

The Value of a PhD in the Twenty-First Century: Balancing Economic Returns, Career Opportunities, and the Hidden Costs to Health and Wellbeing

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ARTICLE INFORMATION	ABSTRACT
Article history: Published: September 2026 Keywords: Doctoral Education PhD value Economic Returns Return On Investment Higher Education Career Opportunities Researcher Wellbeing Mental Health Burnout Work–Life Balance Opportunity Costs Academic Careers Human Capital Doctoral Students Higher Education Policy	The value of doctoral education has long been associated with intellectual achievement, career advancement, and contributions to research and innovation. However, in the twenty-first century, changing labour market dynamics, increasing financial pressures, heightened competition within academia, and growing concerns regarding mental health have prompted renewed debate about whether pursuing a Doctor of Philosophy (PhD) degree remains a worthwhile investment. While numerous studies have examined the economic returns of doctoral education, comparatively less attention has been given to the broader human costs, including psychological wellbeing, work–life balance, family commitments, and opportunity costs. This paper critically examines the multidimensional value of a PhD by integrating evidence from the economics of education, higher education policy, labour market research, and wellbeing literature. Using a comprehensive narrative review of contemporary international scholarship, the paper evaluates the economic, professional, intellectual, and societal benefits of doctoral education alongside its financial, emotional, and health-related challenges. The analysis considers both tangible outcomes, such as lifetime earnings, employability, research productivity, leadership opportunities, and innovation, and intangible outcomes, including personal fulfilment, knowledge creation, critical thinking, and contributions to national development. These benefits are contrasted with the increasing prevalence of stress, burnout, anxiety, depression, prolonged time-to-completion, financial insecurity, delayed career progression, and the opportunity costs associated with extended doctoral study. The paper argues that the value of a PhD should not be assessed solely through traditional economic indicators or salary premiums but through a holistic framework that recognises intellectual capital, social contribution, career flexibility, personal wellbeing, and quality of life. It further contends that while doctoral education continues to generate significant benefits for individuals, universities, and society, these gains may be undermined by institutional cultures that prioritise productivity over researcher wellbeing. Consequently, the paper advocates for a reimagining of doctoral education that promotes sustainable research environments, comprehensive mental health support, effective supervision, financial security, work–life balance, and career pathways extending beyond academia. By presenting an integrated perspective on both the rewards and sacrifices of doctoral education, this study contributes to contemporary debates on the future of doctoral training and offers evidence-informed recommendations for policymakers, higher education institutions, supervisors, and doctoral candidates seeking to maximise the value of doctoral education while safeguarding health and wellbeing.

1. Introduction

Doctoral education has traditionally been regarded as the pinnacle of academic achievement, representing the highest level of formal education and serving as a gateway to advanced research, innovation, intellectual leadership, and societal progress. For centuries, the Doctor of Philosophy (PhD) degree has symbolised scholarly excellence and the capacity to generate original knowledge that addresses complex scientific, technological, social, economic, and environmental challenges (Altbach et al., 2019). Universities, governments, and research institutions have invested substantially in doctoral education because highly trained researchers are viewed as essential drivers of knowledge economies, technological advancement, evidence-based policymaking, and national competitiveness (OECD, 2023; UNESCO, 2021). In an era characterised by rapid digital transformation, artificial intelligence (AI), the Fifth Industrial Revolution (5IR), climate change, demographic shifts, and increasing global uncertainty, the need for highly skilled researchers has arguably become more important than ever.

Historically, obtaining a PhD has been associated with numerous personal and professional advantages. Doctoral graduates have generally enjoyed higher lifetime earnings, increased employability, greater opportunities for academic leadership, enhanced professional credibility, and stronger prospects for influencing policy and practice (Becker, 1993; Mincer, 1974). Human Capital Theory suggests that investment in education enhances individuals' productivity, knowledge, and skills, resulting in improved labour market outcomes and long-term economic returns (Becker, 1993). From this perspective, doctoral education represents one of the

highest forms of investment in human capital, enabling graduates to contribute to research, innovation, entrepreneurship, and economic development.

Beyond financial rewards, doctoral education also produces substantial intellectual and societal benefits. Doctoral graduates develop advanced analytical reasoning, critical thinking, problem-solving, research design, data analysis, communication, leadership, and project management skills that extend well beyond academia (Nerad & Evans, 2014). They contribute to scientific discovery, technological innovation, public policy development, healthcare improvement, educational reform, environmental sustainability, and social transformation. Increasingly, governments view doctoral graduates as strategic assets capable of addressing complex interdisciplinary challenges associated with sustainable development, digital transformation, and global competitiveness (OECD, 2023). Despite these recognised benefits, the value proposition of doctoral education has become increasingly contested. Over the past two decades, significant changes in higher education systems have altered both the experience and outcomes of pursuing a PhD. Worldwide expansion in doctoral enrolments has not always been matched by proportional growth in permanent academic positions, creating an increasingly competitive employment landscape (Cyranoski et al., 2011). Consequently, many doctoral graduates now pursue careers outside universities in government, industry, non-governmental organisations, entrepreneurship, consulting, and international development, prompting questions regarding whether traditional doctoral programmes adequately prepare graduates for diverse career pathways (OECD, 2023).

Simultaneously, the financial costs associated with doctoral education have increased considerably. Tuition fees, research expenses, conference participation, publication costs, relocation, and reduced earning potential during years of study represent significant economic investments for many doctoral candidates. Opportunity costs are equally substantial, as individuals often postpone career progression, home ownership, family formation, retirement savings, and other long-term financial goals while completing their doctoral studies (Walker et al., 2008). For mature students and mid-career professionals, these opportunity costs may be particularly pronounced because they frequently balance doctoral research alongside employment, caregiving responsibilities, and existing professional commitments.

Alongside financial pressures, increasing evidence has highlighted the psychological and emotional demands associated with doctoral education. The doctoral journey is widely recognised as intellectually rewarding yet emotionally challenging. Doctoral candidates often experience prolonged periods of uncertainty, isolation, self-doubt, perfectionism, imposter syndrome, publication pressure, supervisory challenges, funding insecurity, and concerns regarding future employment (Levecque et al., 2017). These pressures may intensify during the later stages of candidature, particularly during thesis writing, examination, and the transition into competitive academic or professional labour markets.

Growing international research suggests that doctoral candidates experience significantly higher levels of stress, anxiety, depression, emotional exhaustion, and burnout than many other highly educated populations (Evans et al., 2018; Levecque et al., 2017). Mental health concerns among doctoral researchers have emerged as a global policy issue, prompting universities to reconsider the adequacy of supervisory practices, institutional support systems, counselling services, workload expectations, and doctoral programme structures. The COVID-19 pandemic further amplified these challenges by disrupting research activities, reducing access to laboratories and fieldwork, increasing social isolation, and extending completion times for many doctoral candidates (UNESCO, 2021). The rapid evolution of artificial intelligence, automation, digital research technologies, and the knowledge economy has also raised new questions regarding the future value of doctoral education. While AI increasingly automates routine analytical tasks, it simultaneously increases demand for highly creative researchers capable of critical thinking, ethical reasoning, interdisciplinary collaboration, and innovative problem-solving. Within the emerging Fifth Industrial Revolution, human-centred innovation emphasises collaboration between humans and advanced technologies, suggesting that doctoral graduates may possess distinctive capabilities that remain difficult to automate. Nevertheless, employers increasingly seek transferable competencies, leadership skills, adaptability, digital literacy, entrepreneurship, and interdisciplinary collaboration in addition to specialised disciplinary expertise, requiring doctoral education to evolve accordingly (Schwab & Malleret, 2020).

An important dimension that has received comparatively limited scholarly attention is the multidimensional nature of "value." Traditional evaluations of doctoral education have often relied on measurable economic indicators such as salary premiums, employment rates, publication outputs, research grants, and academic promotions. Although these metrics remain important, they provide only a partial understanding of doctoral value. Intangible benefits, including intellectual fulfilment, personal growth, resilience, lifelong learning, professional identity, social contribution, community leadership, and public service—are equally significant but considerably more difficult to quantify. Conversely, equally intangible costs—including deteriorating mental health, strained personal relationships, work-life imbalance, chronic stress, delayed life milestones, and diminished wellbeing—are frequently excluded from economic analyses despite their profound influence on individual quality of life.

