer requirements.
- d. ***Integration.*** The level of horizontal integration has significant, direct and positive effects on the level of communication, Nahm et al., (2003). Horizontal integration will also increase information sharing among employees regarding market.

Collective and integrated actions by organisational members are suggested in order to respond to customer requirements, Koufteros et al., (2007).

- e. ***Number of Layers in Hierarchy.*** The number of layers in the hierarchy has significant, direct and positive effects on the level of communication, Nahm et al, (2003). Fewer numbers of layers in hierarchy improves responsiveness to market changes and makes the company react more effectively to customer change. Many companies would benefit by limiting the number of layers in the decision-making hierarchy to respond more flexibly to changing markets, and to provide value to customers, Koufteros et al., (2007).
- f. ***Specialisation.*** Specialists, in complex environments, are typically given substantial authority to determine the best approach to complete their tasks, enabling the organisation to respond rapidly to changes in its environment, Olson et al., (2005). Specialised employee in the R&D department will be able to contribute to product ideas and find a way to realise these ideas. Specialisation is also needed in marketing department so that the commercialisation team can handle customers and monitor competitors.

2.5.3 Product Commercialisation Behaviours

H3: Way that influence Product *Commercialisation behaviours*

This hypothesis is proposed based on the following explanation:

- a. ***Competitor-Oriented Behaviours.*** Knowing the competitor's products will help a company to improve its own products and give customers better products than the

competitors. Recognising the competitor's patents will also help determine the direction of a company's R&D, and determine the scope of a company's patents.

- b. *Customer-Oriented Behaviours.*** Companies that build customer-oriented behaviour and stay close to their customers can benefit through improved market positioning and company performance, Koufteros et al., (2007). The company will be able to fulfill market demand and to provide appropriate products for the appropriate market segment.
- c. *Innovation-Oriented Behaviours.*** The impact of innovation on company performance has been of interest to experts for decades and innovation has been linked empirically to company performance in the US and in China, Deshpande and Farley (2004). An innovative company can provide new products for customers when the old product is obsolete and can also make the product first to market.
- a. *Communication-Oriented Behaviours.*** Communication among departments within a company (R&D, production, marketing) is very important for increasing the success of technology or product commercialisation and for developing marketable products as soon as possible. The level of communication has a significant, indirect and positive impact on plant performance, Nahm et al, (2003).

CHAPTER THREE

METHODOLOGY AND PROFILE OF BRRI UNDER THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH (CSIR-BRRI)

3.1 Introduction

Under this chapter, the researcher discussed the research design, the population, and the sampling procedure of the study and further discussed the research instruments like data collection and analysis procedures and used statistical tools for analysis of the data obtained from respondents.

3.2 The Research Design

The study assessed the product commercialisation behaviour at Building and Road Research Institute (BRRI) in Kumasi under the CSIR. This involved a closer look at the effects of organizational culture and organisational structure on product commercialization behaviour within the BRRI. Against this background, a descriptive research design using the quantitative approach was chosen for the study. According to Fraekel & Wallen, (2003), a quantitative research design is the use of statistical methods of data analysis to study samples so that the findings can be generalized beyond the sample population.

In a descriptive research design of this kind, the collection of information included, data gathering techniques; the use of questionnaires which were self-administered and completed by respondents. The descriptive design was chosen because of its advantage of providing good response from a wide range of people for any given study. In addition to that, it also provided a meaningful picture of events and sought to explain people's opinion

and behaviours on the basis of data gathered at any point in time. Again, the descriptive design was used because it offers greater confidence with regard to particular questions of special interest or value of the researcher since in-depth follow-up questions can be asked on issues not clear to the respondent or the researcher.

The survey ensured that the questions answered used the descriptive research design with clarity and not misleading. The questionnaires was not culturally biased and was meant to address the objectives of the stud where necessary, they were reviewed and modified before been administered at BRRI Premises.

3.3 The Study Population

The target population for this study was all the staffs of the Building and Road Research Institute (BRRI) under Council for Scientific and Industrial Research (CSIR-BRRI) Kumasi Based- Institute comprising top management, senior staff, senior members and junior staff.

In examining the work of Young (2006), population is defined as the larger group from which individuals or items are selected to participate in a study. In other words, we can say that population is all the subjects a researcher want to study. Gill and Johnson (2002) stated that surveys are associated with research population which provides necessary information needed for answering the set research questions. Surveying from the entire population could be very expensive and require adequate time for data collection analysis. From the researcher's observations and judgment, the staff population for BRRI Institute is about two hundred and forty (240) which constitute the entire study population. The researcher chose to conduct the study with respondents from the institute because they are

available and helped the researcher to ascertain their views in relation to the study.

3.4 Sample size and Sampling Technique

A sample is a sub-group or representative selection of a population that is examined or tested to obtain statistical data or information about the whole population (Encarta Dictionary; Saunders et al 2007). Sampling on the other hand, is the process of selecting a group of people, items or cases to be used as a representative or random sample (ibid).

The limitation of this research were timeframe for this research, resource wise and other constraints, the researcher could not conduct the study with all the workers of the BRRI. A sample size of hundred and five (105) staffs and management was selected and self-administered with questionnaire. Where management include five (5) key top management staff of the Institute like the Director, Head Commercialisation Division, Production manager, Head of Research Scientists Association (RSA) and the Accountant to get more facts about the study. The researcher's justification for selecting the sample size was because, the researcher could not administer questionnaire on the entire study population. Therefore, the total sample size of 105 respondents of the BRRI was selected using non-probability sampling technique with emphasis on personal judgment or convenient sampling. This enabled the researcher to contact people who were prepared and willing and available to assist the researcher to carry out the study. This facilitated the research process and enabled the researcher gather appropriate and relevant data from respondent for the study.

3.5 Data Collection Methods

The research instruments used for the collection of data for this research work were questionnaire as shown by Appendix ('I'). The instruments was self-administered questionnaires delivered to the staff such as the senior members, senior and junior staff as well as the top management of BRRI respectively. The researcher adopted the suggestion by Bell (2005) and conducted pilot testing to find out how long the questionnaires took to complete and refine it to answer without any problem.

According to DeVas (2002), the technique of data of collection used in this research was a formally organized set of written items or questions presented in a uniform manner to a number of respondents to obtain responses from them on a specific subject matter or topic of study.

In designing the questionnaire for this study, the first part of the questionnaire captured the personal or demographic data of the respondents. This part included; the gender of respondents, their age distribution, educational / highest professional level, their current position, and the number of years they have worked with the BRRI in particular. The remaining parts of the questionnaires had questions designed on the main issues of the research objective.

The items on the questionnaires were closed ended question items and in many instances, the Five (5)-point Likert-Scale was used to further obtain information from the respondents. The scoring key for the Likert-Scale shows that; 1 = Strongly disagree, 2 =Disagree, 3 = Neutral, 4=Agree and 5 = Strongly agree as indicated in the questions under the Appendix.

3.6 Data Collection Procedure

Questionnaires were the main data collection techniques used for this study. These tools are meant to facilitate the data collection process. The researcher first obtained permission from the top management of the Institute which motivated respondents to freely and willingly avail themselves to assist the researcher more especially during the time of administering the questionnaires.

The questionnaires were self-administered through delivery and collection by the researcher whilst assuring them of their confidentiality stressing that this thesis was purely for academic purpose. Again, while the respondents responded to the items, the researcher was available to clarify any doubts so as to attain a high response rate.

The design of the questionnaires was such that it contains both closed-ended questions meant to further obtain relevant information from the respondents. The close-ended questions consisted of a list of items with alternative answers for respondents to decide on their choice of answers.

3.7 Data analysis procedure

The raw data obtained from a research is of no use unless it is transformed into information for the purpose of decision making (Emery and Couper 2003). The data analysis involved reducing the raw data into manageable size, developing summaries and applying statistical inferences.

Thus, the following steps were taken to analyse the data for the study. The data analysis was done after gathering the interviews and questionnaires from respondents. The observed data was transcribed and content analysis done. The researcher then looked at the emerging

patterns and made deductions in accordance with the purpose of the study at the time of developing there search plan. The questionnaire data was processed by editing, coding, classification and tabulation of the collected data to enable easy analysis of the information received from the field work. In order to ensure an effective analysis of the data, both qualitative and quantitative data collected from the field work were edited thoroughly before the analyses.

The coded data were then inputted into the computer for analysis using statistical software known as Statistical Package for Social Scientists (SPSS) as well as Microsoft spread sheet to organize the data into meaningful form. The Descriptive Analysis Unit of the SPSS was used to summarize the data, create appropriate tables, and graphs which facilitated the interpretation of the results and also provided answers to the various research questions as shown in chapter four.

3.8 Research Reliability

A reliable research is a study which is appropriate or fit to be relied on. It also shows that, the research work is dependable and gives the same or similar result on successive trials by another researcher. In this study, the researcher chosed a method for gathering data, that made the study more reliable. To achieve reliability the researcher first established rapport with some of the stakeholders in the study area like Staffs and Management of BRRI by visiting them on few occasions in their offices to gain information in relation to the study objectives. The participants of the questionnaires were additionally treated with diplomacy and the questions carefully administered so that it will not have any effect on their response and compared the different opinions of the respondents in order to do the analysis.

3.9 Ethical Considerations

In research work, ethical considerations are very important and were not overlooked when conducting the research work. This is because in carrying out the research work, the Institute was contacted before gathering the required data, analyses of the data and reporting the information gathered. As a result, this research involves an express moral approval from the respondents. In other words, a research work was subjected to approval to ensure that the research conforms to acceptable standards of conduct.

In this research work, the respondents willingly took part in the study though they had the right to withdraw from the research. Protection of confidential data given by identifiable respondents and their anonymity and reactions were well noted. A comprehensible account of the rationale and type of access required was provided.

