

RESEARCH ARTICLE OPEN ACCESS

A Career Ecosystem Perspective on Societal and Organizational Characteristics and Careers to the Top in Higher Education

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Received: 27 January 2022 | **Revised:** 23 August 2024 | **Accepted:** 24 October 2024

Keywords: career patterns | culture | higher education | job sequencing | organization leaders

ABSTRACT

The context in which careers develop is attracting increasing scholarly attention. Building on career ecosystem theory, we examine how societal and organizational actors within career ecosystems influence the development of careers. In our study of university leaders in 60 countries, we find that career trajectories are more similar within than across countries and that the overall organizational context relates to the similarity of career trajectories within the career ecosystem. We identify six distinct career patterns to the top of organizations within the ecosystem of higher education (e.g., ‘university president’ or ‘rector’). Furthermore, we identify several societal and organizational characteristics that are related to the prevalence of specific career patterns. Key findings include that academic leaders’ careers tend to follow career patterns within the same organization in countries with low power distance, low labour market flexibility and low meritocracy, as well as in universities with less research focus. Our findings add to the literature on career ecosystems and advance the understanding of career paths to the top of organizations, using the case of academic careers.

1 | Introduction

University leaders have a significant impact not only within but also beyond their organizations by influencing industry, politics and society (Carree, Della Malva, and Santarelli 2014). As the higher education sector grows in relevance and size, more work is being devoted to understanding careers within academia (Jeong, Leblebici, and Kwon 2021; Kraimer et al. 2019; Zacher et al. 2019). However, while a great deal of research has focused on CEOs’ careers (Hamori and Kakarika 2009; Koch, Forgues, and Monties 2017; Koyuncu, Hamori, and Baruch 2017), little attention has been paid to the career paths of those reaching the highest hierarchical position in higher education organizations (Baruch and Hall 2004). Evidence from the USA suggests the

existence of specific patterns in career paths to the top of higher education organizations (Singell and Tang 2013; Wessel and Keim 1994), but different paths might exist in other countries. Moreover, prior research predominantly analysed leaders’ careers through the lens of boundaryless career theory (Guan et al. 2019), emphasizing individual agency. Furthermore, the context in which careers develop has started to receive attention in the HRM literature (e.g., Andresen et al. 2020; Benson et al. 2020; Knappert et al. 2023; Smale et al. 2019), but how societal and organizational characteristics shape careers in higher education remains largely neglected.

We address these shortcomings by employing a career ecosystem perspective (Baruch 2015; Baruch and Rousseau 2019) which

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Summary

- What is currently known?
 - Societies and organizations provide the context in which careers evolve.
 - Dominant career paths vary across societal and organizational contexts.
 - Little is known about career paths to the top of organizations in higher education, and about timing and sequencing of mobility and positions.
- What does this study show?
 - Careers across countries are more dissimilar than careers within countries.
 - Careers evolving within the same organization are more common in societies with lower levels of power distance, labour market flexibility and meritocracy.
 - Careers evolving within the same organization are more common in universities with less research focus.
 - Previous job experience is more important in societies with high uncertainty avoidance.
- Implications of the study findings for practitioners
 - Diverse career patterns lead to the top of organizations in the higher education sector in different societies.
 - Career patterns of successful leaders should be considered when searching for future leaders.
 - Characteristics of the organization should be considered when designing career management systems.

offers a comprehensive view of careers from multiple perspectives and at different levels. Applying this theoretical perspective enables us to take into account the context in which careers of leaders in higher education develop, considering both societal and organizational factors (Baruch and Rousseau 2019). Our first research question is: Do societal (i.e., countries) and organizational actors within career ecosystems affect individuals' careers? Our second research question is: What career patterns lead to the top of higher education organizations, and does the prevalence of these patterns differ depending on the characteristics of the career ecosystem? To answer our research questions, we examine objective, longitudinal career data of 280 university leaders from 60 countries.