The question, therefore, is no longer simply whether a PhD increases lifetime earnings or employment opportunities. Rather, the more pertinent question is whether the overall benefits of doctoral education justify the financial, professional, emotional, and personal sacrifices required to complete it. This question has become particularly relevant as universities seek to improve doctoral completion rates, governments increase investment in research capacity, and prospective students carefully evaluate the return on their educational investment within increasingly uncertain labour markets.

The debate is especially important for developing countries, Small Island Developing States (SIDS), and emerging economies where investment in advanced human capital is essential for sustainable national development but where financial resources, research infrastructure, and academic employment opportunities may be comparatively limited. In these contexts, doctoral graduates often assume multiple leadership roles as educators, researchers, policymakers, consultants, and community leaders, generating substantial societal returns that extend beyond conventional economic measures. Consequently, assessing the value of doctoral education requires a broader framework that incorporates individual, institutional, societal, and national perspectives.

This paper responds to these emerging debates by critically examining the value of a PhD through a multidimensional lens that integrates economic returns, career opportunities, intellectual development, social contribution, and the hidden costs to health and wellbeing. Drawing upon contemporary literature from higher education, economics of education, labour market studies, psychology, and public policy, the paper evaluates both the tangible and intangible outcomes of doctoral education. It argues that the value of a PhD should not be understood solely as a financial investment but as a complex balance between economic returns, career development, knowledge creation, personal fulfilment, and sustainable wellbeing.

Ultimately, the paper contends that while doctoral education continues to play a critical role in advancing research, innovation, and societal development, its long-term value depends upon creating doctoral environments that promote not only academic excellence but also psychological wellbeing, inclusive supervision, financial sustainability, and meaningful career opportunities within and beyond academia. By adopting this holistic perspective, the study contributes to contemporary discussions on the future of doctoral education and provides evidence-informed insights for policymakers, universities, supervisors, employers, and current and prospective doctoral candidates navigating the evolving landscape of higher education.

Table 1: Summary of the Benefits and Costs of Pursuing a PhD

Dimension	Benefits	Costs/Challenges
Economic	Higher lifetime earnings; improved employability; leadership opportunities; consultancy; research funding; career advancement	Tuition fees; research expenses; conference costs; publication fees; reduced income during study; opportunity costs
Professional	Academic recognition; promotion; professional credibility; transferable skills; networking; interdisciplinary collaboration	Competitive job market; limited academic positions; contract employment; publication pressure
Intellectual	Advanced research skills; critical thinking; innovation; creativity; problem-solving; lifelong learning	Long research duration; intellectual fatigue; high performance expectations
Personal	Personal fulfilment; resilience; confidence; leadership development; professional identity	Stress; anxiety; burnout; work-life imbalance; family sacrifices; social isolation
Societal	Knowledge creation; policy influence; technological innovation; educational improvement; economic development; sustainable development	Limited recognition of societal contributions; difficulty measuring public impact

Source: Developed by the author based on Becker (1993), Walker et al. (2008), Levecque et al. (2017), Evans et al. (2018), OECD (2023), and UNESCO (2021).

2. Literature Review

2.1 Introduction

The value of doctoral education has traditionally been examined through the lenses of economics, higher education, labour market outcomes, and research productivity. Early scholarship predominantly viewed the Doctor of Philosophy (PhD) as an investment in human capital that generates higher productivity, increased earnings, and broader societal benefits (Becker, 1993; Mincer, 1974). However, the rapid transformation of higher education, changing labour market demands, increasing doctoral enrolments, financial pressures, and growing concerns about researcher wellbeing have broadened scholarly interest beyond purely economic returns. Contemporary literature increasingly recognises that the value of a PhD extends beyond salary premiums and employment outcomes to encompass intellectual development, social contribution, personal fulfilment, career flexibility, and health and wellbeing (OECD, 2023; UNESCO, 2021).

This review critically synthesises contemporary literature under seven interrelated themes: (1) the economic value of doctoral education, (2) labour market outcomes and employability, (3) non-economic and societal benefits, (4) the financial and opportunity costs of doctoral study, (5) mental health and wellbeing among doctoral researchers, (6) institutional and supervisory influences, and (7) the future of doctoral education in the age of artificial intelligence (AI) and the Fifth Industrial Revolution (5IR).

2.2 Doctoral Education as Human Capital Investment

The economic rationale for doctoral education is firmly rooted in Human Capital Theory, which argues that education enhances individuals' knowledge, productivity, and earning potential (Becker, 1993). Mincer (1974) further demonstrated that additional years of education generally increase lifetime earnings and labour market competitiveness. Within this framework, doctoral education represents the highest level of investment in formal education, producing specialised expertise, advanced research capabilities, and leadership capacity.

Governments have increasingly viewed doctoral graduates as strategic contributors to innovation ecosystems and national economic development (OECD, 2023). Highly skilled researchers contribute to scientific discovery, technological advancement, entrepreneurship, evidence-based policymaking, healthcare improvements, and educational reform. Universities therefore continue to expand doctoral programmes despite changing labour market conditions.

However, critics argue that Human Capital Theory provides only a partial explanation of doctoral value because it primarily emphasises measurable economic returns while overlooking psychological wellbeing, social contribution, and personal fulfilment (Marginson, 2016). The assumption that greater educational investment automatically produces proportionally higher economic rewards has become increasingly contested, particularly in countries experiencing doctoral graduate oversupply and constrained academic employment opportunities.

2.3 Economic Returns of a PhD

Numerous international studies demonstrate that doctoral graduates generally experience higher lifetime earnings than individuals holding bachelor's or master's degrees (OECD, 2023). Wage premiums are particularly evident in engineering, medicine, computer science,

economics, pharmaceutical sciences, and certain STEM disciplines, where advanced research expertise commands high market value. Doctoral graduates also experience improved employment stability, leadership opportunities, consultancy roles, and increased participation in research-intensive industries (Auriol et al., 2013). Beyond academia, employers increasingly value doctoral graduates for their analytical thinking, complex problem-solving abilities, project management expertise, and capacity to manage uncertainty.

Nevertheless, substantial disciplinary differences exist. While STEM graduates often secure relatively high salaries in industry, doctoral graduates in the humanities, education, and social sciences frequently receive comparatively modest financial returns despite making substantial contributions to public policy, education, and social development (Nerad & Evans, 2014). Consequently, financial return alone cannot adequately measure doctoral value across all disciplines.

Furthermore, salary premiums may take many years to offset the direct and indirect costs associated with doctoral study. Opportunity costs resulting from delayed entry into full-time employment often reduce short-term financial gains, particularly for candidates undertaking doctoral studies during their prime earning years (Walker et al., 2008).

2.4 Employability and Career Opportunities Beyond Academia

The expansion of doctoral education has significantly altered graduate career trajectories. Traditionally, PhD graduates expected to pursue academic careers involving teaching and research. However, increasing competition for permanent academic positions has resulted in many doctoral graduates seeking employment in government agencies, international organisations, private industry, policy institutes, consulting firms, and entrepreneurial ventures (OECD, 2023).

Employers increasingly recognise the transferable competencies developed through doctoral education, including critical thinking, leadership, communication, innovation, interdisciplinary collaboration, and evidence-based decision-making (Nerad & Evans, 2014). These competencies have become particularly valuable within knowledge-based economies characterised by rapid technological change. Despite these opportunities, several studies report that doctoral graduates often experience uncertainty during career transitions because traditional doctoral programmes continue to prioritise academic careers despite limited academic vacancies (Sinche et al., 2017). Consequently, scholars increasingly advocate broader doctoral training that includes entrepreneurship, leadership, digital literacy, industry engagement, and transferable professional skills.

2.5 Non-Economic Value of Doctoral Education

While economic returns remain important, contemporary scholarship increasingly recognises the broader intellectual and societal contributions of doctoral education. Doctoral graduates contribute significantly to scientific advancement, innovation, policy development, public health, environmental sustainability, educational improvement, and social justice (UNESCO, 2021).

Doctoral study also promotes intellectual independence, lifelong learning, creativity, resilience, ethical reasoning, and advanced research capabilities. Many graduates describe their doctoral journey as transformative, fundamentally reshaping how they think, solve problems, and contribute to society (Walker et al., 2008).

From a societal perspective, doctoral graduates generate public value by producing research that informs government policy, advances healthcare, improves educational systems, addresses climate change, and supports sustainable development. These societal benefits frequently extend far beyond individual economic returns and justify continued public investment in doctoral education.

