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ORIGINAL ARTICLE

Prominence, Promotion and Positioning of the 'Thesis by Publication' in Six Countries

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Abstract

The international nature of doctoral education creates interesting tensions where national systems, institutional policies, disciplinary customs, individual supervisor preferences, and doctoral researcher needs meet. The Thesis by Publication (TBP), a model where published works are included within the thesis, is available to doctoral researchers in many disciplines and institutions, but it is not a universally accepted format or approached in a homogeneous way. Policy has been known to shape practice, yet we know little about how institutional policies shape TBP practices across different national contexts. This study presents a content analysis of policy documents related to the TBP in public universities across six countries: Australia, Japan, New Zealand, South Africa, Spain, and the United Kingdom. Our goal is to understand the prevalence of the TBP and related policy documentation in different contexts, and how the model is promoted and positioned within the doctoral landscape. Findings from our study challenge the often-stated notion that the TBP is a universally understood format. Our findings also show the risks in the absence of explicit policies, as well as the possible inequalities that may arise as a result of a lack of policy transparency and synergy within and across contexts.

Keywords Thesis by publication · Doctoral education · PhD · Scholarly publishing

Introduction

Successful researchers value the doctorate as preparation for an academic career (Sinclair et al., 2014), and the doctorate is positively associated with academic success of early career academics (Sutherland et al., 2014). It is also valued in a wide range of careers which involve high level research and communication skills, not just in academia. In recent decades and across the world, the landscape of

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doctoral education has changed, moving from a master-apprentice model, to a more diverse offering of program formats, supervisory arrangements, and envisioned potential career outcomes (McKenna and van Schalkwyk, 2023; Poyatos Matas, 2012). The wide range of career options available have led an increasing number of doctorate-holders to pursue careers outside of academia (Kelly et al., 2020). Yet despite this situation, an academic pathway remains the most desired route by most PhD graduates. This latter point underscores the importance of publishing during candidature to best position a graduate for entry into an academic position (Nicholas et al., 2017).

Higher education institutions (HEIs) across the world are becoming more international, and doctoral researchers in particular are becoming, or are required to be, globally mobile. In addition, their doctoral work itself is required to be internationally recognized. However, there is still considerable variation in how doctoral programs are structured, what is expected of doctoral researchers, and what their final submission should look like. While such variation may be expected across disciplines (such as between STEM (Science, Technology, Engineering and Mathematics) and HASS (Humanities and Social Sciences) fields, and across program formats (for example between research focused and professional doctorates), the essence of the doctorate remains the same; 'the development of original, responsible, and ethical thinkers, and the generation of new and original ideas and knowledge' (Nerad et al., 2019, 4).

How doctoral ideas and knowledge are disseminated beyond the generation thereof has become a key concern for stakeholders in doctoral education, including doctoral researchers themselves, supervisors, administrators in research governance, funders, industry, and society at large. Scholarly publications are perhaps the most valuable currency in modern academia as they impact researchers' employment, promotion, and funding opportunities (see for example, Browning et al., 2014). These trends in higher education and pressures on doctoral researchers have shaped how they present and disseminate their research. While these trends are unfolding in the global research arena, the dissemination playing field is by no means equal. Variations are evident across disciplines (with publication during the doctorate being more common in STEM than HASS fields) and types of HEIs (in terms of how publication is encouraged in emerging versus established higher education contexts). There are also inconsistencies across national boundaries, considering that access to resources including literature and funding, opportunities for researcher mobility, and costs associated with publication are often unequal depending on geographical positionality.

The 'by Publication' format has become increasingly commonplace in universities across the globe (Chong and Johnson, 2022; Chapter 2 of Nygaard and Solli, 2021). While there is a lack of consistency in definitions and nomenclature, we focus our attention in this study on the prospective model, where doctoral researchers engage in publication during their candidature and include these outputs within their thesis submission. We refer to this model henceforth as Thesis by Publication (TBP). This is not to be confused with models that allow experienced researchers who do not already hold a doctoral degree to receive this award based on a prior record of publications. This is sometimes called a 'PhD by prior publication,'

and while it is common in the UK (Chong and Johnson, 2022), it is the TBP that has seen immense growth in the past decades, expanding beyond the natural sciences where it first emerged, and beyond Scandinavia where it is well-established (Solli and Nygaard, 2022). Our focus on the prospective model is also influenced by an interest in the development of new researchers at the beginning of their research journeys, as opposed to experienced researchers who would already possess the skills and knowledge necessary for successful publishing.

