



Training Decisions in Botswana's Public Sector: A Real Options Theory Approach

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ABSTRACT

Recent research in organizational behaviour and human resource management shows that commitment to employees by an organization creates a dedicated workforce, evidenced by investment in its human resources. This commitment provides a sustainable competitive advantage or cost efficiency through unique human capital. Training and development improve employee productivity, service quality, and reduce turnover. This paper investigates how real options theory impacts strategic decision-making in public sector institutions regarding employee training and development using a systematic literature review. Studies emphasizing the relation between real options theory and investment in training were reviewed. Findings: training and development are indispensable; competitive advantage is determined by both external and internal factors; and learning options are vital for organizations facing a high risk of skill obsolescence. Research implications and limitations include limited literature, in terms of volume and recent publications, on the intersection of real options theory and human resource management, representing a significant research gap. Furthermore, the role of real options theory in public and non-profit sectors requires exploration, as existing research heavily focuses on profit-making organizations.

Keywords: Real options theory, Training and development, Public sector, Botswana.

Introduction

Recent research in organizational behavior and human resource management suggests that an organization's dedication to its employees often leads to a more committed and responsible workforce (Miller & Lee, 2001), and this commitment is seen by the level of its investment in human capital development. According to Sanyal and Sett (2011), this commitment serves as a source of sustainable competitive advantage, as it has its roots in the unique and hard-to-imitate human capital, which includes employees' skills, experience, and social networks. Advanced human resources management (HRM) practices such as training and development have improved employee productivity, thereby improving service quality and reducing turnover or intention to quit by employees. Therefore, organizations dedicated to their employees often prioritize investments in advanced HRM practices, such as training and professional development (Miller & Lee, 2001). Management is, therefore, faced with evaluating options and choosing production factors to invest in, ensuring the greatest benefit for the organization (Teece, 2007).

Botswana has, since gaining its independence in 1966, grown from being one of the poorest countries in the world to being the current upper-middle-income country it is today. This is largely attributable to (1) the discovery of diamond deposits in the late 1960s, the revenue of which has been used for the development of other sectors of the country's economy, and (2) an efficient and productive government machinery that prides itself on the efficient allocation and management of diamond revenues for, amongst others, infrastructure development. The mention of government machinery cannot be done without the inclusion of the thousands of government employees employed by the government as the largest employer in the country. Government employees have been at the forefront of the management of public finances, and have been praised over the years for efficiently doing so. The efficiency and productivity of government employees have been, in turn, attributable to the human capital (e.g., qualifications, skills,

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experience) the employees possess, having acquired these through years of training and development offered by the government. The Government of Botswana is amongst countries in the world that offer free education for its citizens through training in both local and international institutions of learning.

Government employees have also been afforded these training and development opportunities as a way of equipping them with requisite operational skills and qualifications to efficiently carry out their duties. The government, in doing so, initially adopted an approach in which employees were taken for short-term training to gain immediate skills needed in their jobs, and long-term trainings for arming them with the professional qualifications for succession planning and career progression. The government would later on, with the surge in numbers of employees, adopt an additional approach of allowing employees to enrol in part-time training on programs related to their jobs, and fully reimbursing them upon successful completion of their studies. This saw Botswana government employees growing from being some of the poorly educated to being educated employees, able to grapple with the developing country requirements, while, as Tan (and the human capital theory posit, it increased the chances of employees earning higher salaries in the future as they get promoted.

However, as the surge in numbers of employees continued, with the public sector wage bill also growing, and with the emergence of other national development priorities, the government took an approach of reducing, especially, long-term training of employees, prioritizing training of employees in science, technology, engineering and mathematics (STEM) related jobs. A point to note is that these employees constitute a small fraction of the entire government employees' populace. The government also, due to budget constraints, has not been able to continue reimbursing employees enrolled in part-time studies, and eventually took a decision to discontinue the approach. The result has been that a majority of employees in non-STEM-related jobs are not being trained, and with recent economic hardships and erosion of their purchasing power, they cannot afford to enroll themselves in part-time training. The net effect has been many employees without requisite qualifications to progress in their careers, thus stagnation, impacting employees' motivation. This has also seen the productivity and efficiency of government employees plummeting to an all-time low over the years, with outcries from all corners of society about poor service delivery, wastage in public funds spending and management, to mention but a few.