3.10 Profile of Council for Scientific and Industrial Research (CSIR) and BRRI

3.10.1 Profile of Council for Scientific and Industrial Research (CSIR)

The Council for Scientific and Industrial Research (CSIR) is the foremost National Science and Technology Institution in Ghana. It is mandated to carry out Scientific and Technological Research for National Development. The Council was established in its present form by NLC Decree 293 of 10th October, 1968 and re-established by CSIR Act 521 of 26th November, 1996.

The CSIR has thirteen (13) CSIR Research Institutes are headed by Directors and semiautonomous Management Boards. The Institutes are:

1. Animal Research Institute, Accra;
2. Building and Road Research Institute, Kumasi;

3. Crops Research Institute, Kumasi;
4. Food Research Institute, Accra;
5. Forestry Research Institute of Ghana, Kumasi;
6. Institute of Industrial Research, Accra;
7. Institute for Scientific and Technological Information, Accra;
8. Oil Palm Research Institute, Kusi- Kade;
9. Plant Genetic Resources Research Institute, Bunso;
10. Savanna Agricultural Research Institute, Nyankpala, Tamale;
11. Science and Technology Policy Research Institute, Accra;
12. Soil Research Institute, Kwadaso, Kumasi;
13. Water Research Institute, Accra

3.10.2 Profile of Building and Road research Institute (BRRI)

The Building and Road Research Institute (BRRI) was established in 1952, as the WestBuilding and Road Research Institute under the Council for Scientific and Industrial Research- (CSIR-BRRI) was established in 1952, as the West African Building Research Institute (WABRI) in Accra to test imported building materials. In 1960, WABRI was renamed Building Research Institute (BRI), under the then Ghana Academy of Sciences. In 1963, (BRI) was relocated on the campus of the Kwame Nkrumah University of Science and Technology (KNUST) to offer its facilities and support to the University. In 1964, the Institutes mandate expanded to include road research; hence the name Building and Road Research Institute-(BRRI). It is one of the 13 Institutes of the Council for Scientific and Industrial Research. The Institute is currently located atFumesua, near Kumasi and has

over the years, carried out various assignments in research, development and consultancy to clients in the private and public sectors in Ghana and abroad.

Act of Establishment of BRRI

CSIR-BRRI was established under Act 521 of the Parliament of Ghana as one of the 13 Institutes of the Council for Scientific and Industrial Research (CSIR) in 1996. It is established to carry out research and development activities for the construction Industry.

Vision

“A centre of excellence that offers a one-stop service in the conduct of Research, Training and Technology transfer in the Construction and Transportation Sectors”.

Mission Statement

It has a Mission to: “Promote the conduct of Demand-driven and Problem-based research; provide Training and Technology transfer that links effectively to the Socio-economic Development of the country particularly the Building, Road and Transport industry.

Mandate

- To undertake research into all aspects of building and road design and construction with the view to ensure efficiency, safety and economy.
- To develop construction materials from local sources to reduce construction cost and make housing affordable.

Core Values

The core values BRRI are embedded in the acronym: Price:

P - Professionalism

R - Responsibility

I - Innovations

C - Collaboration

E - Excellence

Professionalism - BRRI can boast of its professional human resources in the building and Construction industry and we ensure that high sense of professionalism Permeates through all our activities.

Responsibility - The activities of the Institute impart a broader community of stakeholders, therefore, we act responsibly and accept responsibility of our actions.

Innovations - BRRI can boast of innovations as a result of constant research into building and roads for socio-economic development and national policy.

Collaboration - Our activities require partnership between various Divisions within the Institute as well as external stakeholders. We, therefore, uphold the principle of teamwork.

Excellence - Our commitment to excellence is reflected in constant research to improve our quality services. This is evidenced in the conduct of research, training, investment in technology and staff capacity building to sustain the objective. These set of values are underlined by the philosophy of HARD WORK, WORTH A PRICE.

It has since then built up high profile core competencies for more efficient performance of the building and road sectors in Ghana. The Institute's experts have played comprehensive roles in Research and Consultancy Services in:-

- a) Analysis of Construction Materials
- b) Construction Supervision
- c) Construction Management
- d) Cadastral and Topographical Surveys

- e) Engineering and Route Survey & Design
- f) Environmental Impact Assessment & Management
- g) Geographic Information System(GIS) applications
- h) Hydrographic Surveys
- i) Mine Surveys
- j) Material Development and Construction Technologies
- k) Roads, Transport and Accident Management and Analysis
- l) Training of Artisans & Contractors and
- m) Valuation Services.

BRRI Products includes:

- 1. PozzoMix Cement
- 2. Pozzolana Cement
- 3. Clay Burnt Bricks
- 4. Clay Paving Bricks
- 5. Cladding Tiles

Personnel Available

The BRRI can call on highly competent chartered professionals of more than 70 permanent engineers, technicians and other relevant supporting staff; experts are available as follows:

Engineers: Civil/Structural	10
Engineers: Geotechnical/Materials	15
Engineers: Geodetic	5
Engineers: Highway/Transportation	10

Architects	6
Quantity Surveyors	8
Planners: Urban/Development/Demographic.....	2
Sociologists	1
Economists	1
Environmentalists	2
Specialists in data processing/information	8
Marketing specialists	2

These professionals are from BRRI's five (5) technical divisions-thus Materials development, Construction, Traffic and Transportation, Structures, Design and Planning, and Geotechnical engineering. In addition, BRRI has three (3) non- technical divisions as Administration, Finance and Commercialization and Information Divisions.

CHAPTER FOUR

ANALYSIS, PRESENTATION AND DISCUSSION OF DATA

4.0 Introduction

This chapter presents the analysis and discussion of the empirical data of this study. The data obtained using the research instruments are analyzed and presented in the form of frequency tables and figures. The researcher further discussed the findings of the study and related it to the existing literature of the study. The sample population for the study was 105 comprised of Junior and Senior Managers of BRRRI of CSIR who were administered with questionnaire.

Out of the 105 questionnaires administered, there were 102 respondents who responded to the questionnaire giving a response rate of 97%. This is because the researcher could not retrieve the entire questionnaire from the respondents.

4.1 Personal Data of Respondents

This section presents the findings of the field research with respect to the demographic characteristics of the respondents of the survey. Areas of particular interest to the researcher under this section were the gender of respondents, age group of respondent, the Highest Educational or Professional Attainment of respondents and the number of years they have served with the organisation as presented by Table 4.1.

Table 4.1 Personal Data of Respondents

Variables		Frequency (N)	Percent (%)
Gender of respondents			
Valid	Female	32	31.4
	Male	70	68.6
	Total	102	100.0
Age group			
Valid	From 18-30 years	27	26.5
	30-39 years	42	41.2
	40-49 years	33	32.4
	Total	102	100.0
Highest educational or Professional Attainment			
Valid	Higher National Diploma	7	6.9
	First degree	48	47.1
	Masters level	42	41.2
	Others	5	4.9
	Total	102	100.0
Number of years Respondents Serve BRRI			
Valid	Between 1-3 years	16	15.7
	4-6 years	11	10.8
	7-9 years	26	25.5
	above 10 years	49	48.0
	Total	102	100.0

Source: Field survey, 2016

Both males and female across different age categories were included in the sample. Males account for sixty nine (69%) of the total sample and the remaining 31% made of females. The Table above is a more graphic representation of that. The age distribution was quit balanced which provided a diversified feedback towards an enriched content. About 27% of the respondents were within 18-30 years, 41% of them were between 30-39 years and finally, 32% of the remaining respondents were between 40-49 years.

With regards to the highest educational or professional attainment of respondents, 7 of the respondents representing 6.9% indicated Higher National Diploma, 48 respondents made of 47.1% had First degree, 42 respondents made of 41.2% had Masters certificate, and 5 of the respondents made of 4.6% indicated others meaning that they had other certificates like

Construction Technician Course among others.

Concerning the number of years Respondents Served BRRI, 16 respondents made of 15.7% indicated between 1-3 years, 11 of them made of 10.8% stated 4-6 years, and 26 respondents also made of 25.5% indicated 7-9 years while 49 respondents constituting 48% stated that they have worked with BRRI for above 10 years.

The finding shows that sixty nine (69%) of the total sample were Males and the remaining 31% were females. Out of which 41% of them were between 30-39 years, and 32% of the respondents were between 40-49 years where 47.1% of them had First degree, 41.2% had Masters Certificates while 6.9% of them were Higher National Diploma holders. In addition to that, 48% of them have worked with BRRI for above 10 years followed by 25.5% of them who worked with BRRI between 7-9 years.

4.2 Organisational Culture and Product Commercialisation Behaviour at BRRI

This section deals with organisational culture traits such as involvement trait, consistency trait, adaptability trait, mission trait of BRRI in order to ascertain the relationship between organisational culture and product commercialisation behaviour at BRRI as presented.

Table 4.2 One-Sample Statistics of Organisational Culture and Product Commercialisation Behaviour at BRRI

Organisational Culture Variables	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Involvement Trait	51.442	101	.000	3.428	3.296	3.560
Consistency Trait	38.750	101	.000	3.252	3.085	3.418
Adaptability Trait	45.396	101	.000	3.522	3.368	3.676
Mission Trait	43.332	101	.000	3.399	3.244	3.556

Source: Field survey, 2016

Looking at the One-Sample Statistics, Involvement Trait appear to have $t=51.442$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.428. This means that in terms of organisational culture and product commercialisation behaviour at BRRI, involvement seem to play a major role in the organisations Product Commercialisation process and on an average the respondents did not agree that it received the needed attention it deserved with $t(101)= 51.442$, and $p< 0.05$.