However, measuring these intangible benefits remains methodologically challenging because traditional economic indicators inadequately capture knowledge creation, social innovation, civic leadership, and cultural enrichment.

2.6 Financial Costs and Opportunity Costs

Doctoral education represents one of the most significant long-term investments individuals make in their careers. Direct costs include tuition fees, research expenses, conference travel, software, equipment, publication charges, and living expenses. Indirect costs include reduced income during candidature, delayed promotions, postponed retirement savings, and foregone employment opportunities (Walker et al., 2008).

Opportunity cost theory suggests that the true cost of doctoral education extends beyond financial expenditure to encompass the value of alternative career opportunities sacrificed during study. Mature students often experience particularly high opportunity costs because they balance employment, family responsibilities, and research simultaneously.

The increasing casualisation of academic employment has further complicated return-on-investment calculations. In many countries, doctoral graduates spend extended periods in temporary postdoctoral or contract positions before securing permanent employment, reducing the financial attractiveness of doctoral study.

2.7 Mental Health and Wellbeing During Doctoral Study

Perhaps the fastest-growing area of doctoral education research concerns mental health and psychological wellbeing. Numerous international studies consistently report elevated levels of stress, anxiety, depression, emotional exhaustion, loneliness, and burnout among doctoral candidates (Evans et al., 2018; Levecque et al., 2017).

Levecque et al. (2017) found that doctoral researchers were significantly more likely to experience symptoms associated with common psychiatric disorders than highly educated members of the general population. Similarly, Evans et al. (2018) identified anxiety and depression as widespread concerns across doctoral education globally.

Several factors contribute to these outcomes, including:

- prolonged uncertainty regarding completion;
- publication pressure;
- perfectionism;
- financial insecurity;
- supervisory relationships;

- social isolation;
- work-life imbalance;
- funding constraints;
- competitive academic cultures;
- unclear career prospects.

The COVID-19 pandemic intensified many of these stressors by disrupting research activities, delaying graduation, reducing social interaction, and increasing financial uncertainty (UNESCO, 2021).

Recent scholarship increasingly argues that mental health should not be viewed solely as an individual responsibility but rather as an institutional issue requiring systemic responses through supportive supervision, flexible doctoral structures, adequate funding, and comprehensive wellbeing services.

2.8 Supervision and Institutional Environment

Doctoral supervision consistently emerges as one of the strongest predictors of doctoral satisfaction, completion, productivity, and wellbeing (Lee, 2008).

Effective supervisors provide:

- intellectual guidance;
- emotional encouragement;
- constructive feedback;
- professional mentoring;
- networking opportunities;
- career advice.

Conversely, ineffective supervision contributes to delayed completion, reduced confidence, conflict, psychological distress, and doctoral attrition.

Institutional culture also influences doctoral experiences. Universities characterised by collaborative research environments, accessible mental health services, transparent expectations, and professional development opportunities generally report higher doctoral satisfaction and completion rates.

Increasingly, institutions are recognising that researcher wellbeing should be considered an essential indicator of doctoral programme quality alongside research outputs and completion statistics.

2.9 Doctoral Education in the Era of Artificial Intelligence and the Fifth Industrial Revolution

The emergence of AI, automation, big data, and the Fifth Industrial Revolution (5IR) is reshaping expectations of doctoral graduates. Rather than replacing researchers, AI increasingly complements human expertise by automating repetitive analytical tasks while enhancing opportunities for interdisciplinary collaboration, creativity, and innovation.

Future doctoral graduates will require competencies extending beyond disciplinary expertise, including:

- AI literacy;
- digital research skills;
- ethical reasoning;
- interdisciplinary collaboration;
- systems thinking;
- leadership;
- entrepreneurship;
- adaptability.

Consequently, scholars increasingly advocate redesigning doctoral education to prepare graduates for careers spanning academia, government, industry, civil society, and global organisations.

Within this context, the value of a PhD should be viewed not merely as an academic qualification but as preparation for lifelong leadership within knowledge-intensive societies.

2.10 Synthesis of the Literature

The literature demonstrates broad agreement that doctoral education continues to generate considerable economic, intellectual, and societal benefits. However, contemporary research also reveals growing concerns regarding financial burden, uncertain employment outcomes, psychological distress, burnout, and declining work-life balance.

Although economic returns remain important, increasing evidence suggests that evaluating doctoral education solely through salary premiums substantially underestimates both its broader societal contributions and its hidden human costs. A holistic understanding of doctoral value therefore requires integrating economic outcomes with career satisfaction, wellbeing, social impact, knowledge creation, and quality of life.

3. Literature Gaps

Despite the rapidly expanding body of literature on doctoral education, several important gaps remain that justify further investigation.

3.1 Gap 1: Overemphasis on Economic Returns

Most studies continue to evaluate the value of doctoral education using conventional economic indicators such as salaries, employment rates, and productivity. Comparatively little research integrates financial outcomes with wellbeing, mental health, life satisfaction, and quality of life, resulting in an incomplete understanding of doctoral value.

3.2 Gap 2: Limited Holistic Frameworks

Existing research often examines economic benefits, career outcomes, or mental health independently. Few studies adopt multidimensional frameworks that simultaneously evaluate economic, professional, intellectual, psychological, and societal dimensions of doctoral education.

3.3 Gap 3: Underrepresentation of Opportunity Costs

Although opportunity costs are acknowledged conceptually, relatively few empirical studies quantify delayed earnings, postponed family formation, retirement savings, career interruptions, or lost professional opportunities associated with prolonged doctoral study.

3.4 Gap 4: Limited Cross-Disciplinary Comparisons

Economic returns vary substantially across disciplines, yet comparative studies examining how perceived doctoral value differs between STEM, health sciences, education, humanities, social sciences, and business remain limited.

3.5 Gap 5: Geographic Imbalance

Most existing research originates from North America, Europe, and Australia. Comparatively little evidence exists from developing countries, Small Island Developing States (SIDS), Africa, Asia, Latin America, and the Pacific, where labour markets, research funding, educational systems, and economic conditions differ considerably.

3.6 Gap 6: Limited Research on Mid-Career and Mature Doctoral Candidates

Most studies focus on traditional full-time doctoral students. Relatively little attention has been given to mature professionals who undertake doctoral study while balancing employment, family responsibilities, caregiving, and financial commitments.

3.7 Gap 7: Insufficient Longitudinal Evidence

Most available studies are cross-sectional. Longitudinal research tracking doctoral candidates before, during, and after graduation is relatively scarce, limiting understanding of how perceptions of doctoral value evolve throughout individuals' careers.

3.8 Gap 8: AI and the Future Value of the PhD

The rapid emergence of AI, automation, and the Fifth Industrial Revolution has fundamentally altered labour market demands. However, empirical evidence examining how these technologies affect the long-term value proposition of doctoral education remains limited and fragmented.

3.9 Gap 9: Institutional Responsibility for Wellbeing

Although increasing attention has been given to doctoral mental health, relatively little research investigates institutional accountability, organisational culture, supervisory models, workload expectations, and systemic interventions that promote sustainable researcher wellbeing.

3.10 Gap 10: Measuring Intangible Returns

Perhaps the greatest gap concerns measuring intangible outcomes such as intellectual growth, societal contribution, policy influence, innovation, resilience, leadership, and personal fulfilment. Existing economic models rarely incorporate these dimensions despite their central importance to the purpose of doctoral education.

3.11 Summary of the Research Gap

Collectively, the literature indicates that while considerable scholarship has examined the economic returns, employability, and mental health implications of doctoral education, there remains no widely accepted multidimensional framework that integrates financial, professional, intellectual, societal, and wellbeing outcomes into a comprehensive assessment of doctoral value. Furthermore, evidence from developing nations and Small Island Developing States remains limited, and little is known about how emerging technologies, changing academic labour markets, and evolving societal expectations are reshaping the value proposition of doctoral education. Addressing these gaps will provide a more balanced and policy-relevant understanding of whether pursuing a PhD remains a worthwhile investment in the twenty-first century.

4. Theoretical Framework

This study is underpinned by three complementary theoretical perspectives: Human Capital Theory (HCT), Job Demands–Resources (JD–R) Theory, and Conservation of Resources (COR) Theory. Together, these theories provide a comprehensive framework for examining whether the benefits of pursuing a Doctor of Philosophy (PhD) degree outweigh its economic, professional, and personal costs.