Despite its growth, and the international nature of doctoral education, there is a paucity of knowledge regarding how the TBP is constituted and implemented in different contexts. At present, many institutions are developing and refining their policies, and this study will highlight trends and differences in existing policies that may be informative. Across institutions there are differences in how the TBP is defined, how it is positioned and promoted, and the expectations placed on doctoral researchers. Institutional policy and national context are factors that shape the TBP; yet we currently know little about how institutional policies differ across contexts, nor how they act as mechanisms that drive the selection of this approach, and how it shapes the format of the thesis itself. To help develop an understanding on this aspect of doctoral education at an international level, we investigated various aspects of the TBP in six different national contexts. This paper reports the findings to the following research questions:

- What is the prevalence of the TBP (and related policies) in different national contexts?
- What nomenclature is used to describe and promote the model?
- What requirements or restrictions are there in adopting the model?
- How is the TBP positioned within the landscape of options available, as illustrated by any mention of benefits and advantages, or risks and disadvantages?

Methods

In order to answer the research questions, we conducted a manifest content analysis. This method involves the examination of textual data where 'meaning is located in the discrete elements of the content that are easily identified on the surface of the text' (Kleinheksel et al., 2020, 133). Sources of data include policies, guidelines and other information (henceforth for brevity, 'policies') provided to students relating to the inclusion of publications in doctoral theses and dissertations. Only information that was publicly available on institutional websites was included, for practical and consistency reasons, but also importantly, because when doctoral and other researchers form an understanding of the TBP as a distinct model, it is informed by various sources, including those beyond their own institutions. This is particularly true for future students who are searching for information without access to internal documents, and current students with limited access to guidelines in their own institutions. For example, an Australian study found cases where even administrators were unaware of the existence of institutional TBP policies (Mason et al., 2019).

Our study involved six countries across four continents (Table 1). These countries were selected for pragmatic reasons—it was important that data collection was conducted by researchers familiar with each context, but it was also strategic. That is, we made efforts to include universities in different regions, and at different stages in terms of their acceptance of doctoral publishing (See Appendix for country overviews). Analysis in each country was delimited to public universities. In the case of Japan, which has an internationally large number of HEIs (Statista, 2023), this was further delimited to 'comprehensive' universities (similar to what constitutes a university in many other countries) and further to those that are nationally funded. In South Africa, three public universities were excluded because they do not currently offer any doctoral-level programs.

Data collection was completed between February and May 2023 by individuals or teams of researchers working on a single country. The authors searched university websites for policies, guidelines, advice to students, and other information related to publishing and doctoral candidature, both manually and using keyword searches. As much as possible, data collection was limited to institutional-level information that covers all students regardless of discipline or program. Japan again was an exception here, due to the fact that graduate schools at national universities work as separate entities, meaning institutional-level policies for pedagogical practice are particularly rare. Therefore, data for Japan were (also) collected at the department level.

To facilitate systematic and consistent data analysis, a detailed codebook was developed based on a pilot study involving two countries (Frick and Mason, 2022), and informed by feedback from collaborators. The process involved 'isolating small pieces of the data that represent salient concepts and then applying or creating a framework to organize the pieces in a way that can be used to describe or explain a phenomenon' (Kleinheksel et al., 2020, 127). From the collated materials, collaborators identified text related to a range of topics and responded to explicit questions posed to elicit specific details. Once data analysis was complete for each country, all data were merged into a single spreadsheet to allow cross-country analysis.

Table 1 Countries involved in the study and scope of the analyses

Country	Scope of analysis
Australia	All 37 public universities
Japan	All 48 (comprehensive) public (national) universities
New Zealand	All 8 (public) universities
South Africa	All 23 public universities that have doctoral programs
Spain	All 50 public universities
United Kingdom	All 140 public universities

Results

To facilitate a cohesive narrative, we have organized this section by topic of investigation. Because of the size and complexity of the dataset, this paper reports findings responding to the research questions listed above. A subsequent paper will focus on the specific regulations and requirements placed on doctoral researchers regarding their TBP thesis submission.

Prevalence of Programs and Policies

Prevalence of the TBP varies across the six countries under investigation (Table 2). In both Australia and New Zealand, all public universities provide a TBP option for doctoral researchers. In Spain, South Africa, and Japan, a TBP is offered in a majority of universities, while it is relatively uncommon in the United Kingdom.

All universities with a TBP option provide relevant online policies publicly, with four exceptions that require a student login (AU=4). In terms of the language of the accessible materials, 85 policies (44%) were provided in English only, capturing all programs in four countries (AU, NZ, ZA, UK). A slightly lower number of 66 policies were written only in languages other than English (34%, JP=49, ES=17), and the remaining 41 policies (21%) combine one or more languages alongside English (ES=33, JP=8).