One could conclude that the management of BRRI are aware of the Involvement Trait and how it would help in the product commercialisation behaviour at BRRI such as; Employees should be committed to their work feel a sense of ownership, and have input, the organisation should empower their employees and build the organisation around teams whose capabilities are developed at all levels, the organisation continually invests in the development of employees' skills in order to stay competitive and meet ongoing business needs, the organisation relies on team effort to get work done, individuals within the organisation have the authority to manage their own work by helping individuals to have the initiative power to manage their own work, that there is a sense of ownership by

employees towards the organisation, and that there is a sense of responsibility by employees towards the organisation.

The results also showed that in terms of human capacity development under involvement trait, most of the employees in BRRI have enrolled in further academic studies to enable them fit the important positions in the organisation to put them in the place of decision making. For example, many are pursuing courses at Bsc, MBA and PhD thus secretaries with HND are now enrolled in Degree courses without sponsorship but rather soft loans with flexible repayments.

Again, under ownership and responsibility, with the sensitization of employees by management of CSIR-BRRI at durbars and other for as on the Government current policy on how the institute should generate its own Internally Generated Funds (IGF) due to dwindling amount of Government subvention, now every staff is challenged to be part of the commercialisation of both products and services of the institute to enable sustainability. For example staffs are charged to do mouth-to-mouth promotion of products and motivation packages have also been instituted to staffs that helped in marketing or selling the institutes products.

The finding on the involvement trait supports Lawler, (1996), that involvement trait deals with the degree to which individuals at all levels of the organisations are engaged in pursuit of the mission and work in a collaborative manner to fulfill organisational objectives. Employees are committed to their work, feel a sense of ownership, and have input. Organisations empower their people, build their organisations around teams and develop human capability at all levels.

Considering Consistency Trait it registered a $t=38.750$, $df=101$, (2-tailed) or the P-value $<.000$ and a mean difference of 3.252. The result meant that as far the organisation is concerned as an organisational culture and product commercialisation behaviour at BRRI, the respondents on an average did not agree that it received the needed attention it deserved with $t(101)=38.750$, and $p< 0.05$ and a mean value of 3,252. It could deduced that, to address this situation the organisation should have a “strong” culture that is highly consistent, well coordinated and well integrated as far as organisational culture and product commercialisation behaviour is concerned.

The results under consistency trait disagree with Block, (1991) who indicated that organisations with this behaviour is rooted in a set of core values, where leaders and followers are skilled at reaching agreement even when there is diverse point of views.

With the adaptability trait, it had a $t=45.396$, $df=101$, (2-tailed) or the P-value $<.000$ and a mean difference of 3.522. This means that in terms of organisational culture and product commercialisation behaviour at BRRI, involvement seem to play a major role in the organisations product commercialisation process adaptability trait had a significant relationship with regards to that where $t(101)= 45.396$, and $p< 0.05$.

The results under adaptability trait showed that to some extent BRRI scans the external environment and responds to the ever-changing needs of its customers and other stakeholders, holds a system of norms and beliefs that support its capacity and changes that increase the organisation chances for survival and growth, is good at meeting customers’ demands and current needs, and also understands and reacts to customers anticipated needs and supports Denison (1990) on the adaptability traits of organisations.

Again, concerning the mission trait of organisations, the results showed a $t=43.332$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.399. This means that even though mission trait plays a great impact in organisational culture and product commercialisation behaviour at BRRI, it was not on an average agreed by the respondents. This notwithstanding its enormous role in the organisations product commercialisation process such as by ensuring that; staffs know where they are going, and how they can contribute to success of the organisation, have a clear sense of purpose and direction for its goals and strategic objectives, and that the organisation should have brilliant visionaries who should not have difficult time translating their dreams into reality, and should also long-range planning in its product commercialisation process. It therefore meant that all the above points stated under mission trait had a significant relationship with regards to organisational culture and product commercialisation behaviour at BRRI where $t(101)=43.332$, and $p<0.05$.

The findings under the mission trait disagree with (Mintzberg, 1987; Hamel & Prahalad, 1994) that mission traits of an organisation expresses the vision of how the organisation will look like in the future and should be upheld by all employees of an organisation.

This finding explains current happenings in the organisation where the staffs are being made aware of where the organisation was going, and how they can contribute to its success with clear sense of purpose and direction for its goals and strategic objectives, encouragement of brilliant visionaries so that they would not have difficult time translating their dreams into reality, and long-range planning in its product commercialisation process.

4.3 Organisational Structure at BRRI

This section looked at some variables of organisational structure whether there is a relationship with product commercialisation behaviour at the Building and Roads Research Institute (BRRI) as discussed below.

Table 4.3 One-Sample Test of Organisational Structure at BRRI

Variables on Organisational Structure and Product Commercialisation Behaviour	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
1. Responsibility, power and work procedures are carried out among members	45.59	101	.000	3.46078	3.3102	3.6113
2. There is work division and coordination for all employees	41.18	101	.000	3.72549	3.5460	3.9050
3. Decision authority is closely held by top managers	52.50	101	.000	3.80392	3.6602	3.9476
4. Decision authority is closely delegated to middle and lower level managers	33.14	101	.000	2.90196	2.7282	3.0757
5. There is coordination between individuals and departments.	42.55	101	.000	3.57843	3.4116	3.7453
6. There are proper rules and procedures to prescribe work details on how, where, and by whom tasks are to be performed.	34.04	101	.000	3.53922	3.3330	3.7454
7. Workers are provided with rules and procedures that encourage creative and autonomous work and learning.	46.68	101	.000	3.38235	3.2386	3.5261
8. Departments and workers are functionally specialised as well as their work, skills, and training (i.e., high level of horizontal integration)	40.67	101	.000	3.48039	3.3106	3.6502
9. There is contact between the experts within each department and top level decision-makers	47.67	101	.000	3.95098	3.7866	4.1154
10. Tasks that involved diversity and employee specialisations are distributed among company members.	41.92	101	.000	3.60784	3.4371	3.7786

Source: Field survey, 2016

- a. Dependent Variable: Product commercialisation behaviour
- b. Independent Variables: Specialisation, Coordination, Layers In Hierarchy, Centralisation, Formalisation, Integration

Taking the point that responsibility and power and work procedures are carried out among organisational members into consideration, it generated a $t = 45.598$, p-value of .000 and a mean difference of 3.461. This meant that most of the respondents on the average did not agree to the variables as applicable in the Building and Road Research Institute (BRRI) even though it was a statically significant variable.

The point that there is work division and coordination mechanisms for all employees, recorded $t = 41.181$, p-value of .000 and a mean difference of 3.725 approximately 4.00 which showed that on the average most of the respondents agree that, There is work division and coordination mechanisms for all employees in BRRI.

On whether at BRRI, decision authority is closely held by top managers, a t-statistic value of 52.503 was recorded, p-value of .000 and a mean difference of 3.803 approximated to 4.00. This meant that on the average, most of the respondents agree that at BRRI, decision authority is closely held by top managers.

In determining whether decision authority is closely delegated to middle and lower level managers, it gave out $t = 33.135$, p-value of .000 and a mean difference of 2.902. It was clear from the results that most of the respondents disagree that decision authority is closely delegated to middle and lower level managers in BRRI.

There is coordination between individuals and departments recorded $t=42.547$, p-value of .000, and a mean difference of 3.578. This clearly showed that on the average, most of the respondents agree that there is coordination between individuals and departments. This finding could be attributed to the fact that BRRI should step efforts to ensure that there is coordination between individuals and departments in their product commercialisation process.

There are proper rules and procedures to prescribe work details on how, where, and by whom tasks are to be performed. This point gave out $t=34.044$, p-value of .000 and mean difference of 3.539. It meant that on the average, most of the respondents agree that at BRRI, there are proper rules and procedures to prescribe work details on how, where, and by whom tasks are to be performed.

Furthermore, the point on whether workers are provided with rules and procedures that encourage creative, autonomous work and learning gave $t = 46.680$, p-value of .000, and 3.38235 as its mean difference. The finding shows that on the average, the respondents did not agree that within the organisation, workers are provided with rules and procedures that encourage creative, autonomous work and learning.

Again, considering whether departments and workers are functionally specialised as well as their work, skills, and training (i.e., high level of horizontal integration), it recorded a $t = 40.666$, p-value of .000 and a mean difference of 3.480. as revealed by the study, it meant that on the average, most of the respondents agree that at BRRI, the departments and workers are not functionally specialised as well as their work, skills, and training (i.e., high level of horizontal integration).

In finding out, whether there is contact between the experts within each department and also with top level decision-makers, it gave out a $t = 47.675$, p-value of .000 and a mean difference of 3.951.

Finally, on whether responsibilities that involved tasks diversity and employee specialisations are distributed among company members, a $t = 41.919$ was recorded with p-value of .000 and a mean difference of 3.608. It meant that on the average, most of the respondents agree that at BRRI, responsibilities that involved tasks diversity and employee specialisations are distributed among company members.

The findings agreed with Koufteros et al., (2007) that organisational structure is the way responsibility and power are allocated, and work procedures are carried out among organisational members and also concerns work division and coordination mechanisms. This further confirms Pleshko (2007) who indicated that there is a relationship between organisational structure and organisational performance using different perspectives to represent organisational structure.

4.4 Organisational Culture Affects Product Commercialisation Behaviour at BRRI

The R square statistic in the model summary is sufficient for any necessary inferences of our study on how organisational culture affects product commercialisation behaviour at BRRI.

Table 4.4. a Model Summary on how Organisational Culture Dimensions Affects Product Commercialisation Behaviour at BRRI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.700 ^a	.490	.458	.72078

a. Predictors: (Constant), Organisational Learning, Capability Development, Creating Change, Customer Focus, Team Orientation, Employee Empowerment

The model summary shows an R squared statistic of 0.490 which is satisfactory. The results indicate that the model is statistically significant and we can rely on the model to explain how organisational culture dimensions affect product commercialisation behaviour at BRRI because there is a 49% chance that our finding is correct.

The ANOVA table below summarises the model used to explain how organisational culture dimensions affect product commercialisation behaviour at BRRI. The ANOVA table shows that the model is reliable ($F=15.219$, $P=0.000$).