4.1 Human Capital Theory

Human Capital Theory, developed by Becker (1964, 1993), posits that investment in education enhances an individual's knowledge, skills, competencies, and productivity, leading to improved employability, higher lifetime earnings, career advancement, and broader economic development. Education is therefore viewed as an investment that generates long-term returns for both individuals and society. Within the context of doctoral education, Human Capital Theory suggests that a PhD represents the highest level of investment in formal education. Doctoral graduates acquire advanced research capabilities, critical thinking skills, leadership competencies, innovation capacity, and specialised expertise that contribute to scientific advancement, organisational performance, and national development. The theory predicts that these accumulated capabilities should produce positive returns through increased career opportunities, higher income, professional recognition, and enhanced social contribution (Becker, 1993; Mincer, 1974).

However, while Human Capital Theory effectively explains the expected economic and professional benefits of doctoral education, it pays relatively little attention to the personal sacrifices, psychological pressures, and wellbeing challenges experienced throughout the doctoral journey. Consequently, additional theoretical perspectives are required to provide a more holistic understanding of doctoral value.

4.2 Job Demands–Resources (JD–R) Theory

The Job Demands–Resources (JD–R) Theory, proposed by Demerouti et al. (2001) and further developed by Bakker and Demerouti (2007), provides an appropriate framework for understanding the psychological experiences of doctoral candidates. The theory argues that wellbeing is determined by the balance between job demands and job resources.

In doctoral education, demands include prolonged research activities, publication expectations, thesis completion deadlines, financial pressures, supervisory relationships, uncertainty regarding career prospects, and work–life imbalance. These demands may contribute to chronic stress, emotional exhaustion, anxiety, and burnout when they exceed an individual's coping capacity.

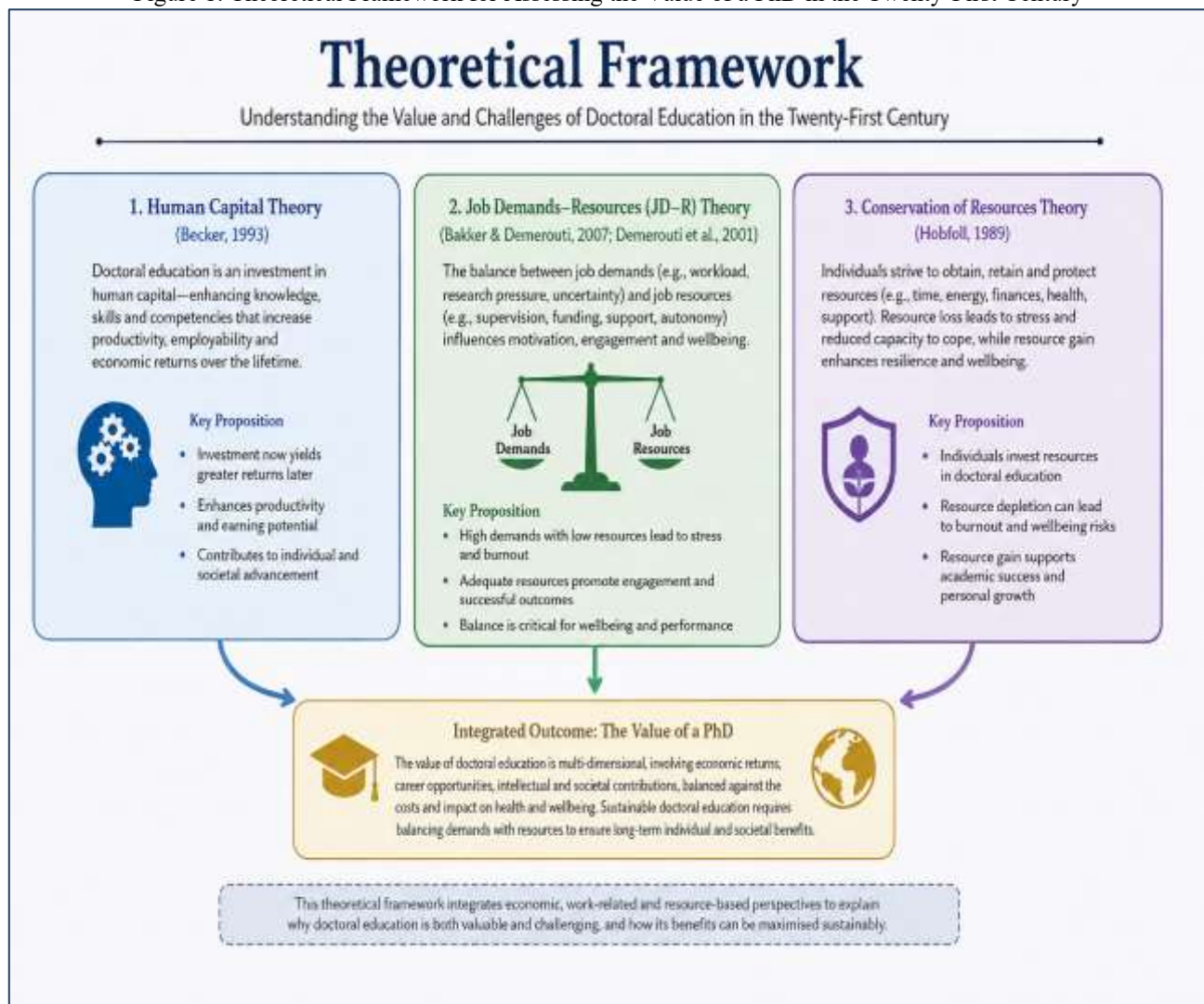
Conversely, job resources, including supportive supervision, mentoring, financial assistance, institutional support, peer networks, professional development opportunities, and positive research environments, can buffer the negative effects of these demands, enhance motivation, improve engagement, and increase the likelihood of successful doctoral completion. Applying the JD–R framework enables this study to examine how institutional and personal resources influence the perceived value of doctoral education beyond purely economic outcomes.

4.3 Conservation of Resources (COR) Theory

Conservation of Resources (COR) Theory, developed by Hobfoll (1989), complements the JD–R framework by explaining how individuals strive to obtain, protect, and build valuable resources, including time, energy, health, finances, social support, and psychological resilience. According to the theory, stress occurs when these resources are threatened, lost, or insufficient to meet ongoing demands. Doctoral candidates invest substantial personal resources throughout their studies, including years of time, financial capital, emotional energy, family commitments, and career opportunities. While successful completion of a PhD may result in significant gains, such as enhanced professional status, increased expertise, career advancement, and personal fulfilment, the doctoral journey may also involve considerable resource depletion through stress, burnout, delayed income, work–life imbalance, and reduced wellbeing.

COR Theory therefore provides an important lens for evaluating whether the long-term gains associated with doctoral education compensate for the resources expended during the doctoral process. It broadens the assessment of doctoral value by recognising that educational success should be measured not only by economic returns but also by the preservation and enhancement of personal wellbeing.

Figure 1: Theoretical Framework for Assessing the Value of a PhD in the Twenty-First Century



Source: Developed by the author based on Human Capital Theory (Becker, 1993), Job Demands–Resources Theory (Demerouti et al., 2001; Bakker & Demerouti, 2007), and Conservation of Resources Theory (Hobfoll, 1989).

4.4 Integration of the Theoretical Framework

Collectively, these three theories provide a multidimensional foundation for the present study. Human Capital Theory explains the anticipated economic and professional returns associated with doctoral education. Job Demands–Resources Theory examines the interaction between the demands of doctoral study and the institutional and personal resources that support successful completion. Conservation of Resources Theory extends the analysis by highlighting the importance of protecting personal, financial, and psychological resources throughout the doctoral journey.

By integrating these perspectives, this study conceptualises the value of a PhD as a balance between economic returns, career opportunities, intellectual growth, and societal contribution, on one hand, and the financial costs, opportunity costs, health impacts, and wellbeing challenges experienced by doctoral candidates on the other. This integrated framework provides a holistic basis for evaluating whether pursuing a PhD remains a worthwhile investment in the twenty-first century.

5. Conceptual Framework

The conceptual framework for this study is developed from the integration of Human Capital Theory, Job Demands–Resources (JD–R) Theory, and Conservation of Resources (COR) Theory. It illustrates that the overall value of pursuing a Doctor of Philosophy (PhD) is determined by the interaction between the benefits and costs associated with doctoral education. Rather than viewing the PhD solely as an investment that yields economic returns, the framework conceptualises doctoral education as a multidimensional process in which financial, professional, intellectual, psychological, and social factors collectively influence an individual's perception of whether the doctorate is a worthwhile investment.