Cases where the number of programs available outweighs the number of institutions are largely concentrated in Japan, where, as discussed earlier, doctoral programs are generally managed by each department. Beyond Japan, five HEIs provide policies that relate to distinct programs, in three cases divided by discipline, such as Universidad Jaime I (ES), which has policies to cater for doctoral researchers in either Social Science or STEM disciplines. The remaining two cases are divided by submission requirements, such as Central Queensland University (AU), which offers students a 'Thesis *with* Publication' option, and a 'Thesis *by* Publication' model, the latter having stricter requirements about the number and status of publications that can be included.

In Japan, numerous department-level policies were identified. Deeper analysis showed that 86% ($n=49$) were in departments that could be broadly categorized into

Table 2 Prevalence of TBP programs and related online policies

Country (ISO Code)	*n* universities	*n* (%) universities with TBP	*n* (%) universities with online policies, etc.	*n* programs
Australia (AU)	37	37 (100%)	33 (89%)	35
Japan (JP)	48	29 (60%)	29 (60%)	57
New Zealand (NZ)	8	8 (100%)	8 (100%)	8
South Africa (ZA)	23	18 (78%)	18 (78%)	19
Spain (ES)	50	48 (96%)	48 (96%)	50
United Kingdom (UK)	140	23 (16%)	23 (16%)	23
Total	306	163 (53%)	159 (52%)	192

STEM and medical fields, while less than 11% ($n=9$) were in HASS fields, with a small number not able to be determined (for example one university only states the departments for which the TBP was *not* an option).

Nomenclature

Across the 192 programs various names are applied to the model but in the plurality of cases ($n=79$, 41%) it is not given any specific or distinct name with policies rather providing instructions on the 'inclusion of publications in a PhD thesis,' for example. Because of the large number and variations of terms used (those in other languages were first translated into English by the multilingual researchers) they have been categorized into groups connected by similar keywords (Table 3).

Requirements, Recommendations, and Restrictions

Of all 192 programs, the TBP was made compulsory for doctoral researchers in only 21 cases (JP=20, ZA=1). These all relate to programs limited to specific disciplines, and as such there were no cases identified where the TBP was an institutional requirement. In an additional five cases (UK=5), policies state that the TBP needs to be decided before enrolling, implying adoption as a condition of enrollment. Three policies, all from the UK, state that students 'should not be obligated to pursue the publication format route' (University of Surrey, UK).

Nevertheless, there are ways in which the TBP may be encouraged. For example, 13 policies (AU=6, ZA=4, NZ=2, UK=1) include language that explicitly recommends the model. For example, University of Canterbury (NZ) 'is strongly supportive of any approach that improves the credibility and employability of UC's doctoral graduates.' In 21 cases, policies provide one or more (and up to seven) benefits or advantages of the TBP, including eight policies which do not offset these with any mention of risks or disadvantages (see next section).

Twenty policies (UK=9, AU=8, NZ=2, ZA=1) refer to the model as an 'alternative' one, including four UK policies where the word 'alternative' was not already used in the naming of the model. Nine policies (AU=7, ES=1, NZ=1) make explicit mention of the TBP as 'new' or 'growing.'

There are also ways in which the TBP may be discouraged. We have already noted a small number of cases where the TBP is only available to students in certain programs or disciplines. In addition, we identified cases where policies indicate the TBP may not be suitable in certain cases ($n=13$, see also Table 6). These policies warn students about the appropriateness of the TBP for particular disciplines ($n=9$), research projects ($n=7$), supervisors ($n=4$) and/or candidates ($n=3$): 'It is not an approach that will necessarily suit all candidates, all disciplines, or all supervisors' (Waikato University, NZ). Griffith University (AU) gives specific examples on cases in which a particular research project may not be suitable:

Table 3 Nomenclature used in relation to the TBP model

Keyword/s	*n*	Example program names	Countries
no specific name	79	–	JP=54, ZA=10, AU=7, UK=4, ES=2, NZ=2
compendium, compilation, collection, series	51	Compendium of publications, thesis by compilation of publications, thesis by compilation, thesis as a series of papers	ES=40, AU=8, ZA=2, UK=1
by	29	PhD by publication, thesis by publication, thesis by published works	AU=11, ES=7, UK=7, ZA=3, JP=1
with, including, incorporating	14	Thesis with publications, thesis with manuscripts, thesis incorporating publications	AU=8, NZ=6
format, style	9	Article format thesis, papers style thesis, publication format thesis	UK=4, JP=2, ZA=2, ES=1
alternative	5	Alternative format thesis	UK=5
integrated	2	Integrated thesis	UK=1, ZA=1
portfolio	2	Portfolio with papers	AU=1, UK=1
other	2	Thesis based on published papers, practice-based PhD	UK=1, ZA=1

Inclusion of papers within a thesis is not a suitable thesis format for all research projects (e.g., collaborative projects where there may be several co-authors for each paper which may make it difficult for the examiner to establish the independence of the candidate's work; where primary data is not collected or results obtained until late in the candidature; or where the research will not produce a logical sequence of papers that are able to be presented as an integrated whole).