Table 4.4. b ANOVA^a on how Organisational Culture dimensions Affects Product Commercialisation Behaviour at BRRI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.440	6	7.907	15.219	.000 ^b
	Residual	49.354	95	.520		
	Total	96.794	101			

a. Dependent Variable: Product Commercialisation behaviours.

- b. Predictors: (Constant), Organisational Learning, Capability Development, Creating Change, Customer Focus, Team Orientation, Employee Empowerment

The regression coefficients below indicate how Organisational Culture Dimensions Affect Product Commercialisation Behaviour at BRRI.

Table 4.4.c Regression Coefficients^a Organisational Culture Dimension On Product Commercialisation Behaviour at BRRI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.762	.568		6.621	.000
	Employee Empowerment	.259	.129	.256	2.015	.047
	Team Orientation	-.538	.097	-.606	-5.522	.000
	Capability Development	.513	.152	.402	3.367	.001
	Creating Change	-.509	.094	-.548	-5.435	.000
	Customer Focus	.694	.113	.625	6.112	.000
	Organisational Learning	-.329	.102	-.331	-3.233	.002

a. Dependent Variable: Product commercialisation behaviours

b. Independent Variables: (Constant), Organisational Learning, Capability Development, Creating Change, Customer Focus, Team Orientation, Employee Empowerment

The above Table 4.4.c above explains the regression test on how organisational culture dimensions can have an effect on product commercialisation behaviours.. The independent variables being employee empowerment, team orientation, capability development, creating change, customer focus, and organisational learning.

Considering the values of the Standardized Coefficients and taking employee empowerment into consideration, it is clear that a unit change in employee empowerment would cause 0.256 or 25% in relation to product commercialisation behaviour in BRRI and it is statistically significant with $p=0.047$. This means that BRRI must be proactive in dealing with most of their employee empowerment by ensuring that; employees are

empowered to work harder and become more committed to the organisation, Employees in the R&D department work harder to develop good products in this organisation and finally ensure that the marketing department is empowered towards understanding the market and commercialising products that meet the market needs.

The regression coefficient indicated that Team-orientation, the Standardized Coefficient value of ($\beta = -0.606$) shows that there is a negative relationship with product commercialisation behaviour. This means that BRRI must ensure and facilitate team building process to boost Product commercialisation.

In addition to that, with regards to CustomerFocus, the Standardized Coefficient value of 0.625 meant that a unit cause of about 63% of customer focus in relation to product commercialisation behaviour in BRRI and it is statistically significant where $p = .000$. To ensure this, BRRI must ensure their customer-focused culture has resulted in customer-oriented behaviour, and that employees should know that all business activities must be conducted with the aim to satisfy the customer in BRRI.

Again, the regression coefficient indicate that capability development has a positive relationship with product commercialisation behaviours, although not very strong ($\beta = 0.402$) as indicated by the beta coefficient. The p value is 0.001; this implies that there is no way that the relationship established happened by chance, in other words, the relationship between capability development and product commercialisation behaviours in BRRI is statistically significant.

Furthermore, with regards to creating change, the regression coefficient indicate that creating change has a negative relationship with product commercialisation behaviours,

although not very strong ($\beta = -0.548$) as indicated by the beta coefficient with a p-value of 0.000, this implies that there is no way that the relationship established happened by chance, in other words, the relationship between creating change and product commercialisation behaviours in BRRI is statistically significant.

Finally, on organisational learning it is clear that a unit change in employee empowerment would cause -33% in relation to product commercialisation behaviour in BRRI and it is statistically significant with $p = 0.002$. The p-value is 0.002 implies that there is no way that the relationship established happened by chance, in other words, the relationship between organisational learning and product commercialisation behaviours in BRRI is statistically significant.

The above findings on organisational culture agree with Schein (1999) who indicated that it is a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems. It has long been known that organisational culture impacts organisational performance and much of the literature has tried to analyse the relationship between organisational culture and behaviours. Therefore, the study investigate the relationship between organisational culture and product commercialisation behaviour.

4.5 Organisational Structure Affects Product Commercialisation Behaviours at BRRI

Table 4.5. a Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.735 ^a	.540	.511	.56091

a.Product CommercialisationBehaviours

b.Predictors: (Constant), Specialisation, Coordination, LayersInHierarchy, Centralisation, Formalisation, Integration

The model summary shows an R squared statistic of 0.540 which is satisfactory. The ANOVA table summarised below shows that the model used to explain how organisational structure dimensionsaffect product commercialisation behaviour at BRRI.The results indicate that the model is statistically significant and we can rely on it because there is a 54% chance that our finding is correct.

Table 4.5. b ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.131	6	5.855	18.610	.000 ^b
	Residual	29.889	95	.315		
	Total	65.020	101			

a. Dependent Variable: 4. Product commercialisation behaviours.

b. Predictors: (Constant), Specialisation, Coordination, LayersInHierarchy, Centralisation, Formalisation, Integration

Table 4.5.c Regression Coefficients of how Organisational Structure Affects Product Commercialisation Behaviours at BRRI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.746	.551		1.353	.179
	Coordination	.111	.089	.093	1.252	.214
	Centralisation	-.033	.072	-.035	-.455	.650
	Formalisation	-.381	.082	-.414	-4.663	.000
	Integration	-.074	.119	-.060	-.622	.536
	LayersInHierarchy	.631	.081	.584	7.794	.000
	Specialisation	.611	.094	.617	6.478	.000

- Dependent Variable: Product commercialisation behaviour
- Independent Variables: Specialisation, Coordination, LayersInHierarchy, Centralisation, Formalisation, Integration

Table 4.5 above explains the regression test on how organisational structuredimensions affect product commercialisation behaviours at BRRI. The independent variables being coordination, centralization/decentration, formalisation, integration, layers-in-hierarchy and specialisation.

The regression coefficient indicate that formalization had a negative relationship with product commercialisation behaviours, although not very strong (beta=-0.414) as indicated by the beta coefficient. The p value is 0.000, this implies that there is no is a clear relationship established which did not happened by chance, in other words, the relationship between formalisation and product commercialisation behaviours in BRRI is statistically significant.

Again, the regression coefficient for Layers-in-Hierarchy indicate that it has a positive relationship with product commercialisation behaviours, which is a strong relationship with ($\beta=0.584$) as indicated by the beta coefficient. The p-value is 0.000, showed that there was a clear relationship established which did not happened by chance, in other words, the relationship between Layers-in-Hierarchy and product commercialisation behaviours in BRRI is statistically significant.

Finally, the regression coefficient for specialisation indicates that it has a positive relationship with product commercialisation behaviours. This means is a strong relationship with ($\beta=0.617$) as indicated by the beta coefficient. The p-value is 0.000, and showed that there was a clear relationship established which did not happened by chance, in other words, the relationship between specialisation and product commercialisation behaviours in BRRI is statistically significant.

The above results on how organisational structure affects product commercialisation behaviours by the respondents confirms Koufteros et al., (2007) that organisational structure is the way responsibility and power are allocated, and work procedures are carried out among organisational members and it also concerns work division and coordination mechanisms.

4.6 Commercialisation Behaviours at BRRI

Table 4.6.a Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732 ^a	.535	.516	.60224
a. Predictors: (Constant), CommunicationOrientedBehaviour, CustomerOrientedBehaviour, InnovationOrientedBehaviour, CompetitorOrientedBehaviour				

The model summary shows an R squared statistic of 0.535 which is satisfactory. The ANOVA table above also summarises the model used to explain the behaviours of commercialisation at BRRI. The results indicate that the model is statistically significant because there is a 54% chance that our finding is correct.

Table 4.6. b ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.093	4	10.023	27.636	.000 ^b
	Residual	34.818	96	.363		
	Total	74.911	100			

a. Dependent Variable: Commercialisation behaviours

b. Predictors:

(Constant),CommunicationOrientedBehaviour,CustomerOrientedBehaviour, InnovationOrientedBehaviour, CompetitorOrientedBehaviour

The ANOVA table above also summarises the model used to explain how the independent variables such as Communication-oriented-behaviour, Customer-oriented-behaviour, Innovation-oriented-behaviour, and Competitor-oriented-behaviour affect commercialisation behaviours at BRRI. The ANOVA table shows that the model is reliable (F=27.636, P=0.000).

Table 4.6.c Regression Coefficients of Commercialisation Behaviours at BRRI

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.653	.274		6.034	.000
	CompetitorOrientedBehaviour	-.153	.120	-.188	-1.272	.206
	CustomerOrientedBehaviour	.681	.115	.677	5.931	.000
	InnovationOriented Behaviour	.799	.118	.811	6.782	.000
	CommunicationOriented Behaviour	-.626	.151	-.711	-4.154	.000

Source: Field survey, 2016

Dependent Variable: Product commercialisation behaviours

Independent Variables: Competitororiented behaviour, Customerorientedbehaviour, innovationorientedbehaviour, communicationorientedbehaviour, communicationorientedbehaviour

Table 4.6.c above explains the regression test on how commercialisation behaviours at BRRI. The independent variables are; Competitor-oriented-behaviour, Customer-oriented-behaviour, innovation-oriented-behaviour, communication-oriented-behaviour, and communication-oriented-behaviour.

The regression coefficient indicated that competitor-oriented-behaviour even though shows a relationship on how commercialisation behaviours affects product commercialisation performance at BRRI, it however had a negative relationship (beta=-0.188) as indicated by the beta coefficient. The p value is 0.206, this implies that there is no clear relationship meaning that competitor-oriented-behaviour did not show commercialisation behaviours in BRRI is statistically significant. This therefore shows that BRRI is not doing well with its competitor-oriented-behaviour and should ensure that; the organisation knows its

competitor's products and improved its own products to give customers better products than their competitors, and also know its competitor's patents which determine the direction and scope of its patents.

