The research agenda setting of higher education researchers

João M. Santos [a, b], Hugo Horta [c *]

[a] *Instituto Universitário de Lisboa (ISCTE-IUL), Centro de Investigação e Intervenção Social (CIES-IUL), Lisbon, Portugal*

[b] *Center for Innovation, Technology and Policy Research, Instituto Superior Técnico, University of Lisbon, Lisbon, Portugal*

[c] *Faculty of Education, The University of Hong Kong, Pokfulam, Hong Kong SAR, China.*

** Corresponding author. Tel: (+852)* 2859 2525. *E-mail address:* horta@hku.hk *(Hugo Horta).*

Abstract

Research agenda setting is a critical dimension in the creation of knowledge since it represents the starting point of a process that embeds individual researchers' (and the communities that they identify themselves with) interest for shedding light on topical unknowns, intrinsic and extrinsic factors underpinning that motivation, and the ambition and scope of what a research endeavor can bring. This article aims to better understand the setting of individual research agendas in the field of Higher Education. It does so by means of a recently developed framework on research agenda setting, that uses cluster analysis and linear modeling. The findings identify two main clusters defining in individual research agenda setting – cohesive and trailblazing – each with a different set of determining characteristics. Further analysis by cross-validation through means of sub-sampling shows that these clusters are consistent for both new and established researchers, and for frequent and "part-time" contributors to the field of Higher Education. Implications for the field of higher education research are discussed, including the relevance that each research agendas cluster has for the advancement of knowledge in the field.

Keywords: research agendas; higher education; higher education research; academic research; cluster analysis.

Introduction

Academic research is a dynamic process containing several layers of complexity (Latour and Woolgar, 2013). As a concept, academic research is not easily definable, which accounts for the many dimensions associated with it (Brew et al., 2016). These dimensions encompass issues related to the sense of belonging and identity, including which research communities individual academic researchers serve, contribute to, and receive value and normative input from (Fyfe, 2015). These communities provide guidance for the research engagement of individual researchers, but increasingly overlap (while sometimes competing) within frameworks that foster co-existing, competing, or cooperative logics framed by multidimensional dichotomies such as international versus national research communities, interdisciplinary, multidisciplinary, and disciplinary priorities, and quality or quantity, among others (Lauto and Sengoku, 2015). In addition to these, a multitude of institutional overlaps and interdependencies arise, which range from research communities, to national research and higher education systems, universities, faculties, departments, and research centers, each of which may impact the academic research developed by individual academics (Henkel, 2015). Environmental pressures such as competitive research funding, the drive to 'publish or perish', and the increasing tensions between teaching and research foci are associated with the introduction of managerialist practices at universities all over the world; all of these have a substantial impact on career progression and academic work itself, which further complexifies the understanding of what academic research is, and what being an academic researcher means (Shattock, 2014).

In this framework, Akerlind (2008) has found that the understandings held by individual academics, of what they are as researchers and what their research is, relates to their own research motivations, but also to the processes and outcomes of the research journey, and who it impacts: these factors provide an important conceptual starting point. This understanding of how academics construct the meaning of their academic research is helpful because it centers research choices on the individual academics while at the same time acknowledging the importance of contextual sets of constraints and incentives that help shape individual decisions during the research process (Moss and Kubacki, 2007). A substantial body of research has described and analyzed academic research processes in the context of their institutional configuration (Stubb et al., 2014), delineating how these research processes relate to other learning processes such as teaching (Hajdarpasic et al., 2015). The largest body of knowledge thus far constructed concerning academic research relates to research productivity and its determinants. Factors affecting productivity include such demographic characteristics as age and gender, individual ability, and self-efficacy, professional factors such as rank, funding, and network centrality, work-related issues including workload, preference for teaching and research, current and past resources, past activities and learning experiences (such as earning a PhD abroad), and social aspects such as marital status and number of children (e.g., Kim and Kim, 2017; Leisyte, 2016; Kwiek, 2016; Baccini et al., 2014; Quimbo and Sulabo, 2014). In the overall characterization of academic research, what has been somewhat overlooked thus far is the set of factors influencing individual academics as they set their research agendas. The reason for this neglect might relate to the fact that setting agendas often precedes the inputs (resources) needed to start research projects, and may therefore be taken for granted by studies that begin with the input phase. Agendas emerging from ongoing research projects may simply be understood as outcomes of an initial research project that feeds the motivation and resources to engage in a new research project, in a known cycle of knowledge production and accumulation (Conceição and Heitor, 1999).

This is not to say that academics are unaware of their own research agendas and the place these hold in their research and professional aspirations. At least one study on university-industry collaborations found individual research agendas to be influential in determining the engagement of academics in those types of collaboration (Lee, 2000), but such individual research agendas remain nevertheless largely ignored at a formal level. In Lee's (2000) work, research agendas are presented as somewhat of a common sense or presupposed idea that academics implicitly understand, without really defining what they are or are meant to be. Formal definitions for research agendas are almost non-existent:[1], academics may know what they mean when they talk about their research agenda (after all, they are engaged in research) but coming up with a definition for it has been more challenging. Research agendas can be associated with individual interests or preferences that carry the potential to shape while being shaped by a set of broad dimensions (e.g., environmental, social, and individual characteristics) and narrow dimensions (associated with the challenges of the research undertaking itself and its possible outcomes), which in combination influence the engagement on researching themes or topics of interest at a given time and place (a similar understanding of research agendas is proposed by Leisyte et al., 2008). This process refers to an interaction between the characteristics of the academic and the specificities of the research interest. Just as complex dynamics, identities, and influences affect one's self-definition as a researcher – following Arkelind's (2008) argumentation – the construction of research agendas is expected to aggregate dimensions of a dialectic between the academic's self-identification as a researcher, including attitudes toward research and associated incentives, and specific attributes relating to the specificities (and related challenges) of the research agenda itself. For example, the fact that an academic prefers to work collaboratively can be a dimension brought into the setting of the research agenda as part of the identity of the academic as a researcher, but it may also influence the choices made and actions taken in developing the research agenda. In other words, a research agenda on a particular topic may not be conceived by the individual academic if collaboration is not part of the initial conception. These connections may not be easy to disentangle, even by the academics themselves, in a highly pressurized, constantly changing academic research environment (Brew and Lucas, 2009).

This article aims broadly to identify the characteristics of research-agenda setting by higher education researchers. The article does not investigate the process of research agenda setting, in that it does not follow the intricacies of the decision-making process followed by individual academics. It also does not identify the topics, issues, or questions chosen (or the methods used to investigate them), but rather identifies factors that shape the decisions defining research agendas (i.e., the choice of themes and topics with different characteristics). Specifically, the question to be asked is whether certain "archetypes" or "doctrines" can be used to group or differentiate academics in their research agenda setting process? The field of higher education is suitable for this exploratory study because it receives contributions from a multitude of researchers from different social sciences backgrounds including education, sociology, political science, economics, and anthropology among others, making it multidisciplinary while at the same time carrying a broad thematic focus (Tight, 2013). The analysis is accomplished by means of cluster analysis, a procedure that aims to identify groups of individuals based on a set of variables – in this case, based on the critical dimensions of the Multi-Dimensional Research Agendas Inventory developed by Horta and Santos (2016). This clustering is followed by a regression analysis aiming to characterize the importance of various dimensions of the research

[1] The definition provided by Ertmer and Glazewski (2014) is a notable exception, albeit only an initial effort; this definition will be shown in the next section of the article.

agenda, followed in turn by a cross-validation of the cluster structure, using two split-sample analyses. Since it is known that the understandings, involvement, and activities of academic researchers are bound to change throughout an academic career (Brew et al., 2016), research agenda setting by both new and established higher education researchers will be analyzed. The same analysis is also performed for academics with different degrees of engagement with the higher education research community (see Harland, 2012).

The article is structured as follows. A brief literature on research agendas and the main characteristics of the field of higher education are presented in the next sections. The methodological section is next, followed by the results section. The conclusion sums up and discusses these findings, drawing implications for the advancement of knowledge in the field.