In 15% of cases ($n=29$), an official approval or confirmation process is required, the majority of those in Spain (ES=19, AU=4, UK=3, ZA=3). This may occur at the beginning of the process allowing a candidate to embark on a TBP, or at the end of the process in relation to final submission, such as Universidad de Extremadura (ES), where supervisors and tutors approve a completed thesis presentation and then 'ask the Academic Commission of the Doctoral Program for authorization to present the thesis [in TBP format].' Further policies ($n=31$, 16%) require candidates to engage in discussions in order to come to an (often informal) agreement with supervisors, many recommending that this occurs as early in candidature as possible (AU=13, UK=9, NZ=5, ZA=3). However for the most part there is no mention of any requirements to adopt the TBP, as stated in the policy at La Trobe University (AU), there is 'no separate "thesis by publication" mode to choose on commencement – just do it!'.

Benefits and Advantages, Risks and Disadvantages

While a small number of policies include explicit mention of positive aspects (advantages, benefits, etc.) and/or negative aspects (disadvantages, challenges, risks, etc.) of the TBP, the majority did not include any such text (Table 4).

Positive aspects are presented in Table 5, with negative aspects following in Table 6. While we have aimed to include illustrative quotes from policies across the dataset, Japan is excluded here as no policy reported such information. Further, multiple quotes are included from Australia, reflecting the higher prevalence of such content in policies.

Table 4 Overview of mentions made in policy materials, $n=192$

Policy materials …	*n* (%)	Countries
mention neither benefits nor risks	158 (82%)	JP=57, ES=48, AU=19, UK=17, ZA=13, NZ=4
mention both benefits and risks	13 (7%)	AU=9, UK=2, NZ=1, ZA=1
mention risks only	13 (7%)	AU=4, UK=3, ZA=3, NZ=2, ES=1
mention benefits only	8 (4%)	AU=3, ZA=2, ES=1, NZ=1, UK=1

Table 5 Benefits and advantages mentioned in TBP policies

Benefit / advantage (*n* countries)	*n*	Illustrative text
Developing skills related to publishing (AU=8, UK=3, ES=1, NZ=1, ZA=1)	14	The PhD by publication develops essential communication skills (Central University of Technology, ZA)
Providing quality assurance (AU=9, ZA=2, UK=1)	12	It also has the significant advantage that examiners tend to be impressed by work that has already been peer-reviewed (Deakin University, AU)
Career competitiveness (AU=6, UK=2, ZA=2, NZ=1)	11	Research students are increasingly advantaged in postdoctoral, academic and other professional employment applications if they have published or have prepared to publish during candidature (Cape Peninsula University of Technology, ZA)
Efficiency (AU=6, UK=3, ZA=1)	10	The research is written up as the PhD proceeds, reducing the need for a long period of writing up at the end of the program. Students adopting this approach often submit their thesis within a shorter time period than those using the traditional structure (University of Reading, UK)
Engagement and feedback (AU=6, UK=1, ZA=1)	8	The peer review process provides the opportunity to receive expert feedback before submitting the thesis for examination (Edith Cowan University, AU)
Timely dissemination (AU=5, NZ=1, UK=1, ZA=1)	8	Candidate's published research findings are available and contribute to their research communities at the earliest possible opportunity (rather than their research only being available under restricted access and delayed conditions in the University library after award of degree). (University of Tasmania, AU)
Reputation of doctoral researcher (NZ=2, ZA=2, UK=1)	5	It is also recognized that there is a strong tradition of publication of research work by postgraduate candidates in order to build and enhance their academic standing in their respective research communities (University of South Africa, ZA)
Reputation of host institution (AU=2, NZ=1)	3	Improves the publication outputs and research ranking of the University (University of New England, AU)
Other (AU=3)	3	a) Enhancing the student experience, b) building industry links, c) increasing opportunities to present at conferences