In addition to that, the regression coefficient for customer-oriented-behaviour at BRRI indicates that it has a positive relationship with how commercialisation behaviours at BRRI. It showed a strong relationship with ($\beta=0.677$) as indicated by the beta coefficient. The p-value is 0.000, which showed that there was a clear relationship established between customer-oriented-behaviour and commercialisation behaviours at BRRI is statistically significant.

The results on customer-oriented-behaviour agree with Koufteros et al., (2007) that companies that build customer-oriented-behaviour and stay close to their customers can benefit through improved market positioning and company output.

Again, the regression coefficient for innovation-oriented-behaviour indicates that it has a positive relationship with commercialisation behaviours at BRRI. This means is a strong relationship with ($\beta=0.811$) as indicated by the beta coefficient. The p-value is 0.000, and showed that there was a clear relationship established which did not happened by chance, meaning that there is a relationship between innovation-oriented-behaviours and commercialisation behaviours at BRRI which is statistically significant.

The findings agreed with Deshpande and Farley (2004) that an innovative company can provide new product for customers when the old product is obsolete and can also make the product first to market.

Finally, considering communication-oriented-behaviours of BRRI, the regression coefficient indicate that, it has a negative relationship with commercialisation behaviours at BRRI. This means it has a strong relationship with ($\beta = -0.711$) as indicated by the beta coefficient. The p-value is 0.000, and showed that there was no clear relationship between communication-oriented-behaviour and commercialisation behaviours at BRRI which is statistically significant.

The result supports Nahm et al, (2003) who indicated that communication among departments within a company (R&D, production, marketing) is very important for increasing the success of product commercialisation and for developing marketable products as soon as possible. The level of communication has a significant, indirect and positive impact on commercialisation behaviour. Therefore, BRRI must ensure that much attention is given to communication-oriented-behaviours to impact positively on Commercialisation behaviour.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of Findings

The finding on personal data of respondents showed that sixty nine (69%) of the total sample were males and the remaining 31% were females. Out of which 41% of them were between 30-39 years, and 32% of the respondents were between 40-49 years where 47.1% of them had First degree, 41.2% had Masters Certificate while 6.9% of them were Higher National Diploma holders. In addition to that, 48% of them have worked with BRRI for above 10 years followed by 25.5% of them who worked with BRRI between 7-9 years.

The findings on the first objective of the study on organisational culture dimensions and product commercialisation behaviour emerged that involvement trait had $t=51.442$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.428 meaning that in terms of organisational culture and product commercialisation behaviour at BRRI.

Even though involvement trait played a major role in the organisations Product Commercialisation process, however on an average the respondents did not agree that it received the needed attention it deserved at BRRI with $t(101)= 51.442$, and $p< 0.05$.

The results further revealed that the management of BRRI as part of their involvement trait policies should help employees to become committed to their work, feel a sense of ownership, and have input, and also empower their employees to build the organisation around teams whose capabilities are developed at all levels.

Again the study revealed that the organisation should continually invests in the development of employees' skills in order to stay competitive and meet ongoing business needs, and rely on team effort to get work done where individuals within the organisation have the authority to manage their own work.

Under ownership and responsibility, the study showed that employees of BRRI are sensitized at durbars and other for as on the Government current policy on how the institute should generate its own Internally Generated Funds (IGF) due to dwindling amount of Government subvention, where every staff is challenged to be part of the commercialisation of the organisations products and services.

The findings on Consistency Trait gave a $t=38.750$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.252 meaning that on an average the respondents did not agree that it received the needed attention it deserved. And to address this situation the organisation should have a “strong” culture that is highly consistent, well coordinated and well integrated as far as organisational culture and product commercialisation behaviour is concerned.

Concerning adaptability trait, it had a $t=45.396$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.522 meaning that on an average the respondents did not agree that it received the needed attention it deserved in terms of organisational culture and product commercialisation behaviours at BRRI.

The findings further showed that with product commercialisation and as part of adaptability trait BRRI scans the external environment and responds to the ever-changing needs of its customers and other stakeholders, holds a system of norms and beliefs that

support its capacity and changes that increase the organisation chances for survival and growth.

On the mission trait of organisations, the results showed a $t=43.332$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.399 meaning that even though mission trait plays a great impact in organisational culture and product commercialisation behaviour at BRRI, it was not on an average agreed by the respondents and therefore needed to be given the necessary attention.

This finding revealed that the current happenings such as cut in government subventions have made BRRI to realise the impact of its mission traits in the organisation and how it can contribute to its success with clear sense of purpose and direction for its goals and strategic objectives, encouragement of brilliant visionaries so that it would not have difficult time translating its dreams into reality, and long-range planning in its product commercialisation process.

Findings on the dimensions of the study on organisational structure and product commercialisation behaviour at Building and Roads Research Institute (BRRI) revealed that; Most of the respondents on the average did not agree that responsibility and power and work procedures are carried out among organisational members was applicable in the Building and Road Research Institute (BRRI). That there is work division and coordination mechanisms for all employees in BRRI with $t=41.181$, $p\text{-value}$ of .000 and a mean difference of 3.725 approximately 4.00.

On whether at BRRI, decision authority is closely held by top managers, majority of the respondents on the average agreed that at BRRI, decision authority is closely held by top

managers with a t-statistic value of 52.503, p-value 0.000 and a mean difference of 3.803 approximated to 4.00.

Majority of the respondents disagree that decision authority is closely delegated to middle and lower level managers in BRRI with $t=33.135$, p-value of .000 and a mean difference of 2.902. On whether there is coordination between individuals and departments on the average, most of the respondents agree that there is coordination between individuals and departments with $t=42.547$, p-value of .000, and a mean difference of 3.578. With regards to the point that there are proper rules and procedures to prescribe work details on how, where, and by whom tasks are to be performed it revealed that on the average, most of the respondents agree that at BRRI there are proper rules and procedures to prescribe work details on how, where, and by whom tasks are to be performed.

Furthermore, on the average, the respondents did not agree that within the organisation, workers are provided with rules and procedures that encourage creative, autonomous work and learning with $t=46.680$, p-value of .000, and 3.38235 as its mean difference.

Again, on whether departments and workers are functionally specialised as well as their work, skills, and training (i.e., high level of horizontal integration), it meant that on the average, most of the respondents agree that at BRRI having a $t=40.666$, p-value of .000 and a mean difference of 3.480.

In finding out, whether there is contact between the experts within each department and also with top level decision-makers, it gave out a $t=47.675$, p-value of .000 and a mean difference of 3.951 meaning that on the average, most of the respondents agree that at

BRRI there is contact between the experts within each department and also with top level decision-makers.

Finally, on whether responsibilities that involved tasks diversity and employee specialisations are distributed among company members, a $t = 41.919$ was recorded with p-value of .000 and a mean difference of 3.608. It meant that on the average, most of the respondents agree that responsibilities that involved tasks diversity and employee specialisations are distributed among company members.

Results on the involvement traits of the study sought to find out how organisational culture affects product commercialisation behaviour at BRRI showed that, BRRI must be proactive in dealing with their employee empowerment issues by ensuring that; employees are empowered to work harder and become more committed to the organisation especially those in the R&D department so as to develop good products in the organisation and also ensure that the marketing department is empowered enough towards understanding the market and commercialising products that meet the market needs. The study also revealed that BRRI must ensure that their customer-focused culture has resulted in customer-oriented-behaviour, and that employees should know that all business activities must be conducted with the aim to satisfy the customer in BRRI.

Again, the regression coefficient indicated that capability-development has a positive relationship with product commercialisation behaviours, although not very strong ($\beta = 0.402$) as indicated by the beta coefficient.

Furthermore, with regards to creating-change, the results showed that creating-change has a negative relationship with product commercialisation behaviours, although not very strong (beta=-0.548) with a p-value of 0.000.

Finally, on organisational learning it is clear that a unit change in employee empowerment would cause -33% in relation to product commercialisation behaviour in BRRI and it is statistically significant with $p=0.002$.

Results on the formalization of organisational structure affects product commercialisation behaviours at BRRI concludes that; the regression test on how organisational structure affects product commercialisation behaviours at BRRI showed that formalisation has a negative relationship with product commercialisation behaviours, although not very strong (beta=-0.414) as indicated by the beta coefficient. The p- value is 0.000 implies that the relationship between formalisation and product commercialisation behaviours in BRRI is statistically significant.

Again,the regression coefficient for layers-in-hierarchy indicated that it has a positive relationship with product commercialisation behaviours, in BRRI with (beta=0.584) as indicated by the beta coefficient and p value of 0.000 meaning that the relationship between layers-in-hierarchy and product commercialisation behaviours at BRRI is statistically significant.

Moreover, the regression coefficient for specialisation indicate that it has a positive relationship with product commercialisation behaviourshaving a strong relationship with (beta=0.617) as indicated by the beta coefficient p-value of 0.000, indicating that the

relationship between specialisation and product commercialisation behaviours in BRRI is statistically significant. With regards to the fifth objective that examined commercialisation behaviours at BRRI the following results were obtained.

The regression coefficient under competitor-oriented-behaviour gave a negative relationship with $\beta = -0.188$ and p value of 0.206 meant that BRRI is not doing well with its competitor-oriented-behaviour and should ensure that; the organisation knows its competitor's products and improved its own products to give customers better products than their competitors, as well as its competitor's patents.

In addition to that, the regression coefficient for customer-oriented-behaviour at BRRI indicates that it has a positive relationship between customer-oriented-behaviour and commercialisation behaviours at BRRI with a $\beta = 0.677$ and P-value = 0.000.

Again, the regression coefficient for innovation-oriented-behaviours showed a positive relationship with commercialisation behaviours at BRRI with a β coefficient of 0.811 and a p value of 0.000.