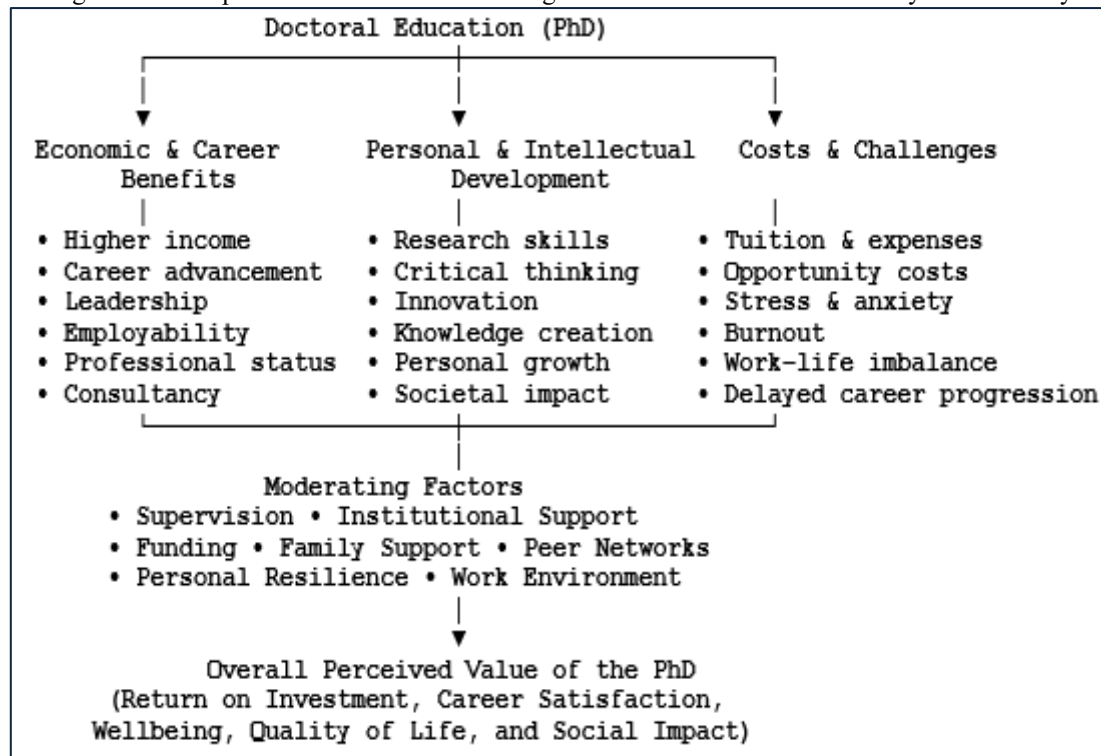
At the centre of the framework is Doctoral Education (PhD), which generates a range of positive outcomes, including enhanced knowledge and research competencies, career advancement, leadership opportunities, higher earning potential, innovation, professional recognition, and contributions to society. These outcomes represent the anticipated returns on investment predicted by Human Capital Theory.

However, pursuing a PhD also involves significant challenges and resource demands. These include tuition and research costs, opportunity costs arising from delayed career progression and reduced earnings, workload pressures, publication expectations, supervisory relationships, work–life imbalance, stress, burnout, and mental health challenges. Drawing on the Job Demands–Resources and Conservation of Resources theories, the framework recognises that the availability of institutional support, financial assistance, effective supervision, family support, peer networks, and personal resilience can moderate these challenges and improve the overall doctoral experience.

The framework proposes that the overall perceived value of a PhD is the result of balancing these competing dimensions. When the economic, professional, intellectual, and societal benefits exceed the financial, emotional, and health-related costs, doctoral education is perceived as a worthwhile investment. Conversely, when the cumulative costs outweigh the anticipated returns, individuals may perceive the doctoral journey as offering limited overall value despite successful completion.

Accordingly, this conceptual framework provides a holistic basis for evaluating doctoral education by recognising that its true value extends beyond salary and career advancement to include health, wellbeing, personal fulfilment, quality of life, and long-term societal contribution.

Figure 1: Conceptual Framework for Assessing the Value of a PhD in the Twenty-First Century



Source: Developed by the author based on Human Capital Theory (Becker, 1993), Job Demands–Resources Theory (Demerouti et al., 2001; Bakker & Demerouti, 2007), and Conservation of Resources Theory (Hobfoll, 1989).

6. Discussion and Analysis

6.1 Introduction

The purpose of this paper was to critically examine whether pursuing a Doctor of Philosophy (PhD) degree remains a worthwhile investment in the twenty-first century by evaluating its economic returns, career opportunities, intellectual contributions, and hidden costs to health and wellbeing. The literature demonstrates that the value of doctoral education cannot be adequately understood through a single economic or educational perspective. Rather, it is a multidimensional construct encompassing financial outcomes, career development, knowledge creation, psychological wellbeing, social contribution, and personal fulfilment. This discussion synthesises the findings through the theoretical lenses of Human Capital Theory (Becker, 1993), the Job Demands–Resources (JD–R) Theory (Bakker & Demerouti, 2007; Demerouti et al., 2001), and Conservation of Resources (COR) Theory (Hobfoll, 1989), while reflecting on the changing role of doctoral education in a rapidly evolving global knowledge economy.

6.2 The Economic Value of a PhD Remains Significant but Increasingly Complex

One of the strongest findings emerging from the literature is that doctoral education continues to generate important economic returns, although these returns are neither uniform nor guaranteed. Human Capital Theory argues that education is an investment that enhances productivity, skills, and earning potential (Becker, 1993). This proposition remains largely valid, as many doctoral graduates continue to experience higher lifetime earnings, greater employment stability, enhanced leadership opportunities, and increased professional recognition compared with individuals holding lower-level qualifications (OECD, 2023).

However, the contemporary labour market presents a more complex picture than the traditional assumptions underlying Human Capital Theory. The rapid expansion of doctoral programmes worldwide has increased the supply of highly qualified graduates without a corresponding increase in permanent academic positions (Cyranoski et al., 2011). Consequently, economic returns now vary considerably across disciplines, sectors, and countries. Graduates in engineering, computer science, medicine, and biotechnology frequently obtain higher financial returns than those in education, humanities, or the social sciences. Nevertheless, financial remuneration alone fails to capture the broader societal contributions made by doctoral graduates working in education, public policy, healthcare, and community development.

The findings therefore suggest that the economic value of a PhD should be interpreted within broader labour market contexts rather than through salary comparisons alone. Increasingly, doctoral graduates create value through consultancy, entrepreneurship, innovation, policy development, leadership, and interdisciplinary collaboration, indicating that traditional measures of return on investment underestimate the broader economic impact of doctoral education.

6.3 Beyond Income: The Expanding Value of Doctoral Education

An important contribution of this review is the recognition that the value of a PhD extends well beyond financial rewards. Doctoral education develops advanced cognitive abilities, research competence, critical thinking, complex problem-solving skills, ethical reasoning, resilience, leadership, and intellectual independence (Walker et al., 2008). These capabilities enable graduates to contribute meaningfully to scientific advancement, evidence-based policymaking, educational improvement, technological innovation, healthcare reform, and sustainable development.

From a societal perspective, doctoral graduates generate knowledge that benefits governments, industries, communities, and future generations. Their research contributes to addressing complex global challenges such as climate change, food security, public health, educational inequality, digital transformation, and artificial intelligence governance. These contributions represent public goods that are difficult to quantify economically but remain central to national development and social progress (UNESCO, 2021).

This broader understanding aligns with contemporary views of universities as institutions responsible not only for workforce preparation but also for knowledge creation, civic engagement, innovation, and the advancement of society. Consequently, the value of a PhD should incorporate both private returns to individuals and public returns to society.

6.4 The Hidden Economic Costs of Doctoral Education

While doctoral education offers substantial long-term benefits, the literature consistently highlights significant financial and opportunity costs. Tuition fees, research expenses, conference participation, publication charges, relocation, and prolonged periods of reduced income represent considerable investments for doctoral candidates (Walker et al., 2008). These costs are compounded by opportunity costs arising from delayed entry into full-time employment, postponed promotions, reduced retirement savings, and deferred family and financial commitments.