Table 6 Risks and disadvantages mentioned in TBP policies

Risk / disadvantage (*n* countries)	*n*	Illustrative text
Not appropriate in all cases (AU=4, UK=4, ZA=3, ES=1, NZ=1)	13	There are specific risks involved with doing a dissertation or thesis as a collection of essays or articles and therefore this option is recommended for top performing academic students and experienced supervisors (University of Johannesburg, ZA)
Time constraints (AU=6, NZ=1, ZA=1)	8	Staying within a time frame and not extending the Doctorate while waiting for papers and reviews (Massey University, NZ)
Publication not a guarantee of quality or conferral (AU=5, NZ=1)	6	The inclusion of published material in a thesis does not guarantee a pass in the degree for which the thesis is submitted. The thesis must stand on its own merits and will be assessed as a single document. Examiners may require changes to any part of the thesis regardless of whether that material has been previously published or not. (University of Otago, NZ)
Thesis formatting and structural issues (AU=3, ZA=2, NZ=1)	6	Theses by publications are often disjointed. The papers do not always cohere seamlessly, partly because they might be written to accommodate diverse journals. The papers are sometimes repetitive (Charles Darwin University, AU)
Unsympathetic examiners (AU=3, UK=1)	4	Examiners unfamiliar with the format can be unsympathetic even if provided with university guidelines (Southern Cross University, AU)
Proving contribution to co-authored publications (AU=2, UK=1)	3	It can be difficult for examiners to determine the student's individual contribution to publications (The University of Manchester, UK)
Limits of journal article genre (AU=3)	3	The examiner of a thesis will have different motivation from the reader of [a] research paper. The examiner of a thesis is interested in the evidence that the candidate has met the requirements for the degree. […] It may be desirable to include more methodological detail than in a publication (James Cook University, AU)
Premature publication (AU=3)	3	Focusing on publication rather than research may lead to candidates being tempted to publish sections of their work prematurely and missing opportunities to fully capitalize on the significance of the work (University of Newcastle, AU)
Other (AU=4)	4	a) Ensuring copyright ownership, b) avoiding predatory publishers, c) dealing with conflicting reviews

Discussion

Content analysis of 192 policies related to the TBP in six countries showed that the format was well represented through publicly available policy documents in some contexts (particularly NZ, AU, ES). In these countries, we note an institutional awareness of the TBP as an option for doctoral researchers, which shows a recognition of the importance of research dissemination beyond the thesis, and the importance of doctoral researchers becoming part of their scholarly communities and discourses.

However, availability and promotion of the TBP was not seen in all countries, especially notable in the UK. As Robinson (2023) notes, universities there 'have been slower to adopt the alternative thesis format' (p. 140). This is despite the UK having a well-established higher education system with a competitive academic job market and a funding model that is influenced by published outputs (e.g., Marques and Powell, 2020). The position of the TBP in the UK is further evidenced through its position as an 'alternative' model. Use of this language makes clear the position of the TBP in the UK as outside of the 'norm,' assumed to be a monograph thesis. This may have implications for its legitimacy in the country, its subsequent uptake, as well as familiarity of the format by UK examiners when acting as external examiners for countries where TBPs are common.

Next we consider the importance of language in policy discourse, and particularly the nomenclature which serves as the 'face' of the TBP, and while we have adopted the term 'Thesis by Publication,' it was used in the naming of only around 8% of programs ($n = 17$) in this study. While a name cannot capture the nuances of the TBP as it is defined in any particular program, it may nevertheless have implications for how it is interpreted. For example, the lack of specific naming could infer the inclusion of publications in a thesis as an expected rather than a special or new approach, or as the only option available, as seen in some cases in Japan. While the term 'publication' may infer a broad array of publication genres, terms such as 'article,' 'paper,' and 'manuscript' appear to refer more specifically to peer-reviewed journal articles. Requirements vary regarding if and how many publications should actually be published at the time of submission. However, use of the term 'published works' or 'published papers' may suggest publication as a requirement for all inclusions. Further, use of terms such as 'series,' 'compilation,' and 'compendium,' suggest a requirement of multiple inclusions, when policies may or may not stipulate a particular number of works to be included. Terms such as 'series', etc. are used often in Spain, and may indicate a requirement for multiple publications, reflecting common practice in many parts of Europe (e.g., Hagen, 2010).

When interrogating language we also looked at the languages in which policies were written, providing insights into intended audiences. Our study included three countries where English is not the majority language (ES, JP, ZA). For example, while English is overall the sixth most commonly used of 12 official languages in South Africa (Statista, 2018), it tends to be the dominant language used in HEIs (Yallew et al., 2021), and this is certainly reflected in the policy documents which are written exclusively in English. The inclusion of English language support materials

in countries where it is not the majority language is reflective of the dominance of the English language in broader higher education discourse (Jenkins, 2014), and the same may be said of the lack of multilingual materials in countries where English is the most commonly used language (AU, NZ, UK), but are nevertheless highly multilingual, and which cater to a large population of international students. The dominance of English in online policy materials that may attract or be sought by potential doctoral researchers serves to privilege those with stronger English skills, despite the fact that quality research is conducted across the world in a multitude of languages.