Finally, considering communication-oriented-behaviours of BRRI, the regression coefficient indicate that it has a negative relationship with commercialisation behaviours at BRRI with $\beta = -0.711$ and p value of 0.000.

5.2 Conclusions

It can therefore be concluded from the study that effective product commercialisation would bring a lot of benefit to BRRI, and they should therefore be mindful of this ensuring that efforts on their involvement trait get all employees to become committed to their work

from junior staffs to management level, feel a sense of ownership, and have input in the organisation which would yield good results in their product commercialisation behaviour. Again, the organisation should scan their external environment well and respond to the ever-changing needs of its customers and other stakeholders, and be more proactive in dealing with their employee empowerment issues.

Furthermore, the organisation should empower its employees to work harder and become more committed to the organisation especially those in the R&D and the marketing departments and also be more customer-focused by stepping up with their competitor-oriented-behaviours.

5.3 Recommendations

From the above findings and conclusions, the following recommendations have been made. The organisation should pay much attention to involvement trait such as employee empowerment, capability developemet and team-orientation because it plays a major role in the organisations product commercialisation behaviour. BRRI should get all employees to become committed to their work, feel a sense of ownership, and have input in the organisation which would yield good results in their product commercialisation behaviours. The organisation should also work with their capability development since it plays a great role on the product commercialisation behaviours. The Management of BRRI should encourage its employees in career development by continuously improving the Credit facilities such as soft loans for further studies for interested staff to access. Teamwork must be encouraged in order to increase synergy in the product commercialisation behaviours which will in effect translate into more innovations.

On the adaptability trait like creating change and organisational learning, BRRI should do more scan on the external environment and respond to the ever-changing needs of its customers and other stakeholders, hold a system of norms and beliefs that support its capacity and changes that increase the organisation chances for survival and growth. BRRI must see organisational learning as a way of repositioning itself by learning from past mistakes and failures. For instance, previously if BRRI was not advertising on Radio Stations but then were getting jobs, now the trend must change because of competition in the same market.

On how organisational culture affects product commercialisation behaviour at BRRI, the study recommended that, management of BRRI must be proactive in dealing with their employee empowerment issues by ensuring that; employees are empowered to work harder and become more committed to the organisation especially those in the R&D department. The organisation should also ensure that their customer-focused culture has resulted in customer-oriented behaviour, with all business activities within the organisation conducted with the aim to satisfy the customer.

The study also recommended that BRRI should consider their mission trait very important since it plays a great impact in organisational culture and product commercialisation behaviour. There is the need for management of BRRI to continue to sensitize its employees at quarterly durbars and monthly seminars on the Government current policy on how the institute should generate its own Internally Generated Funds (IGF) due to dwindling amount of Government subvention, and to challenge every staff to be part of the commercialisation behaviour of the Institute in the sale of products and services to achieve the aims, goals and objectives of the organisation.

The consistency trait gave out a $t=38.750$, $df=101$, (2-tailed) or the $P\text{-value}<.000$ and a mean difference of 3.252 meaning that on an average most of the respondents did not agree that it received the needed attention it deserved. The organisation should have a “strong” culture that is highly consistent, well coordinated and well integrated as far as organisational culture and product commercialisation behaviour. This is re-echoing the need for BRRI to realize how organisational structure dimensions play a pivotal role in product commercialisation behaviours.

With regards to how organisational structure affects product commercialisation behaviours at BRRI, it was recommended that the organisation should pay much attention to centralisation/dcentralisation, integration and coordination which is expected to have on competitor-oriented-behaviour by ensuring that; the organisation knows its competitor's products so that it can improve upon its own products to give customers better products than their competitors which would make BRRI become more competitive in their commercialisation behaviours. It was also recommended that responsibility and power and work procedures should be well received among organisational members within the Building and Road Research Institute (BRRI). Within the organisation, decision authority should be delegated to middle and lower level managers ensuring that there is coordination between individuals and departments.

In addition, the researcher suggests there is the need for Government to provide funding as a seed capital to improve commercialisation behaviour. This fund will be used to set up initial operations of product commercialisation. There is the need for the institute to reinvestment of proceeds from product commercialisation to build internal capacity of

production in terms of modern machinery and equipments to make product commercialisation very competitive. Furthermore, there is the need for government policy to create enabling business environment for ready market for Institutions undertaking product commercialisation. This will facilitate strategic linkages between public and even private institutions to trade among themselves to create worth in public institutions. Furthermore, there is need for high level of management support in the setting of priorities in decision-making, and promotion towards product commercialisation.

5.1.1 Recommendation for Further Research

The further research could expand the scope of the study to cover the other CSIR research institutions in Kumasi and the rest across the country to get the fair view of how organisational culture and organisational structure affect their product commercialisation behaviours. Also, the study could be conducted in other public and private institutions that undertake product commercialisation.

REFERENCES

- Ahmed, (2012).Product Commercialization Strategies in the development of regional bioclusters. *Journal of Product Innovation Management*, 25(2):129-142.
- Asian Development Bank (2001) report, the privatization of public sector enterprises. *Journal of Business Management*. Milwaukee: Jan 2003. Vol. 41, Iss. 1; p. 1 (26 pages)
- Becker, G.(1964). Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education.Columbia University Press, New York.
- Bell (2005), Development and Pilot Testing of a Novel Compensatory Cognitive Training Intervention for People with Psychosis. www.ncbi.nlm.nih.gov › *NCBI* › *Literature* › *PubMed Central (PMC)*
- Brownbridge Martin and Augustine Fritz Gockel (1996) Impact of Financial Sector Policies on Banking in Ghana.; ISBN 18564089 X
- Brow, A.D.(1995). Organisational culture.London: Pitman Publishing.
- Balthazard, P.A., Cooke, R.A., & Potter, R.E. (2006) Dysfunctional culture, dysfunctional organization. *Journal of Managerial Psychology*, 21, 709.
- Bititci, U.S., Mendibil, K., Nudurupati, S., Garengo, P., & Turner, T. (2006) Dynamics of performance measurement and organisational culture. *International Journal of Operations & Production Management*, 26, 1325.
- Brown, M. A. (1997). "Performance metrics for a technology commercialization program." *International Journal of Technology Management* 13(3): 229.
- Byrne, B.M., 2001, Structural equation modelling with AMOS: basic concepts, applications, and programming.

- Candell &Jaffe (1999) Product commercialisation within Research Institutions. *Journal of Product Innovation Management*, 25(2):134-140.
- Calori, R.& Sarnin, P (1991) Corporate culture and economic performance: a French study *Organisation Studies*, (12) 1, 49-74.
- Cameron, K. and Quinn, R.(1999)Diagnosing and changing organisational culture: Based on the competing value framework, Addison-Wesley, Reading MA.
- Christensen, E.W. and Gordon G.G., (1999)An exploration of Industry, Culture and RevenueGrowth,http://findarticles.com/p/articles/mi_m4339/is_3_20/ai_57816041
- Corbett, L. M. & Rastrick, K. N. (2000) Quality performance and organizational culture A New Zealand study. *The International Journal of Quality & Reliability Management*, 17, 14.
- Creswell, J.W. and Plano Clark, V.L., 2007, *Designing and conducting mixed methods research*.
- Damanpour, F., 1991. Organizational innovation: a meta-analysis of effects of determinants and moderators. *Academy of Management Journal* 34 3, pp. 555–590.
- Davidson, P., Klofsten, M., The business platform: Developing an instrument to gauge and to assist the development of young firms *Journal of Small Business Management*. Milwaukee: Jan 2003. Vol. 41, Iss. 1; p. 1 (26 pages)
- Davidson, M.G.(2003),”The Relationship Between Organisational Culture and Financial Performance in a South African Investment Bank”, Disertation, University of South Africa.
- Davis, S.(1984). *Managing corporate culture*.Cambridge, MA: Ballinger

- Delta (2002) Organisational form, ownership structure and corporate performance: A contextual empirical analysis of UK companies. *Journal of Technology Transfer*, 35(4): 401.
- Deal, T.E. and Kennedy, A.A.(1982). Corporate culture, Readings, MA: Addison-Wesley.
- Denison, D.R.(1990), "Corporate culture and organisational effectiveness". New York: John-Wiley.
- Denison, D.R. and Mishra, A.K.(1995), "Towards a theory of organisational culture and effectiveness" , *Organisational Science*, 6(2), 204-223.
- Denison, D.R. and Mishra, A.K.1998. Does organisational culture have impact on quality? A study of culture and quality in ninety-two manufacturing organisations. Presentational to the Academy of Management Convention, San Diego, CA, August 1998.
- Denison, D.R. and Neale, W.S.1996.Denison organisation culture and culture survey. Ann Arbor, MI:Aviat.
- Denison, D.R. and Young J.1999. Organisation culture and effectiveness: Validating a measurement model.Working paper.University of Michigan Business School.Gitman,L.J.(1991). Principles of Managerial fianance(6th ed.) New York.Harper Collins.
- Deshpande, R. & Farley, J.U. (2004) Organizational culture, market orientation, innovativeness, and firm performance: an international research odyssey. *International Journal of Research in Marketing*, 21, 3.
- Dilcher, K., (2002). The Commercialization of University Teaching and Research Through.