For mature students and professionals, these opportunity costs may be particularly substantial because doctoral study often coincides with demanding careers and family responsibilities. Consequently, the actual economic return on investment may take many years to materialise. The discussion therefore suggests that doctoral education should be evaluated using a life-course perspective rather than short-term financial indicators. While graduates may eventually experience higher earnings and professional advancement, these gains frequently occur only after years of substantial personal and financial sacrifice.

6.5 Doctoral Education and the Wellbeing Paradox

Perhaps the most striking finding emerging from contemporary scholarship is what may be described as the doctoral wellbeing paradox. Although doctoral education aims to produce highly capable researchers and future leaders, the process itself often exposes candidates to sustained psychological pressure, emotional exhaustion, and declining wellbeing (Evans et al., 2018; Levecque et al., 2017). The literature consistently reports elevated levels of anxiety, depression, burnout, loneliness, and stress among doctoral candidates. These challenges arise from multiple interacting factors, including prolonged uncertainty, publication pressure, perfectionism, funding insecurity, supervisory relationships, work–life imbalance, and concerns regarding future employment.

From the perspective of the Job Demands–Resources Theory, these findings suggest that doctoral programmes frequently impose demands that exceed available personal and institutional resources (Bakker & Demerouti, 2007). When demands consistently outweigh available support, emotional exhaustion and burnout become increasingly likely. Conversely, supportive supervision, adequate funding, peer networks, mentoring, and positive institutional cultures serve as protective resources that enhance resilience and promote successful doctoral completion.

The findings therefore indicate that researcher wellbeing should no longer be regarded as an individual issue but rather as a systemic institutional responsibility.

6.6 Resource Depletion and the Cost of Academic Success

Conservation of Resources Theory provides additional insight into the doctoral experience by emphasising the importance of protecting valuable personal resources, including time, energy, finances, relationships, health, and emotional resilience (Hobfoll, 1989).

Doctoral candidates invest extraordinary levels of personal resources throughout their studies. They often sacrifice leisure, family time, career progression, financial security, and physical health in pursuit of academic excellence. Although successful completion may generate valuable resource gains—including increased expertise, professional recognition, and career opportunities—the doctoral journey itself frequently involves significant resource depletion.

This perspective challenges traditional assumptions that educational success necessarily enhances wellbeing. Instead, the evidence suggests that success may sometimes be achieved despite deteriorating physical and psychological health. Such outcomes raise important ethical questions regarding the sustainability of current doctoral education models.

6.7 Supervision as a Determinant of Doctoral Success

Across the literature, doctoral supervision consistently emerges as one of the strongest determinants of both academic success and psychological wellbeing (Lee, 2008).

Effective supervision extends beyond technical guidance to include mentoring, emotional support, constructive feedback, professional networking, career development, and encouragement. Strong supervisory relationships foster confidence, resilience, research productivity, and timely completion.

Conversely, poor supervision contributes to delayed completion, reduced motivation, isolation, conflict, and psychological distress. These findings reinforce the growing recognition that supervision should be viewed as a professional partnership rather than merely an academic oversight function.

Universities therefore have an important responsibility to strengthen supervisor training, establish clear supervisory expectations, monitor candidate experiences, and recognise excellence in doctoral supervision as a key indicator of institutional quality.

6.8 Doctoral Education in the Age of Artificial Intelligence and the Fifth Industrial Revolution

The emergence of artificial intelligence, automation, and the Fifth Industrial Revolution (5IR) has fundamentally altered the context within which doctoral education operates. Routine analytical tasks previously performed manually are increasingly supported by AI technologies, while employers place greater emphasis on creativity, interdisciplinary collaboration, ethical judgement, innovation, systems thinking, and complex problem-solving (Schwab & Malleret, 2020).

Rather than diminishing the value of doctoral education, these developments arguably increase the importance of uniquely human capabilities developed through advanced research. Doctoral graduates are particularly well positioned to lead interdisciplinary research, critically evaluate AI-generated knowledge, address ethical challenges, and translate research into practical solutions.

However, universities must adapt doctoral curricula accordingly by incorporating digital literacy, AI competency, data science, interdisciplinary research methods, leadership development, entrepreneurship, and communication skills. Future doctoral programmes should prepare graduates not only for academic careers but also for leadership roles across government, industry, civil society, and international organisations.

6.9 The Need for a Broader Definition of Return on Investment

A major implication emerging from this review is that the return on investment (ROI) of doctoral education should be redefined. Traditional economic evaluations typically focus on salary premiums and employment outcomes. While these indicators remain important, they fail to capture many of the most valuable outcomes associated with doctoral education.

A comprehensive assessment should include:

- economic returns (income, employment, promotions);
- career satisfaction and flexibility;
- research productivity and innovation;
- leadership and policy influence;
- societal contribution;
- personal fulfilment;
- work–life balance;
- physical and mental health;
- quality of life;
- long-term professional sustainability.

Such a multidimensional framework provides a more accurate understanding of doctoral value and better reflects the diverse aspirations of contemporary doctoral candidates.

6.10 Implications for Policy and Practice

The findings have important implications for governments, universities, funding agencies, supervisors, and employers.

Universities should place researcher wellbeing alongside research productivity as a core performance indicator. Doctoral programmes should integrate structured mentoring, mental health support, leadership development, career planning, transferable skills training, and financial literacy.

Governments should recognise doctoral graduates as strategic national assets and invest in sustainable doctoral funding, research infrastructure, innovation ecosystems, and diverse employment pathways beyond academia.

Employers should continue recognising the transferable competencies developed through doctoral education and strengthen partnerships with universities to facilitate graduate transitions into industry, government, and community sectors.

Finally, prospective doctoral candidates should evaluate doctoral education using a holistic framework that considers not only financial returns but also personal goals, family circumstances, health, career aspirations, and long-term quality of life.

6.11 Overall Analysis

The evidence reviewed throughout this study demonstrates that pursuing a PhD remains one of the most significant intellectual and professional investments an individual can make. However, its value cannot be reduced to financial returns alone. The doctoral journey simultaneously produces substantial gains in knowledge, research capability, leadership, innovation, and societal contribution while demanding considerable investments of time, money, emotional energy, and personal wellbeing.

Accordingly, the central question is no longer "Does a PhD pay?" but rather "What constitutes value in doctoral education?" The answer lies in adopting a multidimensional perspective that balances economic returns with intellectual fulfilment, career opportunities, social contribution, health, wellbeing, and quality of life.

Viewed through this broader lens, the PhD continues to represent a valuable investment for individuals and society. Nevertheless, its long-term sustainability depends upon transforming doctoral education into a more supportive, inclusive, financially accessible, and wellbeing-oriented endeavour. Future doctoral success should therefore be measured not only by publications, citations, grants, or salaries, but also by the ability of doctoral graduates to lead meaningful, healthy, innovative, and socially impactful lives.

Table 2: Key Challenges Affecting Doctoral Students' Health and Wellbeing

Challenge	Description	Potential Consequences
Heavy workload	Extended research, teaching, publications, and administrative responsibilities	Fatigue, emotional exhaustion, burnout
Financial pressure	Tuition fees, research expenses, inadequate funding, reduced income	Financial stress, delayed completion
Career uncertainty	Limited permanent academic positions and uncertain employment pathways	Anxiety, reduced motivation
Supervisory relationship	Poor communication, inconsistent guidance, limited mentoring	Delayed completion, dissatisfaction, psychological distress
Work-life imbalance	Difficulty balancing study, employment, and family responsibilities	Reduced wellbeing, relationship strain
Publication pressure	Pressure to publish in high-impact journals before graduation	Stress, perfectionism, imposter syndrome
Social isolation	Independent nature of doctoral research and limited peer interaction	Loneliness, depression, reduced engagement
Technological change	Rapid advances in AI, digital research methods, and changing skill requirements	Skills gap, increased learning demands

Source: Developed by the author based on Demerouti et al. (2001), Hobfoll (1989), Levecque et al. (2017), Evans et al. (2018), Lee (2008), and Schwab and Malleret (2020).