It must be acknowledged that the absence of policy documents governing the TBP format does not necessarily mean that they are unavailable. In four Australian cases we were unable to access policy documents despite reference to their existence. Interestingly, previous data collected in early 2020 during the pilot phase showed that two of these four universities previously made their policies accessible (Frick and Mason, 2022). The reason for this change is unclear, and may indeed be temporary as HEIs are actively updating their documentation. It may also be an effort to protect intellectual property, as universities across the world are increasingly in competition with each other (Nerad, 2020). In any case, data analysis in this study was limited to those materials freely available online, and so it is possible that they may not encompass the totality of materials provided to doctoral researchers.

Overall the content of policies does not appear to place particular pressure on doctoral researchers to adopt the model. The majority of institutions position the TBP as one potential thesis format option, rather than as a one-size-fits-all approach. Considering the many biases in scholarly publishing that may impact doctoral researchers' ability to publish regardless of the quality of their work (Mason and Frick, 2022), and the various motivations for completing doctoral education beyond pursuing an academic career (Skakni, 2018), the evident lack of overt pressure is a positive finding. Inequalities inherent to the way in which the publishing industry is structured and operates may offer one possible explanation as to why institutions may be hesitant to enforce the adoption of the TBP. Inequalities relate to differences in accessibility, journal foci which might privilege contributions from particular regions, and open access and page fees which might discourage publication in some journals (especially considering the added burden of differences in currency exchange rates). Inequalities arguably affect doctoral researchers more than established researchers who are more likely to have decision-making power over individual, institutional and/or project based research funds that can be used to support publication. The publication industry itself may therefore inadvertently and unintentionally discourage the uptake of the TBP through systemic inequality. But this aspect warrants more in-depth interrogation beyond the scope of this paper.

Japan presents a divergence in this respect, being the only country (with one exception in ZA) where (some) programs mandate adoption of the TBP. This is despite overall availability of the TBP being relatively low, and even lower when considering that programs are only available in some disciplines. The lean toward offering the TBP option in STEM fields in Japan mirrors broader trends in research funding (Lem, 2023), although in general research in HASS fields may be more likely to deal with localized issues, making dissemination to international audiences

more difficult and less pressing. However, HEIs in Japan, and particularly national universities, are under increasing pressure to internationalize their institutions (Ota, 2018), and encouraging publication in international journals may be one way to contribute to that agenda.

On that note, researchers in most countries are under pressure to publish, regardless of their career stage. This pressure is largely related to funding models which take into account the number and 'quality' of outputs researchers in particular institutions publish (Macfarlane, 2021). It is interesting to note that where benefits are noted in policy, they are for the most part individual benefits to doctoral researchers. Indeed, the TBP has been found to have benefits for doctoral researchers, and survey responses from almost 250 graduates in Australia mirror the benefits identified in this study (Merga et al., 2020). However, because doctoral researchers are increasingly contributing to institutional outputs—an earlier Canadian study found that doctoral students contribute around one-third of all publications in Quebec province (Lariviere, 2012)—there is a risk of doctoral researchers becoming operationalized in HEIs (O'Keeffe, 2020). In only three cases did we observe transparent acknowledgement of the benefit of the TBP to institutions themselves. The growth of the TBP may indeed be influenced by a recognition that doctoral training needs to better reflect the needs of doctoral students, many of whom wish to pursue a career in academia (Poyatos Matas, 2012) but it certainly is also influenced by the increasingly important role that publications play in HEI funding models, and thus there is a direct benefit to institutions when doctoral researchers engage in publication. We would have expected to see more transparency from HEIs on this point.

We note that transparency surrounding the potential risks and challenges of adopting the TBP is limited. There is some acknowledgement that the model may not be suitable for all doctoral researchers and/or studies, but little interrogation as to why. Many of these challenges are related to biases pervasive in scholarly publishing that privilege some people and studies over others. That students may face difficulties in getting their work published because they adopt an 'unpopular' methodology, or produce null-results, for example, requires consideration of the status of publications that can be included in a TBP. Further, we have identified differences in the prevalence (and thus often acceptance) of the TBP in different countries, though this is often impacted by the inequitable distribution of global resources. For example, supervision was raised as a reason that the TBP may be challenging for doctoral researchers in South Africa. There, supervisors themselves are often in their early career phase, taking on a 'supervision role before they felt that their capacity had been sufficiently developed,' with limited training, and on top of heavy teaching workloads (Motshoane, 2023, 74). Thus, any discussion about differences in prominence, promotion or positioning of the TBP must also acknowledge how national trends are impacted by HE as a global system. Further, policies related to the TBP must account for biases and inequities, and HEIs must ensure that doctoral researchers are not unfairly disadvantaged.

Our collaboratively compiled dataset involved six countries, and as such is delimited in terms of geographical distribution (as outlined in the scope of the dataset). We did not include the broader North America doctoral education system.