We contribute to the career ecosystems framework by being among the first to empirically test this theoretical perspective. First, we integrate all three key actors in career ecosystems (Baruch and Rousseau 2019)—individuals, organizations and societies—within the higher education context. We, thus, clarify how organizational and societal characteristics influence the types of career paths that can be taken to achieve leadership positions in higher education institutions. By applying sequence analysis to examine individuals' entire career trajectories, we introduce a methodological approach that enables a detailed exploration of the timing and sequencing of academic career moves, while also allowing for the testing of similarity hypotheses. Second, academia is a key sector in many countries (Jeong, Leblebici, and Kwon 2021), and the selection and succession planning of university leaders is an important HRM endeavour

(Kaulisch and Enders 2005). By focusing on academic careers in different countries around the globe, we also answer the call for an examination of career paths to the top of organizations in diverse societal and organizational contexts (Andresen et al. 2022; Baruch and Sullivan 2022; Koch, Forgues, and Monties 2017; Mayrhofer et al. 2020). Third, we contribute to expanding the contextual perspective on HRM (e.g., Benson et al. 2020; Biemann, Mayrhofer, and Koch-Bayram 2023; Knappert et al. 2023; Smale et al. 2019). While previous literature has mostly focused on how societal macrostructure affects individuals' career goals and behaviours through HR regulations and practices, we show how it affects individuals' entire career trajectories. Our findings further enrich the literature on organizational career systems (Sonnenfeld and Peiperl 1988). The career patterns that we identify can be linked to specific career systems that differ in terms of talent management or an emphasis on contribution versus loyalty. Overall, our study is highly relevant for individual academics aspiring to leadership roles in academia, such as university president. For HRM professionals in academia, our research provides practical implications for succession planning. Moreover, for HRM professionals outside of academia, our research offers valuable insights that connect country-specific characteristics to career trajectories.

2 | Theoretical Background and Hypotheses

2.1 | Career Ecosystems

To account for the contextual embeddedness of careers, an examination is needed of individuals as agentic entities, their embeddedness in a social and geographic space, and their development over time (Mayrhofer et al. 2020). We, therefore, base our theoretical rationale on career ecosystem theory. Introduced to management studies by Iansiti and Levien (2004), the ecosystem theory refers to 'a system that contains a large number of loosely coupled (interconnected) actors who depend on each other to ensure the overall effectiveness of the system' (5). A career ecosystem is a social system of employment and career-related development and opportunity that emerges from interdependencies among actors (Baruch and Rousseau 2019). The principal actors in a career ecosystem are individuals, organizations and societies (Baruch 2015). Actors interact with each other and are interconnected and interdependent (Iansiti and Levien 2004).

Individual actors can remain in the same organization or society, move elsewhere, or pursue different career outcomes (Guan et al. 2019). Organizational actors plan and manage the careers of their employees through HRM practices and policies (Bagdadli et al. 2021; Baruch and Peiperl 2000; Quigley et al. 2024). Societal actors are mostly countries, governments and other systems (e.g., the legal scheme) that regulate and apply rules to individuals' careers and organizations' career management systems (Kaše et al. 2020) and that come into being through collective intentions and values. Career ecosystems are initiated by bottom-up processes (Gribbling and Duberley 2021) whereby individual actors participate in labour markets (Baruch and Rousseau 2019). These processes create career structures, building on what different actors bring to the system and receive

in return. At the same time, top-down processes also operate in career ecosystems, as societal actors add regulations to the system and, thus, shape the structuring of career activity.

Individuals make vocational choices depending on their personal background and the feedback that they receive from a career ecosystem. Individuals' careers are shaped and structured by values, norms, beliefs and practices constructed within the ecosystem (Cooper et al. 2021). Accordingly, the career ecosystem will influence the types of trajectories and, hence, the final positions that individual can aim for and attain. The rewards offered by organizations, societies, or institutions within countries are a major factor in these choices. Career patterns, which can be classified in terms of characteristics such as organizational mobility or occupational activity can, thus, represent ecosystem structures. In different career ecosystems, different career patterns will be prevalent, as career profiles are social artefacts containing the expectations of the broader environment about prior career experiences (Jeong, Leblebici, and Kwon 2021). Overall, similar career ecosystems will produce similar careers.