7. Conclusion

The question of whether pursuing a Doctor of Philosophy (PhD) degree is "worth it" has become increasingly significant in the twenty-first century as higher education systems undergo rapid transformation in response to globalisation, digitalisation, artificial intelligence (AI), changing labour markets, and growing concerns about researcher wellbeing. This paper critically examined the multidimensional value of doctoral education by balancing its economic returns, career opportunities, intellectual contributions, and societal benefits against its financial costs, opportunity costs, and impacts on health and wellbeing. The evidence reviewed demonstrates that the value of a PhD extends far beyond conventional measures of salary, employment, and academic prestige. Instead, doctoral education represents a complex investment whose outcomes encompass economic, professional, intellectual, psychological, and societal dimensions.

From an economic perspective, the literature continues to support the proposition that doctoral education generates important long-term benefits for many graduates. Consistent with Human Capital Theory, investment in advanced education enhances specialised knowledge, research capability, analytical thinking, innovation, and leadership capacity, thereby improving employability, career progression, and lifetime earning potential (Becker, 1993; Mincer, 1974). However, these economic returns are increasingly variable across disciplines, employment sectors, and national contexts. While graduates in science, technology, engineering, and health-related disciplines frequently enjoy substantial financial returns, those in education, humanities, and the social sciences often realise their greatest contributions through policy development, educational improvement, public service, and social transformation rather than through high salaries alone (OECD, 2023).

A central conclusion emerging from this review is that evaluating doctoral education solely through economic indicators provides an incomplete and potentially misleading understanding of its overall value. Doctoral graduates contribute to society in numerous ways that are difficult to quantify monetarily. They generate new knowledge, advance scientific discovery, strengthen evidence-based policymaking, foster technological innovation, improve healthcare systems, contribute to educational reform, address environmental challenges, and support sustainable development goals (UNESCO, 2021). These contributions represent significant public benefits that extend beyond individual financial returns and reinforce the enduring societal importance of doctoral education. At the same time, the review highlights that these benefits are often achieved through considerable personal sacrifice. The doctoral journey requires sustained investment of time, financial resources, emotional commitment, and personal resilience. Tuition fees, research costs, reduced income, delayed career progression, postponed family and financial goals, and opportunity costs represent substantial investments that may not yield immediate financial rewards (Walker et al., 2008). For many candidates, particularly mature professionals and those with family responsibilities, the opportunity costs associated with doctoral study are substantial and should be recognised as integral components of the overall return-on-investment equation.

Perhaps the most compelling finding of this paper concerns the growing evidence regarding the hidden health and wellbeing costs of doctoral education. International studies consistently demonstrate elevated levels of stress, anxiety, depression, burnout, social isolation, and emotional exhaustion among doctoral candidates (Evans et al., 2018; Levecque et al., 2017). These findings challenge the long-standing assumption that academic success is achieved without significant personal cost. Instead, they suggest that many doctoral candidates attain academic excellence while simultaneously experiencing declining psychological wellbeing, highlighting what this paper conceptualises as the doctoral wellbeing paradox, the pursuit of the highest academic qualification often coincides with some of the greatest personal and psychological challenges encountered during an individual's educational journey.

The theoretical perspectives underpinning this study reinforce this conclusion. Human Capital Theory explains why individuals and societies continue to invest heavily in doctoral education because of its anticipated economic and professional returns (Becker, 1993). However, the Job Demands–Resources (JD–R) Theory demonstrates that the demands associated with doctoral study frequently exceed available institutional and personal resources, increasing the likelihood of stress and burnout unless adequate support systems are provided (Bakker & Demerouti, 2007; Demerouti et al., 2001). Similarly, Conservation of Resources (COR) Theory illustrates how prolonged investment of personal resources, including time, finances, emotional energy, and health, may lead to significant resource depletion if individuals are unable to replenish these resources throughout the doctoral journey (Hobfoll, 1989). Collectively, these theories provide a more comprehensive understanding of doctoral education by integrating both its benefits and its costs. The findings also suggest that the future value of doctoral education will increasingly depend upon its ability to adapt to rapidly changing social, technological, and economic conditions. The emergence of AI, automation, and the Fifth Industrial Revolution (5IR) is reshaping labour markets and redefining the competencies required of future researchers and leaders (Schwab & Malleret, 2020). While AI is likely to automate many routine analytical tasks, uniquely human capabilities, including creativity, ethical reasoning, critical thinking, interdisciplinary collaboration, and innovative problem-solving, will become increasingly valuable. Doctoral education therefore remains highly relevant, provided that programmes evolve to cultivate these capabilities while preparing graduates for diverse careers across academia, industry, government, and civil society.

Another important conclusion concerns the responsibility of higher education institutions. Universities have traditionally measured doctoral success through metrics such as completion rates, publications, citations, research grants, and institutional rankings. Although these indicators remain important, they are insufficient measures of doctoral quality if achieved at the expense of candidate wellbeing. Universities must therefore adopt a more holistic approach that recognises researcher wellbeing as a fundamental indicator of doctoral success. This includes strengthening supervisory practices, improving access to mental health services, providing financial support, promoting work–life balance, developing transferable skills, and creating inclusive research cultures that value both academic excellence and human flourishing (Lee, 2008).

The review further demonstrates that the concept of return on investment in doctoral education requires significant redefinition. Rather than focusing exclusively on financial outcomes, future evaluations should incorporate economic returns, career satisfaction, intellectual development, research productivity, societal impact, leadership capacity, health, wellbeing, quality of life, and long-term professional sustainability. Such a multidimensional framework more accurately reflects the diverse aspirations of doctoral candidates and the broad contributions that doctoral graduates make to society.

Overall, this study concludes that a PhD remains a worthwhile investment, but its value depends on how success is defined. If success is measured solely by salary, rapid career progression, or academic status, the return may appear uncertain or uneven. However, if success is understood more broadly, as the ability to generate knowledge, influence policy, solve complex societal problems, foster innovation, develop intellectual independence, lead organisations, and contribute to the public good while maintaining personal wellbeing—the value of doctoral education remains profound and enduring.

Ultimately, the future of doctoral education lies not in questioning its relevance but in transforming its delivery. Sustainable doctoral education should produce not only outstanding researchers but also healthy, resilient, innovative, ethically responsible, and socially engaged leaders capable of addressing the increasingly complex challenges facing humanity. Achieving this balance will require governments, universities, supervisors, funding agencies, employers, and doctoral candidates to work collaboratively in creating research environments where academic excellence and human wellbeing are viewed not as competing priorities, but as complementary foundations of doctoral success. In this way, the true value of a PhD will be measured not only by the knowledge it creates, but also by the positive and lasting impact its graduates have on individuals, communities, institutions, nations, and the wider global society.

8. Way Forward

The findings of this review demonstrate that doctoral education remains one of the most important drivers of knowledge creation, innovation, and societal advancement. However, the sustainability and long-term value of the PhD depend on the willingness of governments, universities, funding agencies, employers, supervisors, and doctoral candidates to rethink how doctoral education is

designed, delivered, and evaluated. The future of doctoral education should move beyond the traditional emphasis on academic outputs alone and embrace a more holistic model that values research excellence, wellbeing, employability, innovation, and societal impact equally.

8.1 Reimagining Doctoral Education for the Twenty-First Century

The twenty-first century is characterised by unprecedented technological advancement, artificial intelligence (AI), automation, climate change, demographic shifts, geopolitical uncertainty, and increasingly complex societal challenges. These developments require doctoral graduates who are not only disciplinary experts but also interdisciplinary thinkers, ethical leaders, innovators, and effective communicators (OECD, 2023; UNESCO, 2021).

Consequently, doctoral programmes should be redesigned to equip graduates with competencies that extend beyond traditional research skills. Future doctoral curricula should integrate leadership development, entrepreneurship, digital literacy, AI competency, policy engagement, project management, science communication, and interdisciplinary collaboration. Such reforms would enhance graduate employability while ensuring that doctoral education remains responsive to the evolving needs of society and the global economy.

8.2 Placing Wellbeing at the Centre of Doctoral Education

Perhaps the most urgent priority emerging from this review is the need to reposition researcher wellbeing as a central pillar of doctoral education rather than as a peripheral student support service. Universities should recognise that maintaining psychological wellbeing is essential for sustaining research quality, creativity, productivity, and successful completion (Evans et al., 2018; Levecque et al., 2017). A culture that equates academic excellence with excessive workloads, chronic stress, and personal sacrifice is ultimately unsustainable. Instead, doctoral education should foster healthy research environments where candidates are encouraged to balance academic achievement with physical health, mental wellbeing, family commitments, and professional development.