Despite its large size and contribution to international publications, it follows quite a different program format than most other countries, and as such could be a possible case for further study. The majority of the countries involved in this study are positioned in the Global North. The exception is South Africa, which while providing an important hub for doctoral education provision across Africa (van Schalkwyk et al., 2021), is not representative of the entire continent, nor more broadly of the Global South. Trends in higher education systems across the Global South is an area for further investigation.

As noted earlier, our analysis is further delimited to policies and documentation that are available online, and may not capture all the materials provided to students. However, our data collection procedures mirror the process of many potential doctoral researchers when seeking information about doctoral programs and thesis submission models. Thus, while subsequent studies could involve in-depth case studies of a smaller number of HEIs to ensure inclusion of materials that are not publicly available, we do recommend that information on doctoral programs is accessible, particularly as prospective students may be reliant on online searchable materials when making decisions about which programs to apply for.

Conclusion

This paper set out to explore the prominence, promotion and positioning of doctoral theses and dissertations that include publications (sometimes referred to as a Thesis by Publication, or TBP) in different national contexts. The diversity within and across these six contexts highlights the multiplicity and range that exists when it comes to thesis format (hybridity was also noted by Odendaal and Frick, 2018). While thesis format diversity itself may allow for greater originality and a broader representation of doctoral work to emerge, it does carry the risk of creating confusion among stakeholders. The diversity also makes it difficult to define exactly what a TBP is and what it is not, which may evidently vary across contexts (as we will explore in a separate paper).

While HEI policies can promote understanding of such divergence at disciplinary, national, and institutional levels, when policies are missing, inadequate, or inaccessible, ambivalence of interpretation and enactment for both the institution and candidates may result. It furthermore carries the risk that a thesis may not be internationally comparable or accepted. This is a foremost concern for doctoral researchers who need to prove their doctorateness to an international community of scholars, most pointedly at examination. A shared understanding of the TBP and its position in the doctoral researchers' context is paramount, but cannot be assumed, as examination often involves, by design, scholars from different institutions and countries. Our suggestion is not to promote conformity of the TBP, but to promote a higher level of accessibility, depth, and transparency in policy documentation about the position, prominence, and promotion of the TBP in each specific context, and to acknowledge the impact that existing inequalities in academia can have on completion. In doing so HEIs can promote greater synergy between

the various stakeholders in doctoral education, and ensure that doctoral researchers are not disadvantaged as a result of having adopted (or not adopted) the Thesis by Publication model.

Appendix

Contextual statements for six countries included in the study

Australia	There are 43 universities in Australia, most of which, including all 37 public universities, offer doctoral degree programs in a range of disciplines. Entry to doctoral programs is highly competitive, with tuition for all domestic students (and some international students) covered by the Australian Government Research Training Program. Australia is a popular destination for international students, constituting 40% of PhD enrolments compared to the OECD average of 25% (OECD, 2019). The high number of doctoral graduates outweighs the number of secure academic positions, and while many doctoral researchers do follow various career paths, academia remains a goal for many more. As a result, having a solid body of publications places graduates in a stronger position in a heavily competitive job market, but it also contributes to universities' reputation, and profits, as published research outputs are an important part of the national funding model for universities. While publishing during candidature has in the past been largely limited to Science fields, in recent years that has extended to most disciplines, and the most recent national investigation revealed that almost all universities in Australia offered a TBP option for students (Jackson, 2013).
Japan	Japan has approximately 800 universities and colleges, which include 86 national universities as of 2023. Doctoral admissions have declined since 2010, from 16,471 to 14,382 in 2022 (National Institute of Science and Technology Policy, 2023). Japan has a distinct pathway called 'doctorate without enrollment'—ronbun hakase— for individuals of corporate researchers, extant researchers bereft of doctorate and those pursuing degrees beyond the standard timeframe. Conferment is based on research outputs and an oral exam. About half of recent graduates get academic positions, though there are considerable disciplinary differences (Kawamura, Tsuchiya & Hoshino, 2022). This has stimulated discussions about restructuring doctoral education to accommodate diverse career paths. The citation frequency in published articles, specifically the top 10% of papers, functions as a metric for university evaluation and influences the allocation of research-oriented national universities' management expense grants. There is no explicit indication of whether doctoral students are anticipated to contribute to this evaluation scheme (Ministry of Education, Culture, Sports, Science and Technology, 2023).
New Zealand	There are eight public universities in Aotearoa New Zealand, with all offering doctoral programs. Doctoral degrees are also offered in some Polytechnical Institutes and Wānanga, which are institutions underpinned by tikanga Māori (Māori custom) and ahuatanga (Māori tradition). Nearly 50% of doctoral candidates are international, with a government policy since 2006 allowing international PhD candidates to pay domestic fees. Most institutions offer scholarships, which are highly competitive. The PhD programs involve 3-4 years of supervised thesis study, with coursework and training optional. All universities require an oral examination as part of the PhD degree, and the doctoral system generates some excellent completion rates (Spronken-Smith et al., 2018). Given the range of career pathways PhD graduates now enter, higher education institutions are exploring how best to prepare candidates for employment options.

South Africa	There are 26 public universities in South Africa, with the majority (except three) offering doctoral degree programs in a range of disciplines. There is a growing number of private higher education institutions, but very few of these are nationally accredited to offer doctoral programs. Most doctoral programs are by research only, even though national policy does now allow for professional doctorates. Some programs may contain non-credit bearing coursework. Tuition arrangements range from funded programs (usually for full-time students in STEM areas) to self-funded (the majority of students in HASS, who are also mostly enrolled as part-time students). Given the relatively low levels of doctorate staff in public universities (in comparison to other countries, especially in the Global North), the doctorate still primarily serves as a means to supply the academic job market (also given the aging professoriate in the country) even though there is a growing acknowledgement of the need to cater for more diverse career pathways. South Africa has furthermore become a popular destination for especially international students from the rest of the African continent given the international tightening of travel and visa regulations, and rising costs for students from the Global South for studying abroad (Council on Higher Education, 2022; Cloete et al., 2022). The South African government actively promotes knowledge production and research dissemination through a subsidy scheme that rewards institutions for so-called accredited publications (as a means of quality assurance). Institutional income at a national level is thus directly linked to research output.
Spain	In Spain there are 90 public and private universities, most of which (around 90%), including the 50 public universities, provide doctoral programs in various disciplines, offering the possibility of carrying out PDT in different modalities. Since the homologation of doctoral studies to the European Higher Education Area, doctoral training has grown progressively in number of programs, candidates, graduates, and scientific contributions. In 2021, Spanish universities already had doctoral programs and offered 1,173 doctoral degrees in public ($n=50$) and private ($n=33$) universities; in the same year, 90,426 candidates were enrolled, and 11,344 theses were defended. As in other countries, this growth, especially in the last 15 years, has given rise to several challenges and opportunities that Spanish universities and other social agents are trying to address. Doctoral programs are primarily research-oriented and involve 3 to 4 years of supervised thesis study. Courses and training are elective. In recent decades, some professionalization programs and industrial doctorates have been promoted to favor employability and the diversification of career paths. Their implementation is still scarce and has varied according to regions and disciplines. The financing of university spending in Spain, including doctoral studies, is mostly public, following the pattern of Continental European countries. However, public spending on higher education, research, and innovation is lower than the EU average. Particularly from 2009 onwards, investment in research and innovation registered a 24% decrease until 2019 (Hernádez-Armenteros, et al. 2023). Thus, after a long period of severe financial cutbacks, ensuring a stable framework for funding both innovation in doctoral education and research remains a pending issue.

United Kingdom	The United Kingdom comprises four nations: England, Northern Ireland, Scotland, and Wales. Postgraduate provision in the UK includes postgraduate taught (PGT) and postgraduate research (PGR) programs. PGT refers to master's degrees with a substantial teaching component whereas PGR includes all sorts of doctoral programs including PhD and various types of professional doctorates such as Doctor of Education. In terms of PGR students, the United Kingdom has been one of the most sought after destinations for postgraduate researchers, witnessing a generally steady growth in the PGR population from 2013/14 to 2020/21, and the increase in student number is expected to continue (Higher Education Statistics Authority, 2022). However, it is noted that there has been a slight decrease in the percentage of international PGR students from 2013/14 to 2020/21 (Higher Education Statistics Authority, 2022). In-person PhD remains the most popular type of doctoral education in the UK while there are more opportunities for students to pursue a professional doctorate part-time and online. There are more examples of alternative PhD or professional doctorate provision that follows the 'by publication' route, making it a graduation requirement for students to compile a portfolio of published work in lieu of a traditional thesis, although this is still not the norm when compared to other countries in Europe (Chong, 2022). Doctoral education plays an important role in growing the UK's economy by contributing directly to the economy, equipping graduates with the relevant professional skills, and providing support and services to businesses (Universities UK, 2023). A wide range of funding options are available to both home and international doctoral students (mostly available to full-time PhD students) including support from research councils (e.g., the Economic and Social Research Council), universities, commercial and charitable organizations (e.g., The British Academy). Nature of the funding can include (a) waiver of tuition fee and (b) studentship with both tuition fee waived and a stipend provided. Funding conditions are mostly based on academic merits with some university scholarships targeting specific ethnic groups or students with financial difficulties. Some scholarships require students to complete a pre-determined research project as their PhD while others allow students to write their own research proposals.

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