- DeVas (2002), An Overview of Quantitative and Qualitative Data Collection
https://www.nsf.gov/pubs/2002/nsf02057/nsf02057_4.pdf
- Dwyer, S., Richard, O.C. & Chadwick, K. (2003) Gender diversity in management and firm performance: The influence of growth orientation and organizational culture. *Journal of Business Research*, 56, 1009.
- Dyck, C. V., Frese, M., Baer, M., Sonnentag, S. (2005) Organizational Error Management Culture and Its Impact on Performance: A Two-Study Replication. *Journal of Applied Psychology*, 90, 1.
- Emery and Couper (2003). *Analysing the Data. Business Process Management Journal*, 4(2).
- Ezzamel, M., and Watson, R. (1993) Organisational form, ownership structure and corporate performance: A contextual empirical analysis of UK companies. *British Journal of Management* 4, 161.
- Fetterhoff T.J and Voelkel D.(2006), Managing open innovation in Biotechnology. *Research-Technology Management* 49(3), 14-18.
- Fraenkel, J. R. & Wallen, N. E. (2003). *How to design and evaluate research in education*. Fifth ed. New York: McGraw-Hill.
- Gordon, G.G. & Ditomaso, N. (1992) Predicting Corporate Performance from Organizational Culture. *The Journal of Management Studies*, 29, 783.
- Gill and Johnson (2002). *Sampling the Population for the Study*. McGraw Hill.
- Hamel, G., C.K. Prahalad. 1994. *Competing for the future*. Harvard Business School Press, Boston, MA.
- Hartog, D. N. D. & Verburg, R. M. (2004) High performance work systems, organizational culture and firm effectiveness. *Human Resource Management Journal*, 14, 55.
- Henri, J. (2006) Organizational culture and performance measurement systems.

- Hofstede, G. Neuijen, B., Ohayv, D. and Sanders, G. (1990). Measuring organisational cultures: qualitative and quantitative studies across twenty cases' *Administrative Science Quarterly*, 35, 285-316.
- Homburg, C. & Pflesser, C. (2000) A multiple-layer model of market-oriented organizational culture: Measurement issues and performance outcomes. *JMR, Journal of Marketing Research*, 37, 449.
- Ingham, H. (1992) Organisational structure and firm performance: An intertemporal performance. *Journal of Economic Studies* 19, 19
- Ivancevich, J.M., and Donnelly, J.H.J. (1975) Relation of Organisational Structure to Job-Satisfaction, Anxiety-Stress, and Performance. *Administrative Science Quarterly* 20, 272
- Jennings, D.F., and Seaman, S.L. (1994) High and low levels of Organisational adaptation: An empirical analysis of strategy, structure, and performance. *Strategic Management Journal* 15, 459
- Joiner, T. A. (2001) The influence of national culture and organizational culture alignment on job stress and performance: evidence from Greece. *Journal of Managerial Psychology*, 16, 229.
- Jones, A.J. (2007). "Commercialising research: what value to firms?" *Chemistry in Australia* 74(5): 17.
- Kanter, R. 1983. *The change masters: innovation for productivity in the American corporation*. New York: Simon and Schuster.
- Koufteros, X.A., Nahm, A.Y., Cheng, T. C. E. & Lai, K. (2007) An empirical assessment of a nomological network of organizational design constructs: From culture to structure to pull production to performance. *International Journal of Production Economics*, 106, 468.

- Kotter, J.P. & Heskett, J.L. (1992). *Corporate culture performance*: New York: Macmillan.
- Kroeber, A.L. & Kluckhohn, C. (1963) *Culture: a critical review of concepts and definitions*. New York: Vantage Books.
- Kuprenas, J.A. (2003) Implementation and performance of a matrix Organisation structure. *International Journal of Project Management* 21, 51.
- Lawler, E.E., III. (1996), *From the Ground Up: Six principles for Building the Logical Corporation*. Jossey-Bass, San Francisco, CA.
- Large, D., Belinko K., et al. (2000). "Building Successful Technology Commercialization Teams: Pilot Empirical Support for the Theory of Cascading Commitment." *Journal of Technology Transfer* 25(2): 169.
- Laslo, Z., and Goldberg, A.I. (2001) Matrix structures and performance: The search for optimal adjustment to Organisational objectives. *IEEE Transactions on Engineering Management* 48, 144.
- Likert, R. (1996). *New Patterns of management*. New York: McGraw-Hill.
- Lin, X., and Germain, R. (2003) Organisational Structure, Context, Customer Orientation and Performance: Lessons from Chinese State-Owned Enterprises. *Strategic Management Journal* 24, 1131
- Mallak, L. A., Lyth, D. M., Olson, S. D., Ulshafer, S. M., Sardone, F. J. (2003) Culture, the built environment and healthcare organizational performance. *Managing Service Quality*, 13, 27.
- Malone, T.W., and Smith, S.A. (1988) Modeling the Performance of Organisational Structures. *Operations Research* 36, 421
- Marcoulides, G.A. & Heck, R.H. (1993) Organizational culture and performance: Proposing and testing a model. *Organization Science*, 4, 209.

- McNamara,C.(2000), Field Guild to leadership and Supervision, Authenticity Consulting LLC.
- Meijaard, J., et al. (2005) Organisational Structure and Performance in Dutch small Firms.Small Business Economics 25, 83
- Mintzberg,H.(1987),”Crafting Strategy” Harvard Business Review.65 66-75.
- Mullins (2006) Commercialisation behaviours, growth and survival. *International Journal of Industrial Organization*, 13(4): 41.
- Nadler, D.(1998) Champions of change: How CEOs and their Companies are Mastering the Skills of Radical Change.Jossey-Bass,San Francisco, CA.
- Nahm, A.Y., et al. (2003) The impact of Organisational structure on time-based manufacturing and plant performance. *Journal of Operations Management* 21, 281
- Nahm, A.Y., Vonderembse, M.A. & Koufteros, X.A. (2004) The Impact of Organizational Culture on Time-Based Manufacturing and Performance. *Decision Sciences*, 35, 579.
- Nevens, T. M., Summe, G. L., et al. (1990). "Commercializing Technology: What the Best Companies Do?" *Harvard Business Review* 68(3): 154.
- OECD (2007), Gross domestic spending on R&D (indicator). doi: 10.1787/d8b068b4-en.Australian government
- Øgaard, T., Larsen S., and Marnburg, E. (2005) Organizational culture and performance evidence from the fast food restaurant industry. *Food Service Technology*, 5, 23.
- Olson, E.M., et al. (2005) The Performance Implications of Fit Among Business Strategy, Marketing Organisation Structure, and Strategic Behavior. *Journal of Marketing* 69, 49

- Onken, M. H. (1999) Temporal elements of organizational culture and impact on firm performance. *Journal of Managerial Psychology*, 14, 231.
- O'reilly, C.A., III, Chatman, J. & Caldwell, D.F. (1991). People and organisational culture: a profile of comparison approach to assessing person-organisation fit. *Academy of Management Journal*, 34, 487-516.
- Ouchi, W.G. (1998). *Theory Z*. Reading MA: Addison-Wesley.
- Pascale, R. (1995), "The paradox of corporate culture: Reconciling Ourselves to Socialisation" *California Management Review*, 27(2), 26-41.
- Parker, K. and Mainelli, M. (2001). "Great mistakes in technology commercialization." *Strategic Change* 10(7): 383.
- Peters, T.J. & Waterman, R.H. (1982). *In search of excellence*. New York: Harper and Row.
- Pettigrew, A. (1979). On studying organisational cultures. *Administrative Science Quarterly*, 24, 570-581.
- Pleshko, L.P. (2007) Strategic orientation, organisational structure, and the associated effects on performance. *Journal of Financial Services Marketing* 12, 53
- Pothukuchi, V., Damanpour, F., Choi, J., Chen, C.C., Park, S.H. (2002) National and organizational culture differences and international joint venture performance. *Journal of International Business Studies*, 33, 243.
- Pyoria, P. (2007) Informal organizational culture: the foundation of knowledge workers' performance. *Journal of Knowledge Management*, 11, 16.
- Raine, J.K. and Beukman, C. P. (2002). "University technology commercialisation offices – A New Zealand perspective." *International Journal of Technology Management* 24(5,6): 627.

- Randolph, W.A., et al. (1991) Technology-Structure Fit and Performance in Small Businesses: An Examination of the Moderating Effects of Organisational States. *Entrepreneurship Theory and Practice* 16, 27
- Rashid, M.Z.A., Sambasivan, M., Johari, J. (2003) The influence of corporate culture and organisational commitment on performance. *The Journal of Management Development*, 22,708.
- Reynolds, P. D. (1986) Organizational Culture as Related to Industry, Position and Performance: A Preliminary Report. *The Journal of Management Studies*, 23,333.
- Rondeau, K. V. & Wagar, T. H. (1998) Hospital chief executive officer perceptions of organizational culture and performance. *Hospital Topics*, 76, 14.
- Ruekert, R.W., et al. (1985) The Organisation of Marketing Activities: A Contingency Theory of Structure and Performance. *Journal of Marketing* 49, 13.
- Saunders, Mark; Lewis, Philip and Thrnhill, Adrian (2007), *Research Methods for Business* (4th ed.), Essex; Pearson Education Ltd., pg599
- Scaffold, G.S. (1988). Culture traits, strength and organisational performance: moving beyond a strong culture. *Academy of Management Review*, 13(4), 546-558.
- Senge, P. (1990), *The Fifth Discipline: The Art and Practice of the learning organisation*. Doubleday/Currency, New York.
- Schein, E. (1985). *Organisationl culture and leadership*. San Fransisco: Jossey-Bass.
- Schein, E. (1990). *Organisationl culture*. *American Psychologist*, 45(2)109-119.
- Schein, E. (1992). *Organisationl culture and leadership* (2nd ed.). San Fransisco: Jossey-Bass.
- Sergiovanni, T. & Corbally, J. (1984). *Leadership and Organisationl culture*. Urbana: University of Illinois Press.