Research Agendas

While conducting the literature review, a significant number of articles using the term "research agenda" were found, but only Ertmer and Glazewsky (2014) attempted a formal definition of the concept. According to them, research agendas can be conceptualized as a combination of strategic problem-solving frameworks and the operationalization of actions to pursue research goals (Ertmer and Glazewski, 2014). In this manner, research agendas can be seen as both strategic and tactical. In the literature, research agendas are usually articulated in relation to broad topics representing challenges identified by a research community (or by policymakers) as critical for the advancement of knowledge, for the solution to a societal issue, or both. Although collective agreement concerning common challenges is a stronger influence on individual research agendas in the natural sciences, engineering, and the health sciences, priority setting based on research and policy communities is also present in the social sciences, including in the field of higher education (Middlehurst, 2014). As the formulation of individual research agendas in the social sciences is by nature less collective and more focused on application, the individual experiences, backgrounds, and sets of incentives and constraints presented in the immediate institutional environments is expected to have a greater bearing on the choice of research agenda that individual researchers decide to pursue (Spalter-Roth, 2007).

Individual choices concerning research agendas shape the advancement of knowledge in each discipline and field of knowledge, but in today's complex and uncertain world, where academics face careers with increasingly non-linear paths and re-shifting boundaries (Shattock, 2014), these choices are also defined by career considerations and sets of organizational incentives and constraints (Kwiek and Antonowicz, 2015). This suggests that research agendas may not be designed solely for the sake of knowledge advancement itself, but rather are prepared to cope with sets of environmental constraints and incentives that influence the potential of any research agenda including its material and symbolic rewards (this is aligned with the seminal work of Allison and Stewart, 1974, criticizing generalizations of the "sacred-spark" hypothesis). In any case, individual research agendas shape knowledge and the evolution of fields and disciplines, and even granted the influence of collective agendas and the organizational environment, the choice for one research agenda over the other remains a personal choice (as convincingly argued by Polanyi, 2000). Yet, understanding this choice and the determinants affecting it is critical to interpreting the factors leading researchers to opt for specific research agendas and to devising policies that can support choices favoring the advancement of knowledge.

Based on the literature mentioned thus far, complemented by the literature on science and technology studies and on the sociology of science, a recent evaluation framework has characterized individual research agendas in terms of eight critical dimensions, divided into twelve sub-dimensions (see Horta and Santos, 2016). This framework provides a conceptual and methodological instrument to characterize the research agenda setting of researchers in the field of higher education (Table 1).

Table 1 – Dimensions and sub-dimensions of the Multi-Dimensional Research Agendas Inventory

Dimension	Sub-dimension
Scientific ambition	Prestige
	Drive to publish
Convergence	Mastery
	Stability
Divergence	Branching out
	Multidisciplinarity
Discovery	Discovery
Conservative	Conservative
Tolerance for low funding	Tolerance for low funding
Collaboration	Willingness to collaborate
	Invited to collaborate
Mentor influence	Mentor influence

The first dimension is *scientific ambition*, a researcher's desire to attain prestige and recognition by participating and contributing to the endeavors of a relevant research community, with whom he or she identifies (Latour and Woolgar, 2013; Bourdieu, 1999). This dimension is sub-divided into prestige – representing the desire for recognition – and the drive to publish, associated to the need to produce codified knowledge that can be easily disseminated and attain maximum visibility (an aspect in tune with the "publish or perish" trend in modern academia; Dobele and Rundle-Theile, 2015). The second dimension in the framework is *convergence*, which represents a preference for disciplinary approaches. This dimension is sub-divided into the concepts of mastery, representing expertise in a specific field, and stability, representing the investment in time and learning made into that field. This stands in opposition to the dimension of *divergence*, which indicates a willingness to expand beyond a single disciplinary approach. This dimension is sub-divided into branching out, representing the desire to expand into other fields of knowledge, and multidisciplinarity, or the propensity to work in multidisciplinary projects. Both convergence and divergence are well established in the literature as potential strategies for both career and knowledge advancement (see Martimianakis and Muzzin, 2015, Rzhetsky et al., 2015; Schut et al., 2014).

Discovery and *conservative* are also competing dimensions, the former representing the preference for emerging fields carrying the potential for important discoveries and associated with more risk-taking; the latter indicates the preference to research well-established topics, which are considered to be safer (and thus indicating a more risk-adverse stance). The dimension *tolerance for low funding* represents how much the availability of funding conditions an individual's choice of research agenda, at a time when even academics who can undertake research without need of funding are pressed by national and institutional pressures to do so

(Ion and Ceacero, 2017). The seventh dimension, *collaboration*, is considered to be an increasingly important factor in knowledge creation (Wang, 2016) and reflects the researcher's preference to set up research agendas that are collaborative in nature. This dimension is sub-divided into willingness to collaborate, indicating the propensity to collaborate with peers, and invited to collaborate, which measures the collaborative opportunities made available by others to the researcher. The final dimension in this framework is *mentor influence*, which reflects the degree to which an individual's agenda is influenced by his or her PhD mentor, an influence that is expected to decrease over time after the completion of the PhD (Platow, 2012). However, this tendency is not universal, and individuals can either drift away from their mentors early on, or pursue career-long partnerships with them. Mentor influence imbeds the transition of an academic to become an independent researcher, while testing the extent to which PhD mentors influence the research agendas set by their former students long after the conclusion of the PhD.

The field of Higher Education

Higher education is described as a field (rather than a discipline) that has gained visibility in recent decades due mostly to two major worldwide trends: 1) the massification of tertiary education worldwide, as several countries have engaged in a rapid transition from elite higher education systems to mass higher education systems, while other countries have attained nearly universal higher education, which has brought new challenges including those related to internationalization, inequality, skill mismatches, and diversification (Mok, 2016); 2) the relevance of formal and organized learning, i.e. teaching and research, in sustaining competitiveness in the context of globalized, competitive and uncertain knowledge economies where intangibles overcome tangibles, and processes of innovation are transforming the role of higher education institutions in society, requiring analysis to better understand knowledge processes and institutions (e.g., Lo and Tang, 2017). In gaining more visibility, higher education research has continued to be closely linked to policymaking and institutional practice (Kehm, 2015), and generations of higher education researchers remain keenly aware of higher education related policy issues (Ashwin et al., 2016). The relative frequency of higher education reforms and changes to higher education systems means that higher education research is still defined by contributors as informing policymaking and practice and thus influencing the transformation of higher education systems (Altbach et al., 2006). This aspect has led scholars such as Malcolm Tight (2004) to interpret higher education research as a field of study and practice, which due to its object-focused rationale often calls for a multidisciplinary approach (see also Altbach et al., 2006).

Higher education research can be understood as an academic field with relatively blurred boundaries, bringing together researchers that identify themselves with a community and work within it on a multitude of higher education-related topics and issues (Kuzhabekova et al., 2015; Chen and Hu, 2012; Altbach et al., 2006). Higher education researchers have also been recognized as adopting different stances regarding policy issues (Ashwin et al., 2016), and the participation of contributors with various roles in the field tends to blur the distinctions between research and practice, which creates tensions between practically oriented problem solving and scientific reasoning (discussed by Harland, 2012).

This situation leads to two trends. On the one hand, it allows for some theoretical leeway, where theories are deployed because of their empirical applicability without challenging the conceptualization of the research object (Bligh and Flood, 2017). This presents an opportunity

for researchers with disparate interests in a variety of topics, methodologies, and levels of analysis to participate in the community based on common interest in higher education themes (Harland, 2012; Tight, 2008). Relative to this, Tight (2004) argues that higher education research is characterized by overlapping communities of practice, while MacFarlane (2012) describes it as an archipelago of theories, methods, and themes that prevents the field from becoming more coherent. Recent research identifies two main communities in the field of higher education – teaching and learning oriented and policy oriented – and emphasizes the relative compartmentalization between them (Kim et al., 2017; Horta and Jung, 2014); however, other aspects of compartmentalization are noted in the literature as well (see Tight, 2014).

On the other hand, this dynamic leads the field to be host to "part-timers", researchers making one-time contributions (e.g, those who only publish a single article in higher education literature); these interventions may relate to their professional practice or are made by researchers from other disciplines who happen to come across data sources or methods relevant to higher education (Harland, 2012; Clegg, 2012). These part-time researchers do not see themselves necessarily as located within the field of higher education studies (Healey and Jenkins, 2003) but contribute to the community alongside the regular contributors that are considered critical to the development of the field (Clegg, 2012). The characteristics of the field itself entail that research agendas in the field of higher education research may be set with more nuance (and bring in a wider range of factors) than if only researchers were examined having a background in, say, the discipline of education. Another important dimension is the generational change in higher education research, which reflects the same pressures as do other fields of knowledge. Today's new researchers must cope with different pressures when entering an academic career than those established researchers faced: they need to publish more (and more internationally), collaborate more (and more internationally), and raise more research funding to assure career progression and become established in national and global scholarly communities (Jiang et al., 2017). The introduction of tenure-track structures in many academic systems, combined with the lack of stable academic positions, are raising the stakes for the younger generation of higher education researchers, who may face different pressures and conditions than their predecessors, but could also modify their attitudes toward research itself (van der Weijden et al., 2016). Newer higher education researchers may perceive the relationship between the research they conduct and policy less from the standpoint of membership in a higher education community and more from an individual perspective (Ashwin et al., 2016). These career challenges associated with evolving higher education systems undergoing rapid change are likely to influence differently the setting-up of research agendas by different generations of higher education researchers.

Method

Participants

Data for this study was gathered using an online survey deployed between May and November of 2015. Invitations to participate were sent to all corresponding authors of articles who published in higher education journals indexed in Scopus, between 2004 and 2014. The identification of the corresponding authors was done through a Boolean search in the Scopus dataset, which identified the journals in the field using the keywords "higher education" or

"tertiary education" in the journal's title[2]. The resulting articles and equal number of corresponding authors represents the list of the 15 most influential higher education journals as proposed by Tight (2012), adding 23 other journals – some of them recent – in which higher education researchers publish their findings. This allows a representative sample of higher education journals, and follows the same process used in the literature to analyze higher education research communities (see Kim et al., 2017; Tight, 2014; Horta and Jung, 2014). The online survey contained socio-demographic questions and the Multi-Dimensional Research Agendas Inventory (MDRAI), an instrument with 35 Likert-style items to evaluate research strategies, priorities, influences, and goals along 8 dimensions and 12 sub-dimensions, which were validated by means of a Confirmatory Factor Analysis set out in the article that presents the MDRAI inventory (see Horta and Santos, 2016). A total of 1,348 higher education researchers agreed to participate in this survey, but 416 responses were excluded when the respondent left the survey without completing the MDRAI block. This led to a final sample size of 923 participants, of which 495 (53.6%) were females and the other 428 (46.4%) males. The age of participants ranged from 24 to 84 years (M = 50.97, SD = 11.17). A quarter of the participants were affiliated with United States institutions (230; 24.9%), followed in frequency by Australia (140; 15.2%) and the United Kingdom (126; 13.7%). This is proportionally aligned with the worldwide population of higher education researchers publishing in the international literature, which is still concentrated in native English-speaking countries (Kuzhabekova et al., 2015). Higher education researchers affiliated to institutions in 65 other countries accounted for the remaining 427 (46.2%) participants.

Variables

The variables used analytically in this article represent the sub-dimensions in the MDRAI, explained in the section "research agendas," above (see also Table 1). This was a conscious, methodological choice made to obtain greater detail in the clustering process and subsequent analysis. These sub-dimensions are: *prestige*, which indicates the researcher motivation to acquire the recognition of peers; *drive to publish,* which relates to the motivation to publish research; *mastery*, representing the researcher's perceived mastery in a specific field; *stability,* which indicates the level of investment in a single field; *branching out,* associated to setting-up research agendas that are likely to expand to other fields of knowledge; *multidisciplinarity*, which reflects the researcher's preference to engage in topics requiring multidisciplinary approaches; *discovery,* representing a preference for emerging fields and risk-taking behavior; *conservative,* suggesting a preference to research safer and well-established topics; *tolerance for low funding*, which measures to what extent the availability of funding influences the choice of research topics; *willingness to collaborate*, representing the researcher's willingness to start collaborative research projects; *invited to collaborate*, representing the incidence of research agendas started by invitations to collaborate; and *mentor influence*, which indicates the level of influence of the PhD mentor in designing research agendas.

[2]The script of the Boolean search on Scopus was the following: "(SRCTITLE ("higher education") OR SRCTITLE ("tertiary education")) AND DOCTYPE (ar) AND PUBYEAR > 2003 AND PUBYEAR < 2015" — the search reported 40 higher education related journals, but 2 were excluded, the *Chronicle of Higher Education* due to characteristics that set its articles apart from other journals (see Horta, 2017) and the journal *Art Design Communication In Higher Education*, which only published two articles during the reference period.

Procedure

The first stage of the analysis employs cluster analysis to identify specific profiles and create a typology of research agendas. In the literature, cluster analysis has been used in a variety of contexts, including the study of behavioral patterns (e.g, Chou, 2008), science and technology indicators (e.g, Almeida et al., 2009), and profiles of the careers of researchers (Santos and Horta, 2015). In the analysis undertaken for this article, a TwoStep clustering algorithm is used, which offers several advantages over traditional clustering procedures. It allows for the use of both categorical and continuous variables, which is not possible with traditional clustering methods (Norusis, 2012); it is compatible with very large datasets (Zhang et al., 1996); and it is capable of statistically determining the optimal number of clusters (see Chiu et al., 2001 for a detailed description of this procedure). The clustering procedure used log-likelihood estimation, given that the reported Euclidean distance performed poorly in this context (see Santos and Horta, 2015). The model fit was evaluated by means of the average silhouette measure of cohesion and separation ranging from -1 to 1. The cutoff point of 0.2 (and above) was considered for determining whether or not the model has good fit (Kaufman and Rousseeuw, 2009).

The second stage of the analysis makes use of a regression, using input variables to gain additional insights regarding both the relative predictive power of each sub-dimension and their relation to the sub-dimensions that defined the clusters identified in the previous stage. This analysis concludes with a cross-validation that replicates the clustering procedure in sub-samples defined based on "real-life" grouping variables.

Strengths and weaknesses of using perception data

This study relies on self-reported data. Questionnaires represent one of the most practical cost-effective methods to obtain large amounts of data, and produce relatively robust evidence when adequate validation exercises are implemented. However, respondent bias remains an issue, especially regarding socially desirable responses (McDonald, 2008), which represents an inherent limitation of this method. Moreover, the fact that the analysis is based on perception data, means that it refers to respondents' interpretation of a phenomenon, which is inevitably informed by their previous beliefs and experiences, as well as their effort to provide meaning to their experience (Lindsay and Norman, 1977). The way individuals interpret a phenomenon aligns not with reality as it is, but rather with a reality as they construct it. While this is potentially limiting from a methodological point of view, this limitation is mitigated according to a literature that describes self-perceptions as powerful influences defining human action (i.e., what is real is what one perceives it to be) which are highly correlated with actual behavior (Pickens, 2005). Self-perceptions are found to be compelling influencers of behavior and action in higher education settings. Studies showing how student perceptions of themselves (self-esteem) and of their skills guide their academic choices and their employment focus (e.g, Tavares and Cardoso, 2013), while for academics, how they perceive changing institutions and environmental factors alters and shapes their behaviors and their research productivity (e.g, Kwiek, 2015). Response bias under the form of social desirability, for instance, typically manifests as a skewing of the responses towards what is perceived as desirable (Philips, 1972). The instrument used for this analysis was previously validated and found to have normal distribution for all of the used predictors, with low values of skewness and kurtosis (Horta & Santos, 2016), further suggesting that there is little or no response bias.

Results

First stage analysis – Clustering

The clustering procedure yielded two clusters comprising of 605 participants (cluster 1) and 318 participants (cluster 2). The model fit, as evaluated by the silhouette measure of cohesion and separation, was 0.3, indicating a good fit. Tables 2 and 3 and Figure 1 describe the characteristics of these clusters based on the input variables[3]:

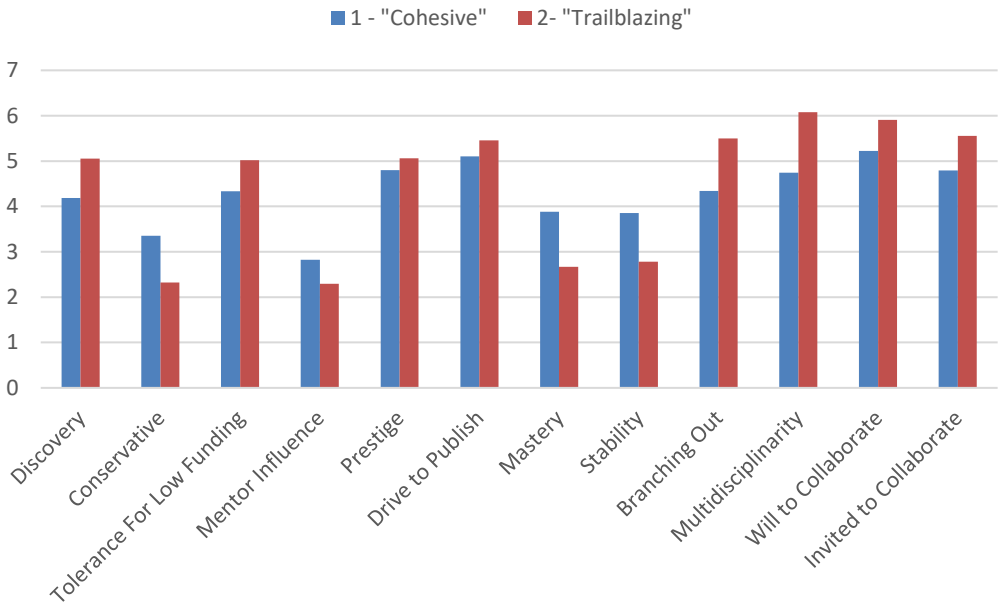

Figure 1. Comparative of variable means for each cluster.

Table 2: Quantitative descriptive statistics for the extracted clusters.

	1 – "Cohesive"		*2- "Trailblazing"*	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Discovery	4.19	0.88	5.05	1.22
Conservative	3.36	0.90	2.32	0.92
Tolerance for Low Funding	4.34	1.14	5.02	1.40
Mentor Influence	2.82	1.23	2.29	1.32
Prestige	4.80	1.06	5.06	1.25
Drive to Publish	5.11	1.11	5.46	1.30
Mastery	3.88	0.97	2.67	0.96
Stability	3.85	0.86	2.79	0.90
Branching Out	4.34	0.94	5.50	0.90
Multidisciplinarity	4.74	1.07	6.08	0.95
Will to Collaborate	5.22	0.94	5.91	0.89
Invited to Collaborate	4.79	1.09	5.55	1.04
Age	50.56	11.37	51.74	10.84
N	605		318	

Table 3: Qualitative descriptive statistics for the extracted clusters.

[3] For analytical purposes, standardized factor scores were calculated for the latent factors representing the dimensions under analysis (DiStefano et al., 2009) using full information maximum likelihood (FIML) estimation for purposes of data imputation (Enders and Bandalos, 2001). However, when descriptive statistics are reported, the simple mean for individual items comprising that factor is used instead, making it easier to read since these values are easier to be interpreted than Z-scores.

Variable	1 – "Cohesive" N	1 – "Cohesive" Column %	2- "Trailblazing" N	2- "Trailblazing" Column %
Gender				
Male	328	54.1%	169	53.0%
Female	277	45.9%	149	47.0%
Country				
Other	87	14.4%	41	12.6%
Australia	88	14.6%	52	16.4%
Canada	26	4.1%	13	4.1%
Finland	13	2.2%	7	2.2%
France	4	0.7%	5	1.6%
Germany	8	1.3%	7	2.2%
Hong Kong	7	1.2%	6	1.9%
Ireland	5	0.8%	5	1.6%
Israel	5	0.8%	1	0.3%
Italy	7	1.2%	3	0.9%
Malaysia	9	1.5%	2	0.6%
Netherlands	22	3.6%	2	0.6%
New Zealand	20	3.3%	13	4.1%
Norway	11	1.8%	3	0.9%
Portugal	16	2.6%	4	1.3%
South Africa	22	3.6%	4	1.3%
Spain	18	3.0%	5	1.6%
Sweden	13	2.2%	4	1.3%
Taiwan	6	1.0%	3	0.9%
United Kingdom	78	12.9%	48	15.1%
United States	140	23.2%	90	28.4%
N	605		318	

Based on the characteristics of the identified clusters, cluster 1 was labelled as "cohesive agendas" and cluster 2 as "trailblazing agendas". The most evident differences between the clusters rest in the sub-dimensions of convergence and divergence, although other differences can be observed, as described below.

The cohesive agenda cluster accounts for two-thirds of the sampled higher education researchers, and represents researchers whose agenda-setting leans toward safer research endeavors. This is evidenced by their comparatively lower scores on the discovery dimension and higher scores on the conservative sub-dimension, indicating a preference for more established fields. Their research agenda setting process is somewhat tolerant to low funding, but less so than that of researchers leaning toward trailblazing agendas. Researchers learning toward cohesive agenda setting also consider their research agenda setting to be more influenced by PhD mentors, while scoring slightly lower on both prestige and drive to publish than their more trailblazing agenda-oriented peers. More substantial differences are observed concerning mastery and stability, which are considerably higher for cohesive agenda-oriented researchers, indicating a preference to specialize and take roots in a single field of inquiry. Accordingly, cohesive agenda-oriented researchers score comparatively lower on branching out, multidisciplinarity, and both collaboration sub-dimensions, indicating less willingness to collaborate with peers and – probably as a consequence – fewer opportunities to partake in cooperative ventures started by others.

The competing cluster of the trailblazing agenda-oriented researchers represent one-third of the sampled researchers and highlight a different set of characteristics. They are more driven toward discovery and less toward conservative research agendas. They report a higher tolerance for low funding than cohesive agenda-oriented researchers, which can be explained by the fact

that they are more willing to attempt exploratory research that does not demand too many resources, but they may also be constrained by research agencies, which tend to prefer to fund established fields (Carayol and Thi, 2005). The influence of the PhD mentor is relatively lower for the agenda setting of these researchers, which may indicate more independence but could also entail that after graduation they quickly shift the focus of their research agendas beyond the research interests of their PhD mentor. On prestige and drive to publish, they score comparatively higher than the cohesive agenda-oriented researchers. A lower score on both mastery and stability indicates that these researchers have less interest in focusing on a single field and prefer broad and multidisciplinary agendas, which is also evidenced by much higher scores than the cohesive agenda-oriented researchers in the branching out and multidisciplinarity sub-dimensions. Researchers following a trailblazing research agenda-setting approach also report a higher preference for collaborative agendas and are given more opportunities for collaboration.

The descriptive statistics for the clusters according to age, gender, and country do not show important differences. The mean age of researchers leaning toward cohesive research agendas is 51, while for those leaning toward trailblazing research agendas is 52. The balance between males and females in both research agenda clusters is similar (54% males to 46% females in the cohesive agendas and 53% males to 47% females in the trailblazing agendas). The same holds true for differences between countries, with more researchers leaning toward cohesive agendas in all countries[4].

Second stage analysis – Linear modeling

The first analysis identifies two main trends in the setting of research agendas by higher education researchers, but cluster analysis as a technique provides limited information on the predictive capabilities of the determining variables. Therefore, a follow-up analysis was conducted using a multivariate General Linear Model, a commonly used procedure (see Parker et al., 2013). This analysis considers dependent variables the sub-dimensions mastery and stability (constituting the convergence dimension), and branching out and multidisciplinarity (constituting the divergence dimension). These sub-dimensions are used because they are the primary differentiators of the clustering structure. The independent variables used were the remaining sub-dimensions in the clustering analysis. The results are summarized in Table 4.

Table 4: Determinant effects on sub-dimensions of Divergence and Convergence

Variables	*Stability*	*Mastery*	*Multidisciplinarity*	*Branching Out*
Discovery	-0.016	-0.006	0.268 ***	0.191 ***
	(0.026)	(0.029)	(0.042)	(0.032)
Conservative	0.347 ***	0.404 ***	-0.164 ***	-0.192 ***
	(0.026)	(0.029)	(0.042)	(0.033)
Tolerance for Low Funding	-0.046 **	-0.057 **	-0.006	0.010
	(0.021)	(0.024)	(0.035)	(0.027)
Mentor Influence	0.019	0.025	0.052	0.100 ***
	(0.023)	(0.026)	(0.037)	(0.029)
Prestige	0.137 ***	0.170 ***	-0.021	-0.009

[4] with the possible exception of France, but the very small number of observations for that country do not permit even a tentative conclusion.

	(0.021)	(0.024)	(0.035)	(0.027)
Drive to Publish	0.013	0.016	0.060	0.067 **
	(0.026)	(0.029)	(0.042)	(0.032)
Will to Collaborate	-0.121 ***	-0.135 ***	0.260 ***	0.166 ***
	(0.035)	(0.041)	(0.058)	(0.045)
Invited to Collaborate	-0.004	-0.012	0.043	0.053
	(0.034)	(0.038)	(0.055)	(0.218)
F(8, 911) ***	60.190	63.162	31.011	35.916
Adjusted R-Squared	0.339	0.350	0.207	0.233
Observations	923	923	923	923

Notes. A General Linear Model with fixed factors (coded as dummies) and covariates is shown. Standard errors are in parenthesis.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

These results show differences between trailblazing and cohesive agenda setting. Discovery – associated with risk-taking, and a research preference for emerging fields carrying the potential for disruptive discoveries – manifests itself as a statistically significant positive predictor of multidisciplinarity and branching out, while having no effect on stability and mastery. From a conceptual standpoint this is expected, since researchers performing cutting-edge research are likely to require knowledge from several existing fields (Martimianakis and Muzzin, 2015; Schut et al., 2014). Inversely, conservative is a statistically strong positive predictor of both stability and mastery, and a negative predictor of multidisciplinarity and branching out. Researchers pursuing conservative research agendas are more likely to specialize to the point where they are reluctant to engage in other fields. There is a key difference between discovery and conservative dimensions, however. Whereas discovery has a positive effect on divergence without any significant effect on convergence, conservative has a positive effect on convergence while simultaneously having a negative effect on divergence. An interpretation for this is that trailblazing agenda-oriented researchers have lesser incentives and thus are neutral to the prospect of doing, for example, replication research, while cohesive agenda-oriented researchers actively avoid riskier endeavors. This may be an expression of the cumulative advantage effect (Allison and Steward, 1974), as researchers who are "ahead of the curve" have lesser incentives to engage in uncertain ventures. This has been shown to occur even in cutting-edge fields such as biomedicine, where researchers become more conservative as the overall risk of the field increases (Rzhetsky et al., 2015). This is co-substantiated by the tolerance for low funding variable, which is a negative predictor for both stability and mastery, meaning that the greater a researcher's tolerance to risk is, regarding research funding, the less likely it is that this researcher will engage in cohesive agenda setting. In this regard, it is also important to note that cohesive research agendas are more linked to disciplines, which research funding agencies prefer to fund (vis-à-vis multidisciplinary and interdisciplinary approaches), therefore making it likely that more research funding would be available for researchers opting for cohesive research agendas (Carayol and Thi, 2005). Tolerance for low funding has no effect on the divergence dimensions, meaning that it has the potential to draw researchers away from the cohesive agenda, while not necessarily pulling them toward adopting trailblazing agendas.

The influence of PhD mentors only has a positive impact on branching out, underlining the key role that mentors can have in encouraging their former students to expand their research agendas into other fields of inquiry. Prestige is a strong and positive predictor of stability and mastery, which are characteristics mostly associated with cohesive research agenda setting. This finding is aligned with literature suggesting that pursuing multiple research foci can be

understood by research communities as a lack of thematic focus and engagement in the interests of that particular community, and thus detrimental to researchers desiring to accumulate prestige which, as a positional good, demands significant amount of time, focus, and effort (Bourdieu, 1999). Drive to publish, however, has a positive effect on branching out, which is expected since entering and expanding into different fields of knowledge requiring a tangible "presence" there that implies a greater need to publish to be visible but also allows a broadening of publication venues. The collaboration sub-dimension is a significant predictor of all sub-dimensions, whereas a higher willingness to collaborate leads to less convergence and more divergence. This resonates with the literature stating that multidisciplinary ventures require higher levels of collaboration than disciplinary and specialized research foci (Leahey, 2016). This implies that those engaging more in trailblazing research agendas are likely to publish more publications in collaboration than those leaning toward cohesive research agenda setting. No statistically significant differences were found for the invited to collaborate variable.

Third stage analysis – Split-sample cross-validation

The literature review suggested potential differences between new and established cohorts of higher education researchers (Jiang et al., 2017; Ashwin et al., 2016), and between part-timers (one-time contributors to the field) and researchers making frequent contributions (Harland, 2012; Clegg, 2012; Healey and Jenkins, 2003). Therefore, a clustering procedure was conducted independently for each of the four groups. The first cross-validation was conducted with the sample divided between new and established researchers. Since differentiation between new and established researchers is not clear-cut, the analysis followed Bazeley's (2003) suggestion of using relative youth as an indicator of whether a researcher is early or late in his or her career (Bazeley, 2003). Therefore, researchers under 40 years old were labelled as new researchers. A related analysis comparing pre-tenured and tenured researchers would also have been of interest, to provide an assessment of new and established researchers complementary to the age-based criterion, but no appropriate data was available to perform it.

In each group, as in the main analysis, only the cohesive and trailblazing research agenda clusters emerged, each showing a fit of 0.3 on the silhouette measure. Figures 2 and 3 juxtapose the two clusters' profiles on both groups. This shows that except for minor differences (such as the influence of PhD mentors being less for the established researchers leaning toward trailblazing research agendas than it is for established researchers leaning toward cohesive research agendas), new researchers, established researchers, part-time, and frequent contributors to the higher education research community all show a similar structuring of their research agendas, leaning either toward trailblazing or cohesive research agendas. This analysis sustains the robustness of the main analysis and implies that contributors to higher education research at different stages in their academic career, or contributing to higher education research at differing frequency, maintain the same dynamics concerning the setting-up of research agendas.

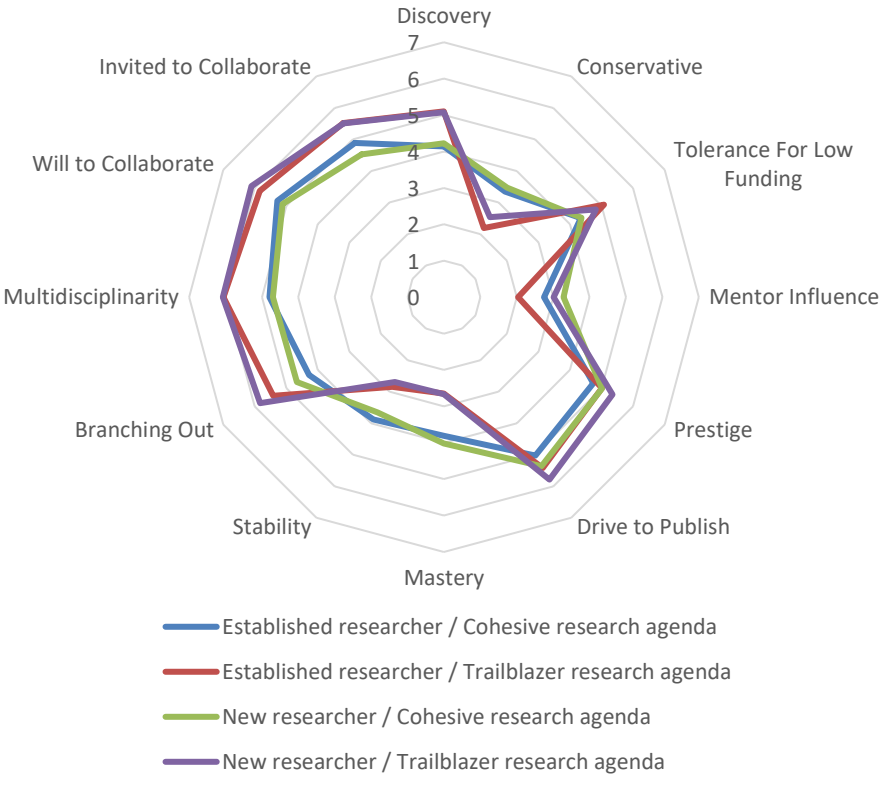

Figure 2. Comparative variable means for each cluster, for new and established researchers in the field of higher education.

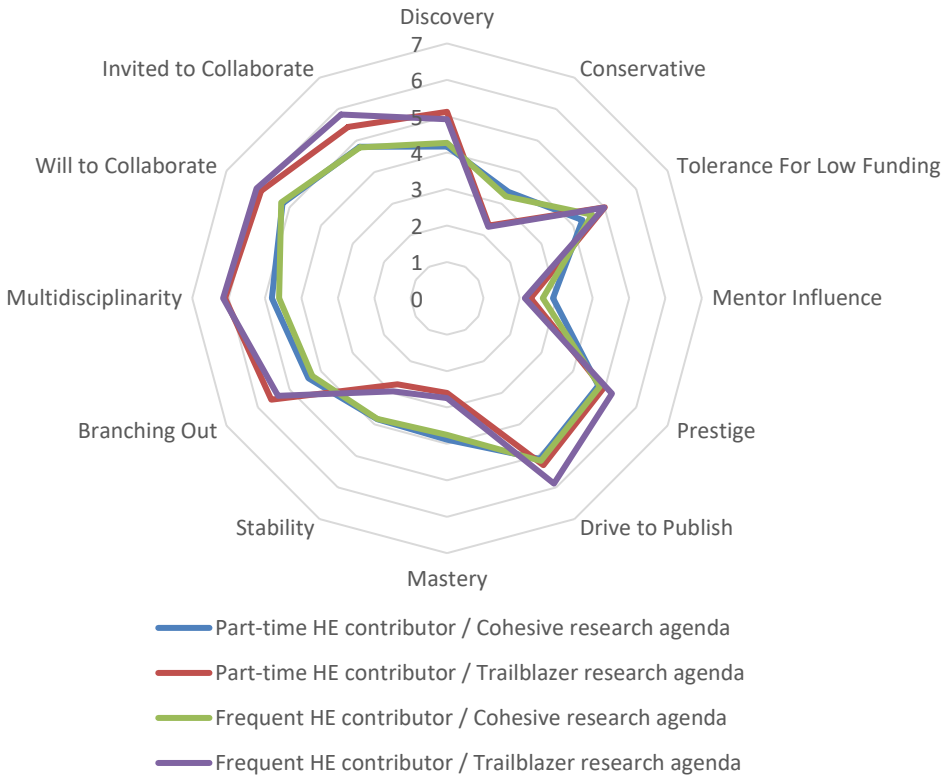

Figure 3. Comparative of variable means for each cluster, on part-time and frequent higher education researchers.

Conclusion

The setting-up of individual research agendas by higher education researchers is characterized by multidimensional features that can be clustered into two main clusters, cohesive and trailblazing. Cohesive research agendas are characterized by a greater focus on developing an expertise in a field, associated with a long-term investment of time and effort in driving forward knowledge on a specific topic, thus implying a level of topical specialization. This relates to the sense of convergence with the existing knowledge in the field but also to stability and safer risk-taking options. These agendas tend to be mostly disciplinary in nature and demand a lesser degree of collaboration, possibly due to the substantial influence of the PhD mentor on research agenda setting (particularly for new researchers), related to the topics or general field of inquiry of the PhD. Trailblazing research agendas, on the other hand, are characterized by a willingness to expand research into other fields of knowledge, to do multidisciplinary research, and to engage and be engaged by others in collaborative projects from the start. This research agenda cluster is associated with risk-taking, since it implies a greater likelihood of leaving one's comfort zone and coping with potentially lesser availability of research funding (the propensity to do research with no funding is higher for those researchers opting for this research agenda).

Both research agenda clusters are strongly associated with peer recognition, although the strategy to attain this recognition from peers is different and relates to key characteristics defining each research agenda cluster. Those researchers leaning toward cohesive research agendas tend to have a desire for recognition that is associated to the mastery of knowledge in a specific field of inquiry as recognized by their peers, while researchers that lean toward trailblazing research agendas tend to do so through a greater drive to publish, evidencing the need to establish a "presence" through concrete research outputs on the many research topics that they engage in. These two different strategies to attain prestige defined in the two research agenda types are closely associated to the contextualization, legitimacy, and related challenges that disciplinary, multidisciplinary, and interdisciplinary researchers face in modern academia (Carayol and Thi, 2005). Research agendas should not be assumed to involve mutually exclusive approaches, but rather are subject to interplay across the continuum of dimensions that characterize them (see also Knuuttila, 2013). Nevertheless, the analysis of research agendas of new and established higher education researchers and part-time and frequent contributors to the field suggests that researchers in different situations in their career – and with varied opportunities to contribute to the field – exhibit a remarkably similar clustering of research agenda setting. This may indicate that some pressures – including those derived from academic capitalism – could be at work undermining expected differences in research agenda setting and underlining isomorphic pressures to conform and survive (particularly for the younger generations of researchers; see Cantwell and Taylor, 2015).

However, aside from the possible pressures pointed above that may be associated with a changing academia, the implications of this study on research agendas clusters for the advancement of knowledge in the field of higher education could be far reaching, particularly if one considers that two-thirds of researchers lean toward a cohesive research agenda while the others tend toward a trailblazing agenda. As one analyzes the dimensions characterizing the research agendas, and the clusters that were formed around them, the dichotomies between them seem to find echo in the work of Kuhn (1970) concerning his reasoning about the paradigms to which groups of researchers adhere (as well as legitimize and protect), embedding specific values, identities, lines of thinking and acting (often dictated by disciplinary norms) in

what Kuhn designated as “normal science”. Meanwhile, often within the same research community, other groups of researchers try to create “small revolutions” that lead to paradigmatic shifts. The former can be associated with researchers leaning toward cohesive agendas, while the latter are associated with those leaning toward trailblazing agendas. This distinction can have substantial repercussions for the advancement of knowledge in the field of higher education, since those researchers engaged in what Kuhn (1970) terms as “normal science” – that is, the ones leaning toward cohesive agendas - tend not to find unprecedented results because the normal science does not aim to find novelties. Rather, and contrary to the perspective of Popper (1963) who argues that researchers constantly strive to scrutinize accepted knowledge and beliefs, Kuhn (1970) argues that researchers adhering to a paradigm do research mainly to reinforce what is already known, albeit perhaps from different angles or in differing contexts, and add little to the advancement of knowledge. This holds true even if paradigm-bound researchers stress that unknowns exist in normal science – which is a pre-condition for discovery - if they try to solve these questions mainly by improving existing explanatory models and not by searching for new ones.

This interpretation places those researchers leaning toward cohesive agendas as stabilizers of knowledge and identity in the field. However, and at the same time, these researchers may not be aligned with the growing call for more multidisciplinary, disruptive and encompassing research agendas to cope with the complex challenges the world is facing (Martimianakis and Muzzin, 2015). They are also expected to be resistant to engage in modes of knowledge production that are described as more transdisciplinary, hierarchically organized, and have a more transitory character (Nowotny et al., 2003). And yet, of greater concern, these would also be the researchers most likely to oppose change because paradigm shifts – entailing novelty and new knowledge leading to the emergence of new paradigms - bring along with them crises and what Kuhn describes as the “end of normal science;” that is, they bring disruption to the field and undermine the scientific positioning of these researchers (who may lose positional power; see Kogan, 2005). Therefore, and in view of this line of argument, a greater balance is desirable between research agendas in the higher education research community, and should be sought in a way that on the one hand, ensures novelty and change in the field but, on the other hand, does not overly lean toward the preponderance of trailblazing agendas, because it is important to realize that fields of knowledge are social systems (Latour and Woolgar, 2013) and as such they require minimum levels of stability, organization, and sets of values and norms to sustain them as recognized fields of knowledge.

References

Allison, P. D., and Stewart, J. A. (1974). Productivity differences among scientists: Evidence for accumulative advantage. American Sociological Review, 39(4): 596–606.

Almeida, J. A. S., Pais, A. A. C. C., and Formosinho, S. J. (2009). Science indicators and science patterns in Europe. Journal of Informetrics, 3(2): 134–142.

Altbach, P. G., Bozeman, L. A., Janashia, N. and Rumbley, L. E. (eds.) (2006) Higher Education: A Worldwide Inventory of Centers and Programs. Rotterdam: Sense Publishers.

Ashwin, P., Deem, R., and McAlpine, L. (2016) Newer researchers in higher education: policy actors or policy subjects? Studies in Higher Education, 41(12): 2184-2197.

Baccini, A., Barabesi, L., Cioni, M., and Pisani, C. (2014) Crossing the hurdle: the determinants of individual scientific performance. Scientometrics 101(3): 2035-2062.

Bazeley, P. (2003). Defining'early career'in research. Higher Education, 45(3): 257–279.

Bligh, B., and Flood, M. (2017) Activity theory in empirical higher education research: choices, uses and values. Tertiary Education and Management, online first, 1-28.

Bourdieu, P. (1999). The specificity of the scientific field. The Science Studies Reader. Ed. Biagioli M. New York: Routledge, 31–50.

Brew, A. and Lucas, L. (Eds.) (2009) Academic Research and Researchers. Maidenhead: Open University Press.

Brew, A., Boud, D., Namgung, S.U., Lucas, L., and Crawford, K. (2016) Research Productivity and academics' conceptions of research. Higher Education 71(5): 681-697.

Cantwell, B., and Taylor, B.J. (2015) Rise of science and engineering postgraduate and the restructuring of academic research. Journal of Higher Education 86(5): 667-696.

Carayol, N., and Thi, T.U.N. (2005) Why do academic scientists engage in interdisciplinary research? Research Evaluation 14(1): 70-79.

Chen, S. and Hu, L. (2012) Higher Education Research As A Field in China: Its Formation and Current Landscape. Higher Education Research and Development, 31 (5), pp. 655–666.

Chiu, T., Fang, D., Chen, J., Wang, Y., and Jeris, C. (2001). A robust and scalable clustering algorithm for mixed type attributes in large database environment (pp. 263–268). Proceedings of the seventh ACM SIGKDD international conference on knowledge discovery and data mining, ACM.

Chou, K.-L. (2008). The prevalence and clustering of four major lifestyle risk factors in Hong Kong Chinese older adults. Journal of Aging and Health, 20(7): 788–803.

Clegg, S. (2012). Conceptualising higher education research and/or academic development as 'fields': A critical analysis. Higher Education Research and Development, 31(5): 667–678.

Conceição, P., and Heitor, M.V. (1999) On the role of the university in the knowledge economy. Science and Public Policy 26(1): 37-51.

DiStefano, C., Zhu, M., & Mindrila, D. (2009). Understanding and using factor scores: Considerations for the applied researcher. Practical Assessment, Research & Evaluation, 14(20): 1–11.

Dobele, A.R., and Rundle-Theile, S. (2015) Progression through academic ranks: a longitudinal examination of internal promotion drivers. Higher Education Quarterly 69(4): 410-429.

Enders, C. K., and Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. Structural Equation Modeling, 8(3): 430–457.

Ertmer, P. A., and Glazewski, K. D. (2014). Developing a research agenda: contributing new knowledge via intent and focus. Journal of Computing in Higher Education, 26(1): 54–68.

Fyfe, A. (2015) Uncomfortable departments: British historians of science and the importance of disciplinary communities. Arts and Humanities in Higher Education 14(2): 194-205.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., and Trow, M. (1994) The new production of knowledge – The dynamics of science and research in contemporary societies. London: Sage.

Hajdarpasic, A., Brew, A., and Popenici, S. (2015) The contribution of academics' engagement in research to undergraduate education. Studies in Higher Education, 40(4): 644-657.

Harland, T. (2012) Higher Education as an Open-Access Discipline. Higher Education Research & Development, 31 (5): 703–710.

Healey, M. and Jenkins, A. (2003). Discipline-based Educational Development. In H. Eggins and R. MacDonald (Eds.) The Scholarship of Academic Development (pp. 47-57). Buckingham: Society for Research in Higher Education/Open University Press.

Henkel, M. (2015) "Multiversities and academic identities: change, continuities, and complexities". In Leisyte, L., and Wilkesmann, U. (Eds) Organizing Academic Work in Higher Education Teaching, learning and identities, London: Routledge (pp. 205-222).

Horta, H. (2017) Higher-education researchers in Asia: the risks of insufficient contribution to international higher-education research In Jung, J., Horta, H., and Yonezawa, A. (Eds) Researching Higher Education in Asia: History, Development and Future. Dordrecht: Springer (pp. 15-36).

Horta, H., and Jung, J., (2014) "Higher education research in Asia: An archipelago, two continents or merely atomization?", Higher Education, 68(1): 117-134.

Horta, H., and Santos, J. M. (2015). The Impact of Publishing During PhD Studies on Career Research Publication, Visibility, and Collaborations. Research in Higher Education 57(1): 28-50.

Horta, H., and Santos, J. M. (2016). An instrument to measure individuals' research agenda setting: the multi-dimensional research agendas inventory. Scientometrics, 108(3): 1243–1265.

Ion, G. and Ceacero, D.C. (2017) Transitions in the manifestations of the research culture of Spanish universities, Higher Education Research and Development, 36(2): 311-324.

Jiang, X., Borg, E., and Borg, M. (2017) Challenges and coping strategies for international publication: perceptions of young scholars in China. Studies in Higher Education 42(3): 428-444.

Kaufman, L., and Rousseeuw, P. J. (2009). Finding groups in data: an introduction to cluster analysis (Vol. 344). John Wiley & Sons.

Kehm, B. M. (2015). Higher Education as a Field of Study and Research in Europe. European Journal of Education, 50(1): 60–74.

Kim, K., and Kim, J.-K. (2017) Inequality in the scientific community: the effects of cumulative advantage among social scientists and humanities in Korea. Higher Education 73(1): 61-77.

Kim, Y., Horta, H., and Jung, J. (2017) Higher Education research in Hong Kong, Japan, China and Malaysia: exploring research community cohesion and the integration of thematic approaches, Studies in Higher Education, 42(1): 149-168.

Kogan, M. (2005) Modes of knowledge and patterns of power. Higher Education 49(1-2): 9-30.

Knuuttila, T. (2013) Science in a new mode: good old (theoretical) science versus brave new (commodified) knowledge production? Science and Education 22(10): 2443-2461.

Kuzhabekova, A., Hendel, D. D., and Chapman, D. W. (2015). Mapping Global Research on International Higher Education. Research in Higher Education, 56(8): 861–882.

Kuhn, T. S. (1970) The structure of scientific revolutions. Chicago: The University of Chicago Press.

Kwiek, M. (2016) The European research elite: a cross-national study of highly productive academics in 11 countries. Higher education 71(3): 379-397.

Kwiek, M. (2015) Academic generations and academic work: patterns of attitudes, behaviors, and research productivity of Polish academics after 1989. Studies in Higher Education 40(8): 1354-1376.

Kwiek, M., and Antonowicz, D. (2015) "The changing paths in academic careers in European universities: minor steps and major milestones". In Fumasoli, T., Goastellec, G., and Kehm, B. (Eds.) Academic Work and Careers in Europe: Trends, Challenges, Perspectives, Dordrecht: Springer (p. 41-68)

Latour, B., and Woolgar, S. (2013). Laboratory life: The construction of scientific facts. Princeton: Princeton University Press.

Lauto, G., and Sengoku, S. (2015) Perceived incentives to transdisciplinarity in a Japanese university research center. Futures 65: 136-149.

Leahey, E. (2016) From sole investigator to team scientist: trends in the practice and study of research collaboration. Annual Review of Sociology 42: 81-100.

Lee, Y. (2000). The sustainability of university–industry research collaboration: An empirical assessment. Journal of Technology Transfer (25): 111–133.

Leisyte, L., Enders, J., and de Boer, H. (2008) The freedom to set research agendas – illusion and reality of research units in the Dutch universities. Higher Education Policy 21(3): 377-391.

Leisyte, L. (2016) New public management and research productivity – a precarious state of affairs of academic work in the Netherlands. Studies in Higher Education 41(5): 828-846.

Lindsay, P., and Norman, D. A. (1977). Human information processing: An introduction to psychology. New York: Academic Press

Lo, W.Y.W., and Tang, H.-H.H. (2017) Dancing with global trends: higher education policy and university governance in Hong Kong, 1997-2012. Journal of Educational Administration and History 49(1): 53-71.

Macfarlane, B. (2012). The higher education research archipelago. Higher Education Research and Development, 31(1): 129–131.

Martimianakis, M. A., and Muzzin, L. (2015). Discourses of interdisciplinarity and the shifting topography of academic work: generational perspectives on facilitating and resisting neoliberalism. Studies in Higher Education, 40(8): 1454–1470.

McDonald, J. D. (2008). Measuring personality constructs: The advantages and disadvantages of self-reports, informant reports and behavioural assessments. Enquire, 1(1), 1-19.

Middlehurst, R. (2014) Higher education research agendas for the coming decade: a UK perspective on the policy–research nexus, Studies in Higher Education, 39(8): 1475-1487,

Mok, K.H. (2016) Massifying and internationalizing higher education, changing labor markets and social mobility: challenges for education and urban governance. Journal of Higher Education Policy and Management 38(3): 233-241.

Moss, G., and Kubacki, K. (2007). Researchers in higher education: a neglected focus of study? Journal of Further and Higher Education, 31(3), 297–310.

Norusis, M. J. (2012). IBM SPSS statistics 19 statistical procedures companion. Prentice Hall.

Nowotny, H., Scott, P., & Gibbons, M. (2003). Introduction: Mode 2'Revisited: The New Production of Knowledge. Minerva, 41(3), 179-194.

Parker, J. N., Allesina, S., and Lortie, C. J. (2013). Characterizing a scientific elite (B): publication and citation patterns of the most highly cited scientists in environmental science and ecology. Scientometrics, 94(2), 469–480.

Phillips, D. L., & Clancy, K. J. (1972). Some effects of" social desirability" in survey studies. *American Journal of Sociology*, *77*(5), 921-940.

Pickens, J. (2005) Attitudes and perceptions. In Borkowski, N. (Ed.) Organizational behavior in Health Care. Sudbury: Jones and Bartlett.

Platow, M.J. (2012) PhD experience and subsequent outcomes: a look at self-perceptions of acquired graduate attributes and supervisor support, Studies in Higher Education, 37(1): 103-118.

Popper, K.R. (1963) Conjectures and refutations: the growth of scientific knowledge. New York: Routledge.

Quimbo, M.A.T., and Sulabo, E.C. (2014) Research productivity and its policy implications in higher education institutions. Studies in Higher Education, 39(10): 1955-1971.

Rzhetsky, A., Foster, J. G., Foster, I. T., & Evans, J. A. (2015). Choosing experiments to accelerate collective discovery. Proceedings of the National Academy of Sciences, 112(47): 14569–14574.

Santos, J. M., and Horta, H. (2015). The generational gap of science: a dynamic cluster analysis of doctorates in an evolving scientific system. Scientometrics, 104(1): 381–406.

Schut, M., van Paassen, A., Leeuwis, C., and Klerkx, L. (2014). Towards dynamic research configurations: A framework for reflection on the contribution of research to policy and innovation processes. Science and Public Policy, 41(2), 207–218.

Shattock, M. (2014) Can we still speak of there being an academic profession? History of Education, 43(6): 727-739.

Spalter-Roth, R. (2007) Sociologists in research, applied, and policy settings bringing professionals in from the cold. Journal of Applied Social Science 1(2): 4-18.

Stubb, J., Pyhalto, K., and Lonka, K. (2014) Conceptions of research: the doctoral student experience in three domains. Studies in Higher Education 39(2): 251-264.

Tavares, O., and Cardoso, S. (2013) Enrolment choices in Portuguese higher education: do students behave as rational consumers? Higher education 66(3): 297-309.

Tight, M. (2003). Researching Higher Education. Buckingham: SRHE, Open University Press

Tight, M. (2004) Research into Higher Education: an A-Theoretical Community of Practice. Higher Education & Development, 23 (4): 395–411.

Tight, M. (2008) Higher Education Research As Tribe, Territory and/Or Community: a Co-Citation Analysis. Higher Education, 55(5): 593–605.

Tight, M. (2012) Higher education research 2000-2010: changing journal publication patterns. Higher Education Research and Development 31(5): 723-740.

Tight, M. (2013) Discipline and methodology in higher education research, Higher Education Research and Development, 32(1): 136-151

Tight, M. (2014) Working in separate silos? What citation patterns reveal about higher education research internationally. Higher Education 68(3): 379-395.

Van der Weijden, I., Teelken, C., de Boer, M., and Drost, M. (2016) Career satisfaction of postdoctoral researchers in relation to their expectations for the future. Higher Education 72(1): 25-40.

Wang, J. (2016) Knowledge creation in collaboration networks: effects of tie configuration. Research Policy 45(1): 68-80.

Zhang, T., Ramakrishnan, R., and Livny, M. (1996). BIRCH: an efficient data clustering method for very large databases (Vol. 25, pp. 103–114). Presented at the ACM SIGMOD Record, ACM.

Appendix

Multi-Dimensional Research Agendas Inventory (MDRAI)

You will be asked a series of questions regarding your motivations and goals as an academic. To respond to this questionnaire, read each statement carefully and decide how much do you agree with each of them. For each statement, check one of the 7 boxes next to the corresponding item. If you don't know or a particular sentence does not apply to you, check the N/A box.

There are no right or wrong answers. Please red each statement and check the box which best applies to you.

How much do you agree with the following statements?

		Completely disagree	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Completely agree	N/A
A1	I aim to one day be one of the most respected experts in my field.								
A2	Being a highly regarded expert is one of my career goals.								
A3	I aim to be recognized by my peers.								
A4	Standing out from the rest of my peers is one of my goals.								
A5	I feel the need to constantly publish new and interesting papers.								
A6	I am constantly striving to publish new papers.								
C1	My expertise is focused on a single scientific area.								
C2	I believe that specialization in one area is preferable to diversification.								
C3	Shifting towards another field of science is not a part of my plans.								
C4	Studying subjects outside of my main field of work is pointless.								
C5	I have invested far too much in my current field to consider branching out into another.								
DI1	I find "cutting-edge" scientific areas more appealing than well-established ones.								
DI2	I would rather conduct revolutionary research with little chance of success than replicate research with a high chance of success.								
DI3	I prefer "cutting-edge" research to "safe" research, even when the odds of success are much lower.								
CN1	I prefer "safe" or "stable" fields of study.								
CN2	I prefer fields of study that are considered "safe" or "stable."								
TL1	Limited funding does not constrain my choice of field.								

TL2	Highly limited funding does not constrain my choice of field.								
TL3	The availability of research funding for a certain topic does not influence me doing research on that topic.								
CO1	I enjoy collaborating with other authors in my scientific articles.								
CO2	My scientific articles are enhanced by collaboration with other authors.								
CO3	I see myself as a team player when it comes to research collaboration.								
CO4	I often seek peers with whom I can collaborate on scientific articles.								
CO5	My peers often seek my collaboration in their scientific articles.								
CO6	I am often invited to do collaborative work with my peers.								
M1	My PhD mentor's opinion carries much weight in my research choices.								
M2	A part of my work is largely due to my PhD mentor.								
M3	My research choices are highly influenced by my PhD mentor's opinion.								
M4	My PhD mentor is responsible for a large part of my work.								
M5	My PhD mentor still often works alongside me.								
M6	My PhD mentor largely determines my venues of research.								
D1	I look forward to diversifying into other areas.								
D2	I would be interested in pursuing research in other fields.								
D3	I enjoy multi-disciplinary research more than single-discipline research.								
D4	For me, multi-disciplinary research is more interesting than single-discipline research.								