Wellbeing indicators should therefore become integral components of doctoral quality assurance frameworks alongside completion rates, publication outputs, and research funding.

8.3 Transforming Doctoral Supervision

Doctoral supervision remains one of the strongest predictors of candidate success, satisfaction, and wellbeing (Lee, 2008). Future doctoral programmes should move beyond the traditional supervisory model toward collaborative mentoring relationships that support both academic development and personal growth.

Universities should provide compulsory supervisor development programmes focusing on effective mentoring, emotional intelligence, intercultural communication, conflict resolution, ethical supervision, inclusive research practices, and mental health awareness. Institutions should also establish transparent supervisory expectations, regular progress reviews, and mechanisms through which doctoral candidates can confidentially seek assistance when supervisory relationships become ineffective.

Strengthening supervisory quality will contribute not only to improved completion rates but also to healthier doctoral experiences.

8.4 Diversifying Career Pathways

The traditional assumption that the PhD primarily prepares graduates for academic careers no longer reflects contemporary labour market realities. Increasing numbers of doctoral graduates pursue successful careers in government, industry, entrepreneurship, international organisations, consulting, healthcare, education, and the non-profit sector.

Doctoral education should therefore explicitly prepare candidates for multiple career trajectories through internships, industry partnerships, professional placements, entrepreneurship training, leadership programmes, policy engagement, and transferable skills development. Universities should strengthen collaboration with employers to ensure that doctoral graduates possess the competencies required within rapidly changing knowledge economies. Such diversification would improve graduate employability while reducing uncertainty regarding postdoctoral career opportunities.

8.5 Ensuring Financial Sustainability

Financial insecurity remains a significant contributor to doctoral stress and delayed completion. Governments, funding agencies, universities, and industry partners should work collaboratively to increase doctoral scholarships, research grants, travel funding, publication support, and emergency financial assistance.

Financial support mechanisms should particularly recognise mature candidates, part-time researchers, women, caregivers, and candidates from low-income backgrounds who often face greater economic challenges during doctoral study. Reducing financial pressures would allow candidates to focus more effectively on research while promoting equity and widening participation in doctoral education.

8.6 Leveraging Artificial Intelligence Responsibly

Artificial intelligence presents both opportunities and challenges for doctoral education. Rather than viewing AI as a threat, universities should integrate AI literacy into doctoral training while promoting ethical, transparent, and responsible use of emerging technologies.

Doctoral candidates should develop competencies in AI-assisted research, advanced data analytics, digital scholarship, research integrity, algorithmic ethics, and critical evaluation of AI-generated knowledge. Simultaneously, institutions must establish clear policies governing responsible AI use to preserve academic integrity and originality. Graduates who combine advanced research expertise with AI competency will be better positioned to lead innovation within the Fifth Industrial Revolution.

8.7 Strengthening Research on Doctoral Wellbeing

The growing evidence regarding doctoral mental health highlights the need for sustained international research into researcher wellbeing. Longitudinal studies should investigate how financial pressures, supervision, institutional culture, family responsibilities, career uncertainty, and technological change influence doctoral experiences over time.

Particular attention should be given to underrepresented regions, including developing countries, Small Island Developing States (SIDS), Africa, Asia, Latin America, and the Pacific, where relatively little empirical evidence currently exists despite rapidly expanding doctoral education systems.

Future research should also develop multidimensional frameworks capable of measuring both the tangible and intangible returns associated with doctoral education.

8.8 Redefining Success in Doctoral Education

Perhaps the most significant transformation required concerns how success itself is defined. Success should no longer be measured solely through publications, citations, grants, rankings, or completion times. Instead, doctoral education should cultivate graduates who are intellectually curious, ethically responsible, socially engaged, emotionally resilient, innovative, collaborative, and capable of addressing complex global challenges.

The future of doctoral education therefore lies not merely in producing more PhD graduates, but in producing graduates who can generate meaningful and sustainable impact while maintaining healthy and fulfilling professional and personal lives.

9. Recommendations

9.1 Recommendations for Governments

- Increase investment in doctoral education through sustainable scholarships, research funding, innovation grants, and national research infrastructure.
- Develop national doctoral education strategies that align doctoral training with workforce needs, innovation priorities, and sustainable development goals.
- Promote research careers beyond academia by strengthening partnerships between universities, government agencies, industry, and civil society.
- Recognise doctoral graduates as strategic national assets whose expertise contributes to economic growth, public policy, innovation, and social development.

9.2 Recommendations for Universities

- Integrate mental health and wellbeing into doctoral programme design, quality assurance, and institutional performance indicators.
- Strengthen doctoral supervision through mandatory supervisor training, mentoring programmes, and regular performance evaluation.
- Expand professional development programmes covering leadership, entrepreneurship, communication, AI literacy, digital research methods, project management, and policy engagement.
- Improve access to counselling services, peer-support networks, writing groups, coaching, and wellbeing initiatives.
- Establish flexible doctoral pathways that accommodate mature students, part-time researchers, caregivers, and working professionals.
- Develop comprehensive career services supporting transitions into academia, industry, government, entrepreneurship, and international organisations.

9.3 Recommendations for Supervisors

- Adopt mentoring approaches that balance academic guidance with emotional support and professional development.
- Foster open, respectful, and transparent communication throughout the doctoral journey.
- Encourage realistic expectations regarding workload, publication, and career progression.
- Promote work-life balance while recognising the diverse personal circumstances of doctoral candidates.
- Support candidates in developing transferable professional competencies alongside research expertise.

9.4 Recommendations for Funding Agencies

- Expand doctoral scholarships that adequately reflect living costs.
- Provide dedicated funding for conference participation, publications, fieldwork, software, and research dissemination.
- Introduce emergency financial assistance schemes for candidates experiencing unexpected hardship.
- Support interdisciplinary, industry-linked, and international doctoral research initiatives.

9.5 Recommendations for Employers

- Increase recognition of the transferable skills developed through doctoral education.
- Create employment pathways that utilise doctoral graduates' research, leadership, analytical, and innovation capabilities.
- Strengthen university–industry collaboration through internships, collaborative research projects, and knowledge-transfer partnerships.

9.6 Recommendations for Doctoral Candidates

- Evaluate doctoral study using both economic and personal considerations, including career aspirations, wellbeing, family responsibilities, and long-term goals.
- Develop strong time-management, resilience, communication, leadership, and networking skills throughout candidature.
- Seek supportive supervisory and peer relationships while maintaining healthy work-life boundaries.
- Embrace lifelong learning by developing competencies in AI, digital technologies, interdisciplinary collaboration, and science communication.
- Prioritise physical and mental wellbeing throughout the doctoral journey, recognising that long-term success depends on sustaining both academic excellence and personal health.

Table 3: Recommendations for Enhancing the Value and Sustainability of Doctoral Education

Stakeholder	Key Recommendations	Expected Outcomes
Governments	Increase doctoral funding; strengthen national research strategies; expand innovation investment	Stronger research capacity; economic development; national competitiveness
Universities	Improve supervision; provide mental health services; embed transferable skills and AI literacy; strengthen career development	Higher completion rates; improved wellbeing; enhanced graduate employability
Supervisors	Provide mentoring, constructive feedback, and emotional support; promote work–life balance	Increased student satisfaction; improved research productivity; reduced attrition
Funding Agencies	Expand scholarships; provide conference, publication, and research support	Reduced financial stress; improved research quality
Employers	Recognise transferable doctoral skills; strengthen university–industry partnerships	Improved graduate employment; stronger innovation ecosystems
Doctoral Candidates	Develop resilience, leadership, digital skills, networking, and career planning while prioritising wellbeing	Greater career success; sustainable professional development; improved quality of life

Source: Developed by the author based on the findings of this study and informed by Becker (1993), Bakker and Demerouti (2007), Hobfoll (1989), OECD (2023), UNESCO (2021), and Walker et al. (2008).

9.7 Final Recommendation

The evidence presented in this paper strongly suggests that the question should no longer be whether a PhD is worth pursuing, but rather how doctoral education can be redesigned so that its intellectual, economic, and societal benefits are achieved without compromising the health, wellbeing, and quality of life of those who undertake it. A sustainable doctoral education system must therefore balance research excellence with human wellbeing, ensuring that future generations of doctoral graduates emerge not only as outstanding scholars, but also as healthy, resilient, innovative, and socially responsible leaders capable of addressing the increasingly complex challenges of the twenty-first century.

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