- Spreitzer, G. 1995. Psychological empowerment in the workplace: Dimensions, measurements and validation. *Academy of Journals*. 381442-1465.
- Sudarsanam (2010): *Creating Value from Merger and Acquisition*, Pearson Education Ltd. UK.
- Schein, E., 1999, *Organisational Culture*, Sloan School of Management, <http://dspace.mit.edu/handle/1721.1/2224>
- Sengupta, S. & Bushman, F. A. (1998) Organizational culture and new product performance: An exploratory investigation in high-technology firms. *American Marketing Association. Conference Proceedings*, 9, 391.
- Sharma, M. Kumar, U. et al. (2006). "Role of University Technology Transfer Offices in University Technology Commercialization: Case Study of the Carleton University Foundry Program." *Journal of Services Research* 6: 109.
- Sin, L. Y. M. & Tse, A. C. B. (2000) How does marketing effectiveness mediate the effect of organizational culture on business performance? The case of service firms. *The Journal of Services Marketing*, 14, 295.
- Singh, G. (2001). "Skills requirements of the biotechnology industry: Moving from research and development to commercialization." *International Journal of Biotechnology* 3(3,4): 244.
- Skerlavaj, M., Stemberger, M.I., Skrinjar, R. & Dimovski, V. (2007) Organizational learning culture-the missing link between business process change and organizational performance. *International Journal of Production Economics*, 106, 346.
- Trice, H. M & Beyer, J.M. (1993). *The culture of work organisations*. New Jersey: Eaglewood Cliffs Prentice Hall.

- Tsamenyi, M. & Mills, J. (2002) Perceived Environmental Uncertainty, Organizational Culture, Budget Participation and Managerial Performance in Ghana. *Journal of Transnational Management Development*, 8, 17.
- Van der Post ,W.Z., De Conning, T.J. and Smith, E.M(1998).The relationship between organisational culture and financial performance: some South African evidence.*South African Journal of Business Management*,29(1)30-40.
- Visser, B. (2000) Organisational communication structure and performance. *Journal of Economic Behavior & Organisation* 42, 231
- Weir, C. (1995) Organisational structure and corporate performance: An analysis of medium and large UK firms. *Management Decision* 33, 24
- Weick, K.E.(1987)' Organisational Culture as a source of High Reliability''*Califonia Management Review*, 299112-117.
- Wonglimpiyarat, J. (2007). "Management of government research and development towards commercialisation." *International Journal of Management Practice* 2(3): 214.
- Yount, Rick (2006). "Research Design and Statistical Analysis in Christian Ministry," 4th Edition. Fort Worth, Texas: Southwest Baptist Theological Seminary
- Yin, R.K., (2003), Case study research: design and methods.
- Zahra, S.A. and Nielsen, A.P. (2002). "Sources of capabilities, integration and technology commercialization." *Strategic Management Journal* 23(5): 377.

APPENDIX

QUESTIONNAIRE TO THE STAFF OF BUILDING AND ROAD RESEARCH

INSTITUTE (BRR)-KUMASI INSTITUTE

Your candid opinion is highly solicited in this work to enable the researcher who is a student of Kwame Nkrumah University of Science and Technology gather the needed information for this work. This research is about ‘The Effect of Organisational Culture and Organisational Structure on Product Commercialisation Behaviour of Building and Road Research Institute (BRR) under the CSIR, Kumasi (A case study of the BRR)’ for purely academic purposes. All information furnished will therefore be treated with strict confidentiality.

Please tick [✓] the appropriate response(s) or options and express your views to the following questions where necessary.

PART ONE: PERSONAL DATA OF RESPONDENTS

1. Gender of respondent [] Female [] Male
2. Age Group [] 18 to 30 years [] 30 – 39 years [] 40 – 49 years
[] 50 -59 years [] Above 60 years
3. Highest Professional or Educational level
[] Higher National Diploma (HND) [] First Degree Level
[] Masters Level [] Others {Please specify}.....
4. How many years have you served in this Institute?
[] from 1-3 years [] 4-6 years [] 7-9 years [] Above 10 years
5. What is your current position in this Institute?
.....

PART TWO: ORGANISATIONAL CULTURE

Tick (✓) the appropriate statement that best describes your position on the relationship between organisational culture and product commercialisation behaviour where, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, and SA=Strongly Agree.

Statement	SD	D	N	A	SA
Involvement Trait:					
1. Employees are committed to their work a. Employees feel a sense of ownership b. Employees have input.					
2. The organisation empowers their employees and build the organisation around teams whose capabilities are developed at all levels.					
3. The organisation continually invests in the development of employees' skills in order to stay competitive and meet ongoing business needs.					
4. The organisation relies on team effort to get work done.					
5. Individuals have the authority to manage their own work a. Individuals have the initiative to manage their own work b. Individuals have the initiative to manage their own work					
6. There is a sense of ownership by employees towards the organisation. a. There is a sense of responsibility by employees towards the organisation.					
Consistency Trait					
1. The organisation is effective because it has a "strong" culture that is highly consistent, well coordinated and well integrated					
2. The organisation's leaders and followers are skilled at reaching agreement even when there is diverse point of views.					
3. There is a common mindset and a high degree of conformity in the organisation.					

Adaptability Trait					
1. The organisation scans the external environment and responds to the ever-changing needs of its customers and other stakeholders.					
2. The organisation holds a system of norms and beliefs that support its capacity and changes that increase the chances for survival and growth.					
3. The organisation is good at meeting Customers' demands and current needs.					
4. The organisation understands and reacts to customers anticipated needs.					
Mission Trait					
1. Staffs know where they are going, and how they can contribute to success of the organisation.					
2. The organisation has a clear sense of purpose and direction for its goals and strategic objectives.					
3. The organisation has brilliant visionaries who have difficult time translating their dreams into reality.					
4. The organisation lacks long-range planning in its product commercialisation behaviour.					

PART THREE: ORGANISATIONAL CULTURE DIMENSIONS

Indicated your view on the ways that Organisational Culture affects Product

Commercialisation Behaviour, where, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, and SA=Strongly Agree.

<i>Statement</i>	<i>SD</i>	<i>D</i>	<i>N</i>	<i>A</i>	<i>SA</i>
<i>a. Employee Empowerment</i>					
1. Employees are empowered to work harder and become more committed to the organisation.					
2. Employees in the R&D department work harder to develop good products in this organisation.					
3. The marketing department is empowered towards understanding the market and commercialising products that meet the market needs.					
<i>b. Team Orientation.</i>					
1. Employees from across departments work as a team to achieve company goals.					
2. Exchange of information and communication among employees is very high.					
<i>c. Capability Development.</i>					
1. Employee skills are viewed as an important factor in increasing the company's performance.					
2. The organisation invests in the employee skill development to increase their capabilities to understand customers and to become innovate.					

d. <i>Creating Change.</i>					
1. Anticipated change is required to make change in product development and commercialisation behaviour changes.					
2. The organisation handles customer and competitor change behaviours by adapting the products provided and the way the company runs its business.					
e. <i>Customer Focus.</i>					
1. Our customer-focused culture has resulted in customer-oriented behaviour.					
2. Employees know that all business activities must be conducted with the aim to satisfy the customer.					
f. <i>Organisational Learning.</i>					
1. There is an organisational learning culture to increase innovation capability of the organisation.					
2. The organisation learns from its failures and mistakes to improve its innovation capability.					
3. <i>Organisational culture dimensions can have an influence on product commercialisation behaviours.</i>					

PART FOUR (5):ORGANISATIONAL STRUCTURE DIMENSIONS

Indicated your view on the ways in which Organisational Structure affects Product Commercialisation Behaviours, where, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, and SA=Strongly Agree.

<i>Statement</i>	<i>SD</i>	<i>D</i>	<i>N</i>	<i>A</i>	<i>SA</i>
a. Coordination.					
1. Coordination leads to intense communication among employees.					
2. Coordination makes it easier for employees to share information and have the same level of information regarding markets, competitors and customers.					
b. Centralisation.					
1. Centralised organisations would cause product commercialisation implementation to become straightforward after a decision is made.					
c. Formalisation.					
1. The formal procedures of the organisation encourage employees to be aware of, and response to market changes.					
2. Employees are provided with rules and procedures encourage creativity, autonomous work and learning.					
d. Integration.					
1. The level of horizontal integration has significant, direct and positive effects on the level of communication.					
2. Horizontal integration will increase information sharing among employees regarding market.					
3. The collective and integrated actions by employees are allowed in order to respond to customer requirements.					

e. Number of Layers in Hierarchy.					
1. Fewer number of layers in hierarchy improves responsiveness to market changes and enables the organisation react more effectively to customer change.					
2. Limited number of layers in the decision-making hierarchy helped changing markets, and provided value to customers.					
f. Specialisation.					
1. Specialists are given substantial authority to determine the best approach to complete their tasks.					
2. Specialised employees in the R&D department contribute to product ideas and find a way to realize these ideas.					
3. Specialisation is provided in marketing department so that the commercialisation team can handle customers and monitor competitors.					
4. <i>Organisational structure dimensions can have an influence on product commercialisation behaviours.</i>					

PART FIVE (5):COMMERCIALISATION BEHAVIOURS

Indicated your view on the ways which affect Product Commercialisation Behaviours, where, SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, and SA=Strongly Agree.

<i>Statement</i>	<i>SD</i>	<i>D</i>	<i>N</i>	<i>A</i>	<i>SA</i>
a. Competitor-Oriented Behaviours.					
1. The organisation knows its competitor's products and improved its own products to give customers better products than their competitors.					
2. The organisation knows its competitor's patents which determine the direction and scope of its patents.					
b. Customer-Oriented Behaviours.					
1. The organisation builds customer-oriented-behaviour and stay close to their customer for better market positioning and company performance.					
2. The organisation is able to fulfill its market demand and to provide appropriate products for the appropriate market segment.					
c. Innovation-Oriented Behaviours.					
1. The organisation is innovative and can provide new products for customers when the old product is obsolete.					
2. The organisation can also make the product first to market.					
d. Communication-Oriented Behaviours.					
1. There is communication among departments thus- R&D, production, and marketing to increase the success of product commercialisation.					
2. There is communication among departments for developing marketable products.					
3. The level of communication has played a significant, indirect and positive impact on product commercialisationbehaviour of the organisation.					
4.Ways which can influence Product Commercialisation behaviours					

THANK YOU VERY MUCH FOR YOUR TIME.