



PHD BY PUBLICATION

AN INSTITUTIONAL ANALYSIS

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INTRODUCTION

PhD¹ theses generally follow one of two different formats. Firstly there is the (more traditional) monograph, which is written as a unified and coherent work, and which is most commonly found in non-laboratory areas. Secondly, the PhD by publication² has evolved, which comprises a number of papers written during a period of postgraduate training, as well as an introduction to and summary of the papers included. The PhD by publication has become established as a form of doctoral knowledge production across disciplines. Increased demands for shorter completion times, lower dropout rates and higher so-called productivity during postgraduate study are instrumental in driving the pressure to publish internationally (Boud & Lee 2009). National funding and subsidy formulas,³ relatively low doctoral production rates and the aging profile of active researchers (ASSAf 2010; Backhouse 2008) may furthermore contribute to the promotion of PhD formats that are thought to address these issues. These trends have (at least in part) led to the two different kinds of doctoral dissertations. Both the national and international drivers of the PhD by publication format seem to originate mostly from calls for accountability and quality assurance, appraisal and excellence, and effectiveness and efficiency. Such drivers are mostly aimed at managerial imperatives and policy adherence, rather than at the scholarly development of students or the advancement of scientific knowledge (see, for instance, Giroux 2014; Altbach 2012, 2013). Scholars warn that students and supervisors alike may not be well prepared for doctoral education in general (Manathunga 2007), or for such an alternative format as such (Paré 2010), as it may demand a different doctoral supervisory pedagogy (Lee 2010).

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However, the inverse is also true as the PhD by publication may contribute to knowledge production as the published work may be more widely and easily accessible than through a monograph. It also holds potential promise for both the student and supervisor(s), as they may benefit from the input of peer reviewers prior to the eventual formal examination of the complete body of work. Published work also benefits the scholarly profile of both students and supervisors (the latter especially in the case of co-publication). As such, Aitchison, Catterall, Ross and Burgin (2012) found that some supervisors use the format of the PhD by publication as a basis for an alternative pedagogical supervisory strategy.

In the South African context the Higher Education Qualifications Sub-framework (SAQA 2012) provides some guidelines on the outcomes expected at the completion of the doctorate in general, but as it rightfully leaves room for different programme formats and discipline contexts, it does not specifically speak to the PhD by publication. It is therefore up to specific disciplines and institutions to determine the parameters of this format of the doctorate. Such parameters do, however, need to be aligned to the national guidelines and international standards within different disciplines and higher education institutions. Context-specific guidelines such as these may become increasingly important given the mobility and diversity of both students and supervisors, and the increasing internationalisation of research.

Given the institutional diversity in terms of research and supervisory capacity and resources at South African universities, context-sensitive analyses of PhD production trends are necessary. This chapter provides such an institutional analysis of PhD formats and its possible implications at one research-intensive South African university.

BACKGROUND TO THE STUDY

South African higher education institutions may benefit from doctoral publication through subsidy generation,⁴ as may supervisors and students through building their individual research profiles. Kyvik and Aksnes (2015) found that incentive and reward systems at both the institutional and individual levels increased research output productivity in the Norwegian context over time. It is thus not surprising that institutions subscribe to practices that could increase publications in the light of international rankings and monetary benefits, whereas co-publication with students may have both monetary and reputational benefits for supervisors. Since the doctorate has become a basis for academic appointments, publications in addition to a PhD may provide early career researchers with a competitive advantage in gaining employment.

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In a national study among all eight New Zealand public universities, Sutherland, Wilson and Williams (2013) found that early career academics were more likely to be successful in all scholarly facets if they had published during their doctorates. Aitchison *et al* (2012) furthermore found that highly successful supervisors in various Australian universities integrate publication with thesis writing. Reviewer comments on submitted publications help to hone students' academic writing and provide credentialed feedback in these situations, while supervisors also benefit from such expert reviewer input. The submitted/published papers furthermore become fundamental building blocks for the eventual thesis. In my own research on supervisory practices in the South African context, I have come across evidence where supervisors in particularly the natural sciences use this format to develop doctoral students' creativity (Frick 2012). Seen against this background, the PhD by publication seems like a winning format.