2.2 | Careers in Higher Education

Extant research has shown that some managerial career patterns are more likely to be found in specific contexts (Vinkenburg and Weber 2012). In higher education institutions, distinct career ladders to top positions such as 'university president' or 'rector' have been identified (Biemann and Datta 2014; Wessel and Keim 1994). Academic and administrative career patterns are predominant. While ascending via the academic career

ladder, individuals often lead a research field, serve in editorial roles and lead scholarly societies, which is considered a classical path in academia (Benz, Bühlmann, and Mach 2021; Hakala 2009). The ability to 'make it' via this path depends mostly on one's track record of publications (Beigi, Shirmohammadi, and Arthur 2018). When ascending via the administrative ladder, an extensive administrative background from inside or outside academe is required (Singell and Tang 2013; Wessel and Keim 1994).

Career patterns of leaders of academic institutions who previously worked outside the higher education system are less common and have been posited to be more complex (Biemann and Datta 2014). Moreover, careers in academic institutions are often characterized by long-term employment relationships (Baruch and Hall 2004). Thus, we argue that the ecosystem in which careers evolve shapes the nature and number of unique career patterns—specifically, in our study, career patterns to the top of academic organizations (Baruch 2013). In Figure 1 (based on Baruch and Rousseau 2019), we present a conceptual model that depicts how different variables (at the individual, organizational and societal levels) relate to each other in this ecosystem.

2.3 | Societal Actors in Career Ecosystems

Countries are societal entities that we consider important actors in career ecosystems. It has been suggested that their impact on careers works via the education system, training mechanisms, legal constraints and cultural attributes that shape the nature of what is considered a desirable, acceptable and fulfilling career (Baruch 2015). Societal effects on careers may occur through

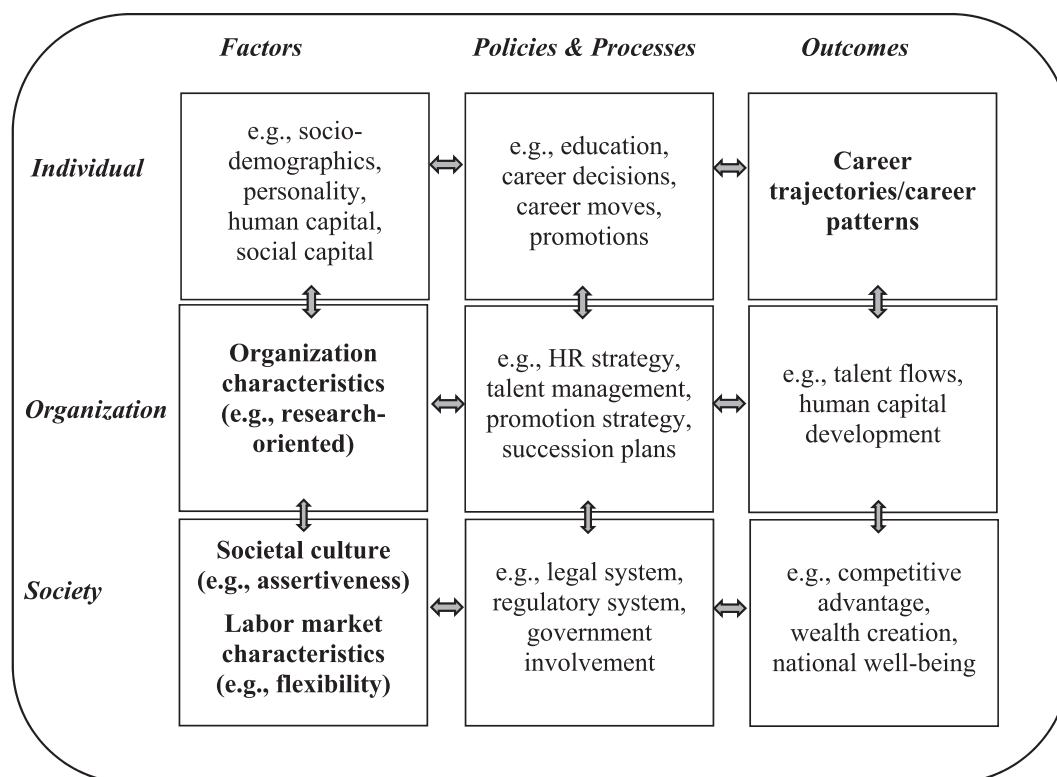


FIGURE 1 | The academic career ecosystem. Adapted from Baruch and Rousseau (2019). Constructs examined in this study are bold.