In HRM, specifically, strategic human resources management (SHRM) literature, there has been a shortage of studies based on the application of real options theory (Andalib *et al.*, 2018). Specifically, there has been a scarcity of studies on the application of real options theory in training and development within the context of HRM (Bhattacharyya, 2018).

In light of the foregoing, through this literature review, this paper seeks to answer the following questions:

RQ1: What role does real options theory (ROT) play in deciding whether to invest in human assets or not?

RQ2: How does real ROT play a part in assisting organizations such as the government of Botswana in making strategic decisions on whether:

- to continue with the current approach of training prioritized professions, or reconsider holistic training and development.

Literature Review

Evolution of Real Options Theory and Theory Underpinnings

To be able to see the fit of and evolution of real options theory, it is necessary to first see how concepts such as the resource-based view (RBV) paved the way for this emergence. The resource-based view was a consequence of work by Barney, which pronounced that "firms can develop sustained competitive advantage only by creating value in a way that is rare and difficult for competitors to imitate." A key insight from the Resource-Based View (RBV) was the necessity for organizations to shift their focus from external factors as the only source of competitive advantage to internal factors, highlighting the importance of resources like human assets and human capital. Furthermore, a pronouncement by the study was that a system such as that of HR is difficult to emulate (Henri, 2006), given its uniqueness and embeddedness in an organizational ecosystem. As such, RBV has since become influential in strategic human capital. However, proclaimed to have the downside of the RBV lacks the ability to explain how management develops scarce resources and transforms them to be at par with changing environments. As such, in their study to



indicate how ROT can address this gap, (Kogut & Kulatilaka, 2001) explained that ROT offers a process-based framework for understanding the logic and economic reasoning behind prioritization of investment decisions, which may allow firms to effectively capitalize on uncertainties rather than merely navigating them.

Real Options

Following a discussion of the rationale for ROT, an option is thus defined as “the right, without any obligation, to act in a particular way in the future. Options are valuable when there is uncertainty” (Sanyal & Sett, 2011). Organizations invest in physical and human assets, usually with the expectation of generating future revenue streams. In contrast, real options refer to targeted investments in these assets that offer the flexibility to respond to future uncertain events (Kogut & Kulatilaka, 2001). In a more specific context, the real options approach extends financial option theory to apply to options on real (non-monetary) assets. Madhani (2017) further described the real options approach as a technique for evaluating and managing strategic investment decisions in an uncertain business environment. The study highlighted the key distinction of options from other organizational resources, emphasizing resources with option value such as a multi-skilled workforce. As such the implication being that real option is a useful tool for making decisions on what to and where to invest in (Madhani, 2017).

According to Trigeorgis (2004), firms can employ various types of real options to address different uncertainties they encounter. “Options to defer, stage, or abandon are commonly used in scenarios involving substantial investments under uncertainty. Flexibility options, on the other hand, are integrated into the initial design—such as recruiting a multi-skilled workforce—when uncertainties in factor or labour markets are anticipated, enabling adjustments in the scale of operations or the switching of process inputs or outputs,” (Sanyal & Sett, 2011). Discretionary investments, amongst others, in the development of new skills that can drive future growth by capitalizing on opportunities arising from environmental uncertainties, are considered growth and learning options. Clearly, real options play a crucial role as strategies for mitigating various uncertainties. (Bhattacharya & Wright, 2005) categorised these uncertainties into (1) return, (2) volume and combination, and (3) costs. They argued that the sources of these uncertainties may be related to (1) the market, (2) the firm itself, or (3) the individual employees. However, the study also took cognizance of externalities such as technological developments and dynamic labour demand that may affect the market value of a firm’s human capital as these changes can make some of the processes and especially, human skills obsolete (Bukhary, 2024; Chakraborty & Rajasekar, 2024; Ding *et al.*, 2024; Narayana *et al.*, 2024; Alexandrovna *et al.*, 2025; Johar *et al.*, 2025; Liedekerke *et al.*, 2025).

To understand the distinction between financial and real options, it is essential to discuss the most prominent differences between the two concepts, and **Table 2** below is a tabulation of these.

Table 1. Financial vs Real Options

Financial Options	Real Options
Financial options are almost perfectly tradable because of efficient financial markets.	Real options are not perfectly tradable because market imperfections and asymmetries are present in their markets.
Financial options are written on financial assets (e.g., stocks, currency and commodities).	Real options exist implicitly in the resources, capabilities, and processes of the firm and hence are written on tangible or intangible assets.
The price of financial assets varies over time, and the exact valuation of financial options is possible.	The exact valuation of real options may not be possible even after a long time because of inherent invisibility (or intangibility) and complexity.
Financial options have specific maturity dates, and premium is paid at the time of the contract.	Real options typically involve unknown or uncertain expiry dates.
Real options typically involve unknown or uncertain expiry dates.	Real options may not be written and exist implicitly in the resources, capabilities, and processes of the firm.
Financial options attributes: • Call option/put option. • Price of financial asset. Produce option income on the stocks owned through the covered call strategy.	Real options attributes: • Option to invest/divest. • Present value of project. • Project cash flow. • Present value of investment.



- | | |
|---|---|
| <ul style="list-style-type: none"> • Exercise price. • Variance of asset returns. • Time to maturity. • Short maturity (in months). | <ul style="list-style-type: none"> • Volatility of project's returns. • Length of deferral time. • Longer maturity (in years). |
|---|---|

Source: Adapted from (Madhani, 2017)

Training and Development in HR Options

The human resource function has, over the years, been seen as a mere support function to more strategic functions of organizations. This is evident in how, when faced with financial difficulties, functions such as HR systems (expenditures on training, staffing, reward, and employee involvement systems) would be the first consideration for budget cutbacks (Wright *et al.*, 2001). However, with the emergence of concepts such as strategic human resource management, HR has now had to prove how relevant it is to the strategic success of organisations, especially the importance of its components such as human assets and human capital (Belfiore *et al.*, 2024; Figueroa-Valverde *et al.*, 2024; Karatas, 2024; Lee & Ferreira, 2024; Negreiros & Ory, 2024; Wolderslund *et al.*, 2024; Abdullah *et al.*, 2025; Alexandrovna *et al.*, 2025; Johar *et al.*, 2025; Schneider & Krüger, 2025).

Studies such as those by (Tan, 2014) and (Bhattacharya & Wright, 2005), when asserting the significance of human assets as a strategic resource and contributory factor of economic growth, defined a firm's human asset as the combination of the employees themselves and an inventory of the knowledge, skills, and abilities they possess, commonly referred to as human capital. To expand this definition, further defined the related HR practices as mechanisms through which the human capital of the firm is acquired, maintained, and motivated. Thus, through HR practices, the firm invests in its human capital from the time of recruitment of human assets and manages them throughout their stay with the organization. A critical aspect of investing in human capital is its maintenance; continued investment in human capital is not only beneficial to the individual, but also to the economic growth of the organization (Tan, 2014). The primary explanation for how these practices contribute to a firm's value is rooted in the resource-based view, which posits that they generate valuable human capital (Bhattacharya & Wright, 2005). When concurring with the value creation notion by human capital, (Welpel *et al.*, 2007) in their study, indicated how human capital is becoming an increasingly central value-creating factor in competitiveness.

There exist several ways in which an organization can develop its human capital; (1) the firm can purchase human capital by recruiting employees already in possession of the skills and experience required; and/ or it can develop its own human capital through training and job experience gained through career progression. Through their study, when demonstrating how people are the basis of knowledge, skills, and competencies of an organization, used an illustration of an employee who has been with a firm for several years. The authors posited that although the employee's experience may be valuable, if the employee is not taken through any training and development, they do not gain additional skills. As such, if the firm decided to offshore the employee's job, two things would likely result—retrenchment and losing the employee's expertise and unique human capital, or redeploying the employee to another job. However, the latter option becomes dependent upon the employee's adaptability to the changing working environment, leading to high uncertainty of return from the employee. The authors also presented flexibility scenarios arising from (1) non-provision of suitable learning opportunities or training, resulting in a mismatch of human capital with the changed demand pattern, leading to risk of loss of the human capital value, (2) high remuneration costs, making an employee expensive for an organization, hence uncertainty of cost, (3) changed demand requiring the employee to relocate, a difficult option for the employee due to family obligations. This gives rise to uncertainty of combination. Many HR practices (e.g., recruitment tests for technical skills, training on existing skills) that do not address the issue of management of uncertainty do not possess any option characteristics and hence do not qualify as HR options (Sanyal & Sett, 2011).

The salience of governance and incentives enabling learning opportunities and the consequent new knowledge acquisition has made intangible assets critical to organizational success, according to Teece. The authors indicated the varying types of learning, which include, amongst others, experiential, individual, and organization-driven. It is imperative for organizations to commit to prioritizing high levels of employee job satisfaction and fostering employee development. (Miller & Lee, 2001).



Human assets, like many real options, are characteristic of uncertainties (return, volume, and combinations) due to the varying sources- individual, firm, and market, as earlier mentioned. **Table 1** is a depiction of, for instance, uncertainties relating to return- skill obsolescence caused by individual erosion of existing skills and human capital loss caused by a firm's inability to generate/accommodate new skills and learning.

Table 2. Uncertainty of human assets

Uncertainties	Sources Of Uncertainties: Individual	Firm/Government Department	Market
<i>Uncertainties of return:</i> • Skill obsolescence • Demand for future skills • Human capital loss • Loss of productivity	• Erosion of existing skills • Inability to learn new skills • Employee dissatisfaction, lack of commitment • Voluntary turnover	• Skill profile mismatch with market requirements. • Inability to generate/ accommodate new skills and learning. • Turnover of critical skill group. • Inability to institutionalize knowledge. • Lack of employee development. • Lack of concern for employees.	• Demand for new skills • Uncertain supply of new skills. • Uncertain demand for existing skills. • Changing career patterns.
<i>Uncertainties of volume and combinations:</i> • Variations in number of employees required. • Variations in deployment of human assets.	• Absenteeism, leave • Resistance to changes in work arrangements	• Variations in demand for number of employees in different units/jobs	• Variations in demand for and supply of goods and services
<i>Uncertainties of costs:</i> • Variations in total employee outlay versus cash flow	• Overuse/misuse of benefits • High guaranteed pay/bonuses	• Lack of slack/buffer, high human capital leverage	• Business cycles • Competitive pressures for cost reduction.

Labour market environment uncertainties can consequently create uncertainty around ROI in human assets, leaving room for both downside losses and upside gains. Ignoring these uncertainties is likely to result in either overvaluation of human assets or an underestimation of the importance of investments in them. Similar to other strategic investments made under conditions of uncertainty, investments in human assets can be structured and managed to shield the firm's human assets from potential risks, such as obsolescence, while capitalizing on opportunities arising from uncertainties, such as equipping employees with new skills through training and development. ROT can “provide the process heuristic for understanding the cognitive and the economic logic of sequential resource investment choices that firms make in managing their human resources” (Sanyal & Sett, 2011). Uncertainty of returns can be due to skill obsolescence or an inability to acquire new skills at an individual level, as employee skills may become obsolete due to failure to adapt or develop new competencies in response to changing demands (Bhattacharyya, 2018)

As such, ROT can be used as a decision-making tool to value and decide on the amount and timing of investment to be made on employee training and development (Bhattacharyya, 2018)

Materials and Methods

The application of real options theory in the human resource management field is in the nascent stage with limited literature. As such, an algorithm search for the “real option theory” AND “human resource management” produced a limited output of articles (Ghiga *et al.*, 2024; Kęska & Suchy, 2024; Kounatidis *et al.*, 2024; Noor *et al.*, 2024; Jagsi *et al.*, 2025; Schneider & Krüger, 2025; Wong *et al.*, 2025). However, a search for the concept of “real options theory” only produced a considerable output of articles, though those relating to human resource management, especially training and development of human assets, were minimal (Csep *et al.*, 2024; Ghiga *et al.*, 2024; Jin *et al.*, 2024; Osluf *et al.*, 2024; Rypel *et al.*, 2024; Fischer *et al.*, 2025; Mansour & Saeed, 2025; Musa *et al.*, 2025; Raza *et al.*, 2025). As such, the research algorithm developed for the systematic literature review was in two folds and as follows:

- a. “Real options theory” AND “human resource management”, which generated sixteen (16) output articles. Following the removal of duplicates, thirteen (13) output articles were selected for topic and abstract reading. Due to the limited article output, no further inclusion/ exclusion criteria were imposed.
- b. “Real options theory” search in the Scopus and Web of Science databases was done, generating 493 output articles. An inclusion/ exclusion criterion was then applied with a focus on articles published in the years 2000-2025, even though some high-impact articles from before were included; further focusing on categories: Management, Economics, Business, Business Finance, Industrial Relations Labor, Public Administration; selecting only articles, early access, review articles, and book chapters. The refined search generated 292 output articles. A further inclusion/ exclusion criterion was imposed with a focus on articles in the management category only, generating 130 articles for topic and abstract reading. After the preceding stage, a total of 28 articles were analysed through full-text reading. This was after a further inclusion/ exclusion criterion limited to the management category was imposed to focus on articles on real options theory application within the human resources management field.

One of the benefits of a research study is the ability to provide the target audience with a complete and concise methodology with replicability capability. The “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) is a technique used not only to ensure replicability of a methodology but also to guarantee transparency (Dekker & Bekkers, 2015). Furthermore, the PRISMA guideline’s primary purpose is to guide the reporting of systematic reviews (PRISMA, 2024). This paper utilises the PRISMA guideline as contained in **Figure 1** below to report the research protocol for relevant literature.

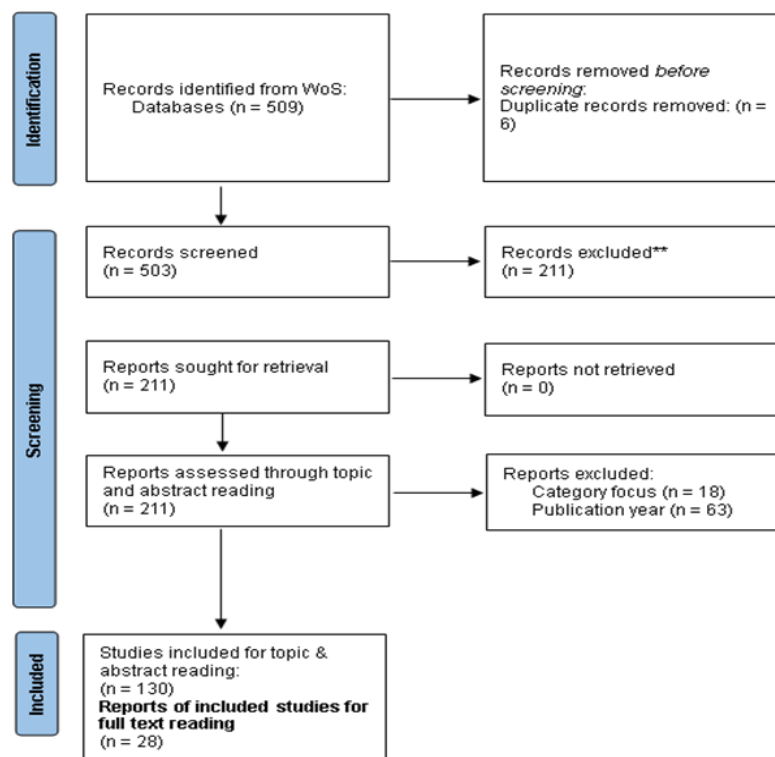


Figure 1. PRISMA Flow diagram

Results and Discussion

This section provides a synthesis of articles whose research purposes were on human resource management, training and development of human assets as a real option, and how strategic decisions are made when it comes consideration of whether to invest or not in human capital.



Real Options and Training and Development

ROT in HRM is becoming prevalent and an area of interest for scholars. Several of the available studies underscore the importance of ROT in HR functions. For instance, a study by (Madhani, 2017) posited that HR options are derived from certain HRM practices, such as selectivity in staffing and job rotation, amongst others. Amongst some of its findings, the study found that the presence of appropriate HR capabilities enables organizations to manage uncertainties proactively. The study highlighted that specific HR management practices, such as training and development, generate HR options by minimising uncertainties related to the return on investment in human capital, as well as its volume and costs. According to the authors, these HR options play a crucial role in stabilizing returns from human capital, thereby maintaining an organization's competitive advantage. Another study also underscored the value of HR options as firm investments in human capital to create the capability of flexibility. Whereas results of another study by (Welpé *et al.*, 2007) highlighted that real options theory provides a framework for the differentiated assessment and analysis of human capital, enabling investments in uncertainties that are associated with human capital. The authors concluded therefore that ROT is a foundation for measuring human capital's inherent opportunities and risks.

However, (Perufo *et al.*, 2018), when discussing the real options approach to flexibility in HRM, pointed out that whereas functions such as recruitment of employees may generate revenue for the company, they have inherent costs. This study was based on the recognition that growth options become possible at the recruitment phases of employees, as the targeted recruitment techniques, such as competency-based interviews, are selective, thereby ensuring progression opportunities for employees with relevant skills. According to the authors, these HRM practices can be referred to as “options” on human capital investment, also concurring to some degree that they minimize risks and maximize opportunities in HRM. They further posited that, like other investment decisions, the decision to recruit an employee comes with some uncertainty related to issues such as the employee's performance (labor supply), thereby creating a need for planning for training and development.

Findings suggest that the development of human capital has many organizational benefits such as improved productivity and thereby competitive advantage for an organization, but also has a bearing on other employee performance-related concepts such as employee satisfaction (Miller & Lee, 2001). Commitment to human capital development by organizations, therefore, remains imperative; however, as (Bhattacharya & Wright, 2005) put it, the amount and timing of such training and development is crucial. Obsolescence of employee skills, on the other hand, presents as a risk that organizations must manage. As (Bhattacharya & Wright, 2005) concluded, organizations with a high number of employees with obsolete skills, thereby a higher demand for new skills within employees, have to provide more learning options through training and development opportunities.

Conclusion

Training and development of the human capital is a phenomenon that any organization no longer has the luxury of passively disregarding. Competitive advantage is no longer determined by external environmental factors, but also, and largely so, by internal factors such as human assets. Provision of learning and growth options is imperative, especially for organizations faced with a higher risk of large numbers of employees with obsolete skills and competencies. This creates a necessity for organizations to shift away from a fixation on budgetary constraints towards a more balanced and sustainable viewpoint of investment in human capital (Maley, 2019).

This paper sought to establish what role ROT plays in decision-making when it comes to investing in human assets and whether training and development is relevant. Indications from the available literature are that ROT plays and has played a pivotal role in assisting decision-makers, firstly, to realise that HR as a strategic function is a key competitive factor. Secondly, ROT assists decision-makers in investment decisions on human capital given prevailing risks within the uncertain labour market environment.

Limitations and Dimensions for Future Research

The most prominent limitation of this paper is the limited availability, both in terms of volume and recently published articles, or lack of literature on real options theory as relating to and applied within the HRM field. However, this presents a research direction and gap worth exploring, to add to the available literature. It is also worth exploring in



the future what role ROT plays in strategic decision-making within public sector and non-profit making organization as almost all the studies' focus is on profit-making organizations.

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