But the PhD by publication demands a different doctoral pedagogy and infrastructure in comparison to the traditional monograph (Lee 2010), which necessitates an appraisal of available supervisory capacity, as well as the aligned professional development of academic staff. While institutions often encourage student publishing, there seems to be little recognition for the pedagogical work and kind of study necessary to acquaint students (and some cases supervisors) with the practices of publishing (Aitchison, Kamler & Lee 2010). In addition, a PhD by publication requires supervisors who are engaged in publication activities themselves (Paré 2010). If we look at publication trends in the Southern African context (Abrahams, Burke & Mouton 2009; Mouton 2011; Mouton, Boshoff & Tijssen 2006), there are limited numbers of potential supervisors who meet this requirement. The PhD by publication may furthermore promote a certain kind of research, typically laboratory-based studies that can more easily be organised into separate publishable units.

Unfortunately there seem to be few documented and concerted efforts that address the needs of students and their supervisors to create environments that truly nurture doctoral publication within the Southern African context. Such an effort also needs to consider current doctoral production trends in order to determine the way forward. This chapter aims to provide such an institutional overview at one South African research-intensive university, namely Stellenbosch University.

AN INSTITUTIONAL ANALYSIS OF THE PHD BY PUBLICATION

Stellenbosch University is one of 26 public universities in South Africa (Universities South Africa 2016). It is considered a research-intensive university with a strong emphasis on postgraduate education. Current data indicate that there are 1 473

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doctoral students registered at the university (compared to 1385 in 2014), which amounts to 4.89% of the total student population of 30150 students (Uys 2015, personal communication). The institutional regulations for higher degrees (Stellenbosch University 2012)⁵ stipulate that all candidates need to produce a supervised doctoral thesis for examination (above and beyond possible publications that might have already been published).⁶ A thesis in this context is considered to be a body of original work built around a central and cohesive problem.⁷ These regulations allow for both monographs and PhDs by publication, but in the latter case require that a prescribed statement be included on the candidate's contribution to each paper included.⁸ In terms of format, the regulations require that the PhD by publication consist of an introductory chapter followed by either a number of published and/or unpublished papers, or a combination of chapters and published and/or unpublished papers, followed by a summary of the research results that indicates the scientific contribution of the study. Only papers that originated after the student had registered for the PhD can be included⁹ and these papers may not have been previously submitted to any university for the purpose of obtaining a degree. Students are responsible for ensuring that no copyright infringements occur if and when published papers are included in theses.

For the purposes of this chapter, theses of authors who graduated between 2008 and 2014¹⁰ were downloaded from the university's electronic research repository and analysed. A comparison was made across nine faculties (including Agrisciences – AGRI; Arts and Social Sciences – ASS; Economic and Management Sciences – EMS; Education – EDU; Engineering – ENG; Law; Medicine and Health Sciences – MHS; Science – SC; and Theology – TH) and 69 departments within these faculties (see Figure 18.4 for a more detailed list), and 1129 theses were each analysed in terms of the title, index, abstract, first and final chapters in order to determine whether the thesis could be considered a PhD by publication.¹¹ The classification criteria used to determine this included whether

- different chapters had their own literature review, methodology and reference sections;
- there were interrelated themes in separate chapters – a collection of papers where each paper is presented as a separate chapter; and/or
- there were introductory and conclusive wrap-around chapters introducing and concluding a collection of publishable and/or published papers.

Overall, 738 (65.37%) of the theses analysed were classified as monographs, and 391 (34.63%) were classified as PhDs by publication (N=1129). This total count necessitated a more nuanced view of differences across the time period included

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in the study. Figure 18.1 provides an overview of PhD production across the time period for PhDs in both formats within the institution as a whole.

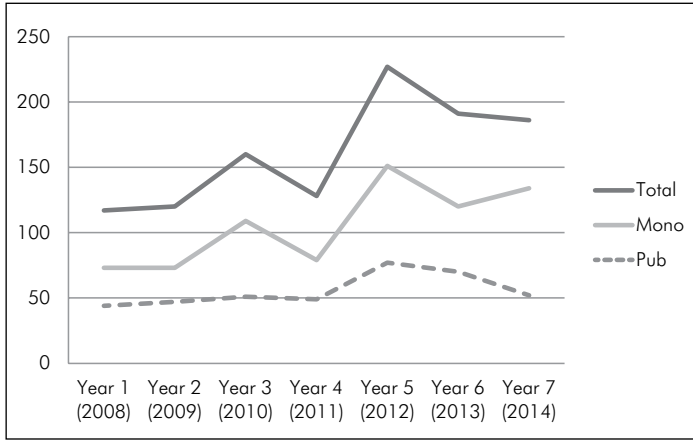


FIGURE 18.1 Total PhD production per year (2008-2014)

Figure 18.1 indicates that while total institutional PhD production over the time period seems to have increased slightly over the time period included in the study (despite some marked annual variations), the PhD by publication production as such remained relatively more stable. It also indicates that the monograph seems to remain the preferred thesis format overall, though a more disaggregated interpretation below provides a more detailed analysis.

The total number of theses produced within faculties fluctuated more notably over the same time period, as indicated in Figure 18.2 below.

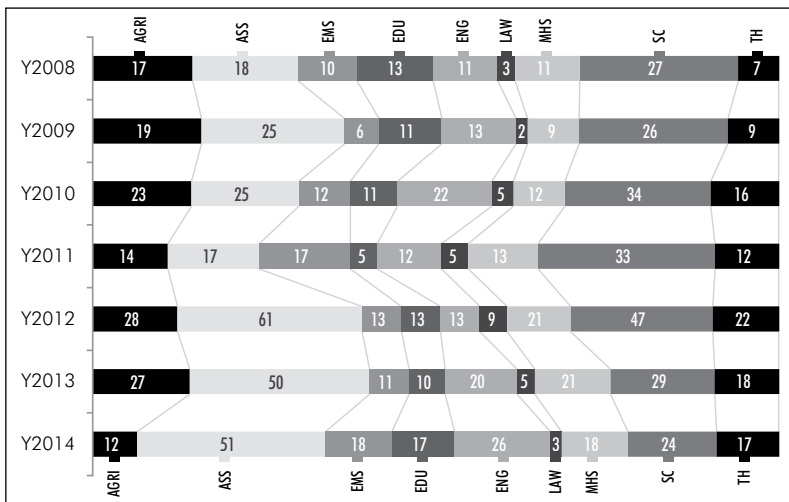


FIGURE 18.2 Total number of theses per faculty per year (2008-2014)

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The faculties of Arts and Social Sciences (n=247), Science (n=220), Agrisciences (n=140), Engineering (n=117), Medicine and Health Sciences (n=115), and Theology (n=101) produced the most PhDs over the studied time period (≥100). Figure 18.3 indicates that the preferred format differed between faculties, where the PhD by publication was notably more prevalent in the faculties of Agrisciences (7% Mono, 93% Pub), Medicine and Health Sciences (40% Mono, 60% Pub), and Science (27% Mono, 73% Pub). This is in contrast with the remainder of the faculties where all except Engineering (82% Mono, 18% Pub) formatted more than 90% of their theses as monographs.

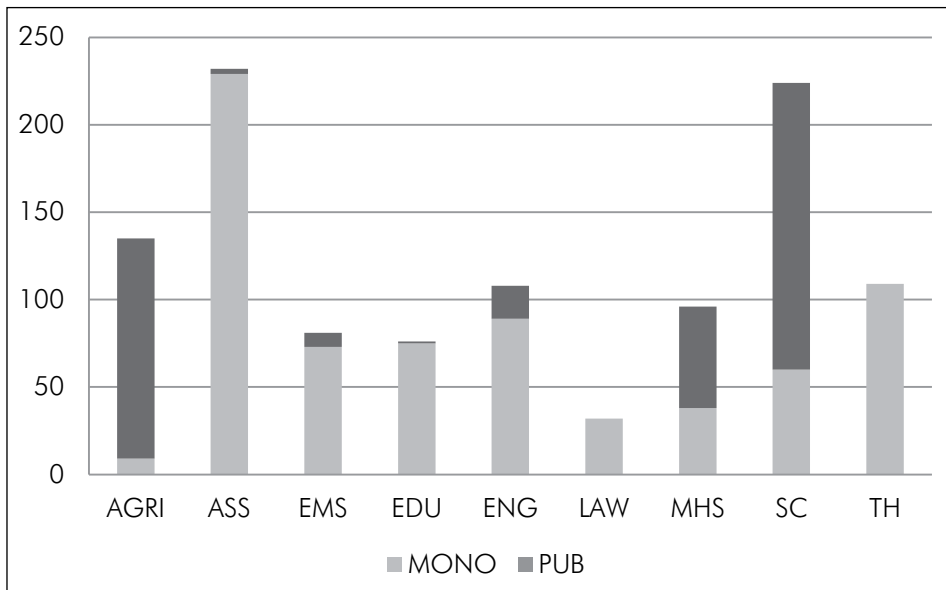


FIGURE 18.3 PhD production and format across faculties (2008-2014)

As the faculties of Agrisciences, Science and Medicine and Health Sciences are also among the top producers of PhDs overall, it is imperative to understand what the format trends are within these faculties. Given the evidently preferred format differences between faculties, a more detailed analysis was done within faculties. Figure 18.4 provides a more detailed analysis per department for the total study period.

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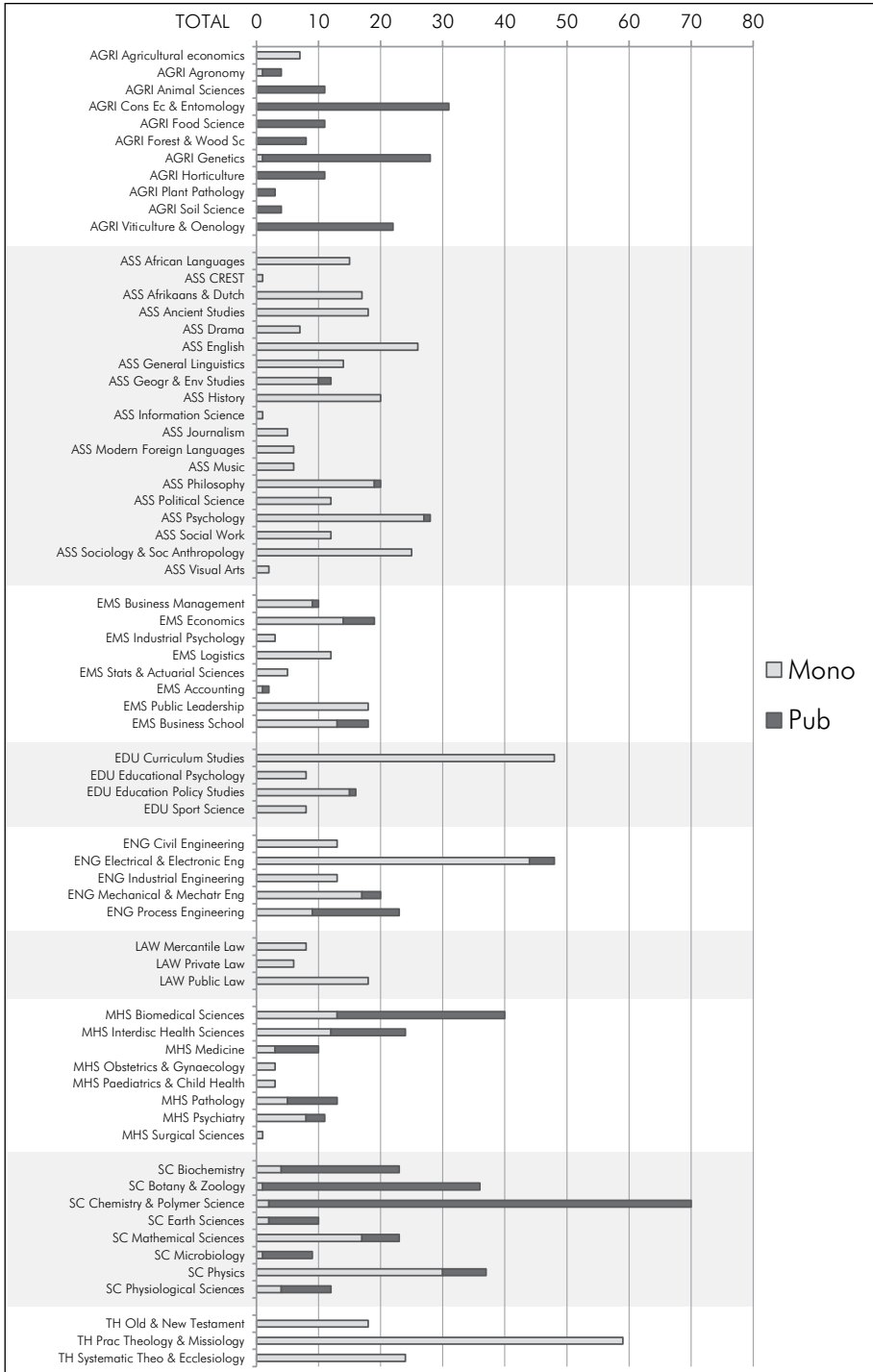


FIGURE 18.4 PhD format per department based on the total study period (2008-2014)

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The Faculty of Agrisciences shows noteworthy levels of doctoral production across the study period, with three departments dominating the dataset (Conservation Ecology and Entomology, Genetics, and Viticulture and Oenology). Within these departments, as well as the others, the PhD by publication seems to be the preferred thesis format, except in the case of Agricultural Economics, an anomaly that is not easily explained through interpretation of the data alone, and a more in-depth interrogation of doctoral pedagogies within the specific department may be necessary to shed light on this obvious difference. One possible explanation could be supervisor preferences. Another explanation could be disciplinary trends, as Agricultural Economics is positioned within a predominantly natural science-oriented faculty in this case (Agrisciences), but as a discipline may be associated with Economics (which is more closely aligned to the Humanities).

The Faculty of Medicine and Health Sciences has the longest tradition of producing doctoral theses by publication, even though PhD production overall in these disciplines has been lower than in some of the other faculties. It is noteworthy that PhD production is not evenly distributed across departments in this faculty, with a predominance of two particular departments (Biomedical Sciences and Interdisciplinary Health). The high incidence of the PhD by publication format in particularly Biomedical Sciences could be attributed (at least in part) to the laboratory-based and collaborative nature of research groups of study, where co-publication of clinical results forms a key component of advances (and thus also doctoral work) in these fields.

The Faculty of Science produced the second highest number of doctorates (N=220, second only to the Faculty of Arts and Social Sciences with N=247 over the same time period). The doctorate by publication was the preferred format in most departments, except for the departments of Mathematical Sciences and Physics. As in the case of Agricultural Economics, this trend warrants a finer (probably more qualitative) analysis of doctoral pedagogies at play within these particular contexts in order to understand these differences. Given the relatively high doctoral production rate in especially Physics (third highest in the faculty), this is a particularly interesting digression from the format norm that cannot be explained by singular supervisory pedagogic idiosyncrasies or format preferences. As in the case of Biomedical Sciences, the fields of Botany and Zoology, and Chemistry and Polymer Science also have strong group research and co-publication traditions that may explain the preference for the PhD by publication format.

A more detailed analysis of the two different PhD format structures was also done to determine possible notable differences in these formats. The monographs and publication-based PhDs were compared in terms of number of chapters (excluding

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indices, reference lists and appendices) and number of pages (a total page count of the .pdf documents was utilised for this purpose). Table 18.1 provides the results for this comparison.

TABLE 18.1 Comparison between PhD thesis format structures

	# Pages				# Chapters			
	Minimum	Maximum	Median	Mean	Minimum	Maximum	Median	Mean
Monograph	50	1 450	279	288.6	3	17	7	7.1
Publication	60	688	200	207.3	4	18	7	7.0

Table 18.1 indicates a noticeable difference between the two formats in the number of pages per thesis, with the publication-based format having slightly less pages on average. This is not a surprising finding, as publishable papers need to adhere to journal prescriptions on word count and length of submitted manuscripts, whereas monographs are not subject to such limitations. There are furthermore no strict prescriptions in terms of the length of a monograph across faculties (and there seems to be quite a bit of variation even within faculties). However, it is interesting that the difference is not even larger in comparing the length of these two formats. One explanation clarifying this smaller-than-expected difference is that the theses completed on a publication basis often included multiple appendices with data and analysis thereof that formed part of the theses, but not necessarily the eventual publications.

Table 18.1 indicates that there seems to be no notable difference in the number of chapters between the two different formats. In the case of the monograph, this finding is interesting as it is somewhat more than the expected five- to six-chapter format consisting of an introductory chapter, a literature/theoretical review, a methodological chapter, chapter(s) on the results and discussion thereof, and a concluding chapter. In the case of the PhD by publication format, it indicates that on the whole five possible publishable papers are potentially included in these theses if the institutional regulations of an introductory and a concluding chapter are followed. However, this was not always the case as the analysis itself showed a variety of approaches that were followed in constructing the eventual theses and not a strict adherence to the relatively new institutional regulations. Since the institutional regulations do not prescribe that these chapters necessarily need to be published by the time of examination, room is allowed for possible interpretation on what is considered publishable material to be included in the theses.

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Since scholars (Lee 2010; Paré 2010) point out that the PhD by publication requires a different kind of doctoral pedagogy, it was important also to see what the actual documents could reveal about supervisory practices. A comparison between the number of supervisor(s) per thesis was done (Table 18.2).

TABLE 18.2 Comparison between supervisory numbers in different PhD formats

	# Supervisors			
	Minimum	Maximum	Median	Mean
Monograph	1	4	1	1.4
Publication	1	5	2	1.9

Across all theses there was an average (mean) of 1.6 supervisors per thesis. In the case of monographs it was slightly lower at 1.4 supervisors per thesis across the institution, whilst there was an average (mean) of 2 supervisors per publication-based thesis. This difference is noteworthy, since it implies that the institution would need more supervisory capacity if it wants to promote a PhD by publication format. This, in turn, would imply that more supervisors would need to have doctorates themselves¹² and there would need to be strategies and support mechanisms in place to support and regulate co-supervision practices within the institution. This finding also has implications for governing co-publication practices within the institution, as supervisors often become co-authors on the papers that result from the theses. The current institutional policy does address these aspects to a certain extent, but still leaves room for varied supervisory practices. The work of Thein and Beach (2010) is instrumental in understanding the supervisory practices that support a pedagogy that supports publication, which includes

- mutual engagement from both the student and supervisor in collaborative research;
- co-authored research that provides opportunities for mentoring writing development;
- reciprocal review and evaluation; and
- networking.

Laboratory-based studies where the whole lab-community (consisting of master’s and doctoral students, post-doctoral fellows, and one or more supervisors) works on aligned projects are therefore obviously well suited to this format, as is also evident from the data presented above.

In the social sciences, researchers often do not have the luxury of such close-knit research micro-communities. The predominance of the monograph format in the

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social sciences in this particular dataset and the reported predominance of an apprenticeship approach to supervision in these disciplines (ASSAf 2010) as an individualised and personal relationship between the supervisor and the PhD student the lower supervisor-to-student mean are thus not surprising. However, it may mean we need to start thinking differently about how postgraduate programmes and supervisory relationships are structured in these disciplines if publication during the doctorate is an institutional imperative.

A FUTURE FOCUS

In considering the PhD by publication as a possible thesis format within the doctorate, we open the positioning of research education – and the doctorate in particular – up to scrutiny. The dataset of 1 129 doctoral theses analysed over a seven-year period at one South African research-intensive university showed diversity in formats across faculties and even within faculties as not all theses were easily classifiable as either monographs or PhDs by publication. There does not seem to be a strict adherence to the institutional guidelines aimed particularly at governing the PhD by publication (even while taking into account that these regulations were only formally accepted towards the latter part of the study period).

This study only provides an initial analysis and there is much scope for further research and finer grained analyses. Currently a more in-depth study flowing from this initial work is under way. Part of this study will be to develop a more rigorous and robust thesis format classification system, as the initial analysis highlighted that the diversity across and within formats transcends the binary classification system used in this chapter. Furthermore, more work is needed to determine to what extent work from monographs does eventually get published, and whether the PhD by publication does in effect lead to actual publications (as the regulations stipulate 'publishable' work, rather than published work). Further work will also investigate supervisory pedagogies and co-publication practices in greater depth. The work will also be extended across selected higher education institutions in South Africa, as this approach will provide a more complete and comprehensive picture of PhD publication and pedagogical practices.

The work presented in this chapter has shown that diversity in PhD formats may have implications for doctoral pedagogy, supervisory capacity, institutional policy and institutional funding. These considerations and related role players (including students, supervisors, institutions and the national higher education context) need to be kept in mind when deciding on a suitable doctoral format, either in policy or practice. As such, the ethics underlying format choices need further interrogation

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and debate. National debates on this issue have not addressed whose interests are primarily served by publishing during the PhD – institutional stature and ranking, supervisors' academic standing, or the scholarly development of the student?

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ACKNOWLEDGEMENTS

This study would not have been possible without the input and encouragement of the following people: Dr Albi Odendaal, for his input and his continuation of this work; Prof Jan Botha, whose institutional knowledge and memory are indispensable in a project such as this; and Dr Wilhelm Uys, who is always prepared to provide an institutional perspective on available data.

NOTES

1. I use the terms 'PhD' (Doctor of Philosophy) and 'doctorate' (the more general term) interchangeably in this article, even though the latter term may include multiple forms and programme structures not relevant to the typical PhD.
2. Both 'thesis' and 'dissertation' are terms used in the South African context to describe the document produced during a PhD that is presented for examination. Even though 'dissertation' is the preferred term at Stellenbosch University, I use 'thesis' (plural theses) that seems more prevalent in international literature.
3. In the South African context, research – both in the form of doctoral theses and research papers – is subsidized separately if it meets particular criteria. The PhD by publication may therefore lead to so-called 'double dipping', as both the completed thesis and the published work from it will be subsidised. This means that a PhD by articles can in reality be subsidised twice, which may be a positive for the individual institution, but not for the general research funding system. South Africa is one of the few places, if not the only one, where research outputs are directly subsidised and this should be a consideration in arguments for and against the PhD by publication.
4. The South African government subsidises research at public higher education institutions both in the form of thesis production and publication. The latter needs to meet specified requirements (in terms of peer review, advancing scholarship in the field, and specified listing on (inter)national indexes in the case of journals) in order to be considered for subsidy purposes and may include books, book chapters, peer-reviewed conference proceedings, patents, and academic journal articles. I use the generic term 'paper' to refer to all such publication-based outputs.

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5. Before 2012 no formal institutional regulations governed the PhD by publication at Stellenbosch University, although it was already a well-established practice as can be seen from the dataset presented here. This policy vacuum may account for the diversity in format found in the data.
6. Senior and honorary (unsupervised) doctorates were not included in the dataset.
7. Only PhD theses were included in this study, as the focus is on the PhD as a form of research training. Thus honorary doctorates and senior doctorates (for example DSc and DEng degrees) were not included in the dataset.
8. These regulations were only formalized in 2012 by an institutional task team, and therefore few of the theses in the dataset followed the particular prescription. All theses were therefore analyzed by the criteria provided whether they were stipulated as publication-based theses or not.
9. In the case where a Master's degree is upgraded to a PhD, only papers that originated after the student registered for that particular Master's degree are allowed in the thesis.
10. The choice of time period was motivated by the practice at Stellenbosch University to upload all doctoral theses to the public repository that only started in 2008. The data reported in the ASSAf report (2010) – currently arguably the most comprehensive published report on the status of the PhD in South Africa – furthermore only included data from the years 2000 to 2007. This paper therefore aims to provide a focused analysis of institutional trends thereafter. The dataset includes theses from the December 2008 graduation ceremony to the March 2015 graduation ceremony, thus December and March of the next year counted as one year in each of the included years (as this is how annual graduation rates and institutional subsidies are calculated).
11. The Faculty of Military Sciences was excluded as no PhD theses were produced within this faculty for the studied time period. Only departments where doctoral theses were produced are included in the list of departments.
12. Currently 60.6% of the Stellenbosch University academic staff complement has doctorates – which is one of the highest percentages in the country.