resource flows that institutions in societies make possible (Baruch and Rousseau 2019). To succeed in specific career ecosystems, such as the public sector in China, individuals are often required to demonstrate political loyalty or cultural appropriateness (Yao and Baruch 2024). For example, in prior studies, Scherer (2001) and Brzinsky-Fay (2007) found that the first 5 years in the careers of graduates differ between countries due to different education and training systems. Moreover, individual actors' career goals and career planning behaviours have been shown to be affected by the societal macrostructure in countries (Andresen et al. 2020), and Biemann and Wolf (2009) already found that careers of top managers varied across Denmark, Germany, Japan, the UK and the USA. Since the establishment of universities, the country-specific context has defined the structure of the career system in higher education (Altbach 2009). Even within Europe, comparisons between countries suggest significant variations in the ways in which universities are governed (Paradeise et al. 2009). We suggest that country characteristics will lead to the formation of specific career trajectories which will, accordingly, differ from career trajectories in other countries. Thus, we hypothesize:

Hypothesis 1. *Careers are more dissimilar across countries than within countries.*

Societal culture is an important characteristic of societal actors (Baruch 2015) and can influence careers through a societal legitimization and regulation of career practices, values and norms (Smale et al. 2019). It will affect preferences for career-related behaviour valued by individual and organizational actors within a specific career ecosystem. There have been calls for research endeavours on how societal culture affects career paths (Baruch and Sullivan 2022; Mayrhofer et al. 2020). For example, career mobility is inhibited in collectivistic cultures with high uncertainty avoidance (Claes and Ruiz-Quintanilla 1998); career proactivity is more important for subjective financial success in cultures with high in-group collectivism, high power distance and low uncertainty avoidance (Smale et al. 2019); and loyalty to one organization is rewarded in societies that score high on institutional collectivism, such that individuals engage in less career mobility (Peretz and Fried 2012).

HRM practices, such as those for succession planning or staffing (Biemann, Mayrhofer, and Koch-Bayram 2023; Knappert et al. 2023), are usually in line with the cultural context in the respective countries. Moreover, individuals will make similar career choices due to similar career goals and preferences. Careers have been shown to include similar actions and moves in similar societal cultures depending on how different types of career mobility or experiences are valued in those cultures (Benson et al. 2020; Smale et al. 2019) and, in particular, in the academic context (Miller, Glick, and Cardinal 2005). Therefore, we suggest that individuals' career trajectories depend on societal culture, such that in countries with more dissimilar cultures, they will be more dissimilar. Furthermore, as individuals with certain career trajectories will be viewed as adhering more strictly to the cultural values within a society, particular societal cultures will favour the prevalence of specific career patterns.

Hypothesis 2a. *Dissimilarity in societal culture is positively related to dissimilarity in careers.*

Hypothesis 2b. *Societal culture is related to the prevalence of specific career patterns.*

Labour markets are the landscape in which careers take place (Baruch 2015). Societal actors such as countries intervene in labour market-related activities in ways that influence the aspirations and actions of organizations and individuals—for example, through the encouragement of talent flow (Baruch and Rousseau 2019). National governance is responsible for and can influence norms of behaviour or legal constraints that relate to career behaviour and career outcomes—for example, by providing unemployment benefits and welfare programs that may encourage individuals to take risks associated with career moves (Bagdadli et al. 2021). In a study across 85 countries, Botero et al. (2004) showed that the regulation of labour market flexibility affects labour force participation and individual employment. In a study by Biemann et al. (2023), selection practices were more similar in countries with similar regulatory contexts. Overall, regulations and practices for selection, promotion, layoffs, or mobility will shape individuals' careers. Thus, we expect individuals' career trajectories to be more dissimilar in countries that have more dissimilar labour market characteristics. Moreover, certain types of career trajectories will be more common in countries with particular labour market characteristics.

Hypothesis 3a. *Dissimilarity in labour market characteristics is positively related to dissimilarity in careers.*

Hypothesis 3b. *Labour market characteristics are related to the prevalence of specific career patterns.*

2.4 | Organizational Actors in Career Ecosystems

Organizations are also important actors in career ecosystems as they shape the structuring of individuals' career activity (Baruch and Rousseau 2019). Organizations follow certain business strategies or focus on certain stakeholders; based on this, they deploy an HR strategy with policies and practices, such as executive incentives or talent management (Baruch and Rousseau 2019). When selecting or promoting employees or choosing leaders, human resource managers usually match leaders' managerial style or personnel activities with the organization's business strategy (Muller-Camen and Salzgeber 2005). Some universities focus on research and international collaborations (Harwood 2006; Sargent and Waters 2004), whereas others focus on teaching (Canhilal, Lepori, and Seeber 2016) or on practical outcomes and entrepreneurship (Klingbeil et al. 2019; Muller-Camen and Salzgeber 2005). Thus, organizations shape career trajectories by influencing individuals' career decisions and career moves through certain career systems with particular HR practices and policies (Baruch and Rousseau 2019; Sonnenfeld and Peiperl 1988).

For example, selection processes of employees or organization leaders will favour certain career patterns over others (Biemann and Wolf 2009). In a sample of US law school deans, Jeong, Leblebici, and Kwon (2021) found that diversity in organizational size increased dissimilarity among deans' career profiles.

When organizations are dissimilar with regard to their business strategy and to career systems that entail specific HR practices and policies (Sonnenfeld and Peiperl 1988), the careers of individuals in these organizations will also tend to be dissimilar. Moreover, organizational characteristics will favour the emergence of specific career patterns, as certain types of career trajectories will be viewed as adhering more strictly to the overall HR strategy, and individuals with these types of careers are more likely to be recruited, selected, or promoted.

Hypothesis 4a. *Dissimilarity in organizational characteristics is positively related to dissimilarity in careers.*

Hypothesis 4b. *Organizational characteristics are related to the prevalence of specific career patterns.*

3 | Method

3.1 | Sample

We collected career information on university leaders, that is, the one individual highest in the university hierarchy (e.g., the rector, university president, or vice chancellor) in 60 countries. Universities are organizations that are comparable across countries (Bleiklie 2014) as there exist worldwide standards through accreditations and rankings, which enables us to study the impact of ecosystem characteristics on careers. Moreover, individuals' positions in higher education are comparable across organizations and countries (Bentley and Kyvik 2012). The selected countries were mainly those that participated in the GLOBE study (House et al. 2002), and the selection of individuals was based on university size and on the availability of required career information.

We obtained career information from biographies and curricula vitae on universities' websites and systematically cross-checked and complemented it with biographical data from personal websites and other sources (e.g., press articles). In some instances, biographical information regarding job spells was incomplete or specifications about start and end dates were missing, particularly in the case of early-career jobs. Individuals were only included in the sample when annual career information was available and when their career history did not contain gaps of more than 1 year. We constructed a data set that contained every job held from graduation until the top position at the organization was attained, with information on organization name, start date, end date and job title for each individual.

Our final sample included 280 individuals (239 men and 41 women) from around the globe (33.6% Europe, 28.2% Asia, 17.5% Northern America, 9.6% Latin America, 7.5% Africa and 3.6% Oceania). The age when individuals were appointed to the highest leadership position was, on average, 54.8 years ($SD = 7.6$), ranging from 37 to 77 years. The median and mean of leaders per country were 4 and 4.77, respectively. With only two exceptions, all individuals were either nationals of the country in which the university they led was located, or nationals of adjacent countries sharing the same language.

3.2 | Measures

3.2.1 | Careers

Individuals' career sequences started in the year after they obtained their university degree (e.g., Bachelor's, Master's, diploma) and ended in the year when they made it to the leadership position. In each year, they held a position that was coded as one of the following: assistant professor (*Ai*), associate professor (*Ao*), dean (*De*), director (of an university institution; *Di*), investigator (researcher outside of an university; *In*), lecturer (*Le*), post-doc (*Pd*), PhD student (*Ph*), full professor (*Pr*), provost (*Pv*), researcher (at a university; *Rs*), university leader (*Ul*), vice leader (of a university; *Vl*), or other position outside of academia (e.g., CEO, engineer, politician; *Ot*). The data coding was carried out by two coders working independently. We checked the reliability of our data by calculating Cohen's kappa for 10 randomly chosen careers. For this purpose, the second rater searched for the career information of 10 randomly chosen individuals from our sample and then, in a second step, coded their career positions. This resulted in a good kappa value of 0.74 (Fleiss 1981).

When individuals held more than one position at a time, the information was combined, which is common in research that examines career sequences (Biemann and Datta 2014). An individual working as a professor at a university and at the same time as an investigator at a company would be coded as *InPr*, and an individual holding positions as dean and professor would be coded as *DePr*. Furthermore, we included information on whether individuals were employed at the university at which they eventually made it to the top (1 = yes, 0 = no). Once position and organization information were combined, we had a total of 92 career states—for example, *1DePr* for an individual who held positions as dean and professor at the university where they subsequently became a leader—and one state for missing information (see Supporting Information S1 for details on coded states). Each career state was appended to the previous state, thus forming a career sequence for each individual in our sample (see Supporting Information S1: Appendix B for sample sequences).

3.2.2 | Societal Culture

Data on societal culture were derived from the GLOBE study (House et al. 2002) in which nine dimensions of culture values have been identified. Aggregated values for the cultural dimensions are available on the website of the GLOBE study, along with the following definitions and detailed information on the methodology of the study (<https://globeproject.com>). Uncertainty Avoidance is the degree to which organizational or societal members diminish the unpredictability of future events through, for example, social norms, rituals and bureaucratic practices. Future Orientation is the degree of individuals' engagement in future-oriented behaviours such as deferring gratification, making plans and investing in the future. Power Distance is the extent to which organizational or societal members agree and expect that power should not be distributed

equally. Institutional Collectivism is the degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action. Humane Orientation is the degree to which individuals are encouraged and rewarded for moral behaviour such as being altruistic, generous, caring and kind. Performance Orientation is the extent to which group members are encouraged and rewarded for performance improvements and excellence. In-Group Collectivism is the extent to which individuals show loyalty, pride and cohesiveness in their families or organizations. Gender Egalitarianism is the degree to which societies or organizations reduce gender discrimination and role differences. Finally, Assertiveness is the extent to which individuals are confrontational, dominant and aggressive. All dimensions are measured on a 7-point Likert-type scale.

3.2.3 | Labour Market Characteristics

Data on labour market characteristics were derived from the Global Competitiveness Report (Schwab 2019). Since we were interested in labour market characteristics, we used data from the dimension Labour market, which comprised the two sub-dimensions Flexibility and Meritocracy and Incentivization. Flexibility was calculated from eight items; for example, the extent to which regulations in a country allow for flexibility of hiring and firing practices. Meritocracy and Incentivization was calculated from four items; for example, the extent to which professional managers who were chosen for merit and qualifications hold senior management positions in organizations versus relatives or friends without regard to merit. Each country obtained a value on a continuous scale from 0 to 100 on each of these dimensions. Detailed information on the methodology of the study is available on the World Economic Forum's website (<https://www.weforum.org/reports>).

3.2.4 | Organization Characteristics

We retrieved information on organization characteristics from the website of the Times Higher Education (THE 2019) World University Ranking. This ranking provides comparable information on numerous universities worldwide. It uses performance indicators to evaluate universities based on five areas: Teaching is a measure of the learning experience and quality; Research is a measure of both the quality and quantity of research output based on reputation, research income and productivity; Citations is a measure of how influential that research is in terms of the number of times work published by academics at the university is cited in other papers; International Outlook is a measure of international-to-domestic ratios across staff, students, and research collaborations; and Industry Income is a measure of how much the university earns from its industrial work (THE 2019). Each dimension is ranked on a scale from 0 to 100. Detailed information on the methodology is available on <https://www.timeshighereducation.com/world-university-rankings>.

3.3 | Data Analytic Strategy

3.3.1 | Calculating Dissimilarity of Career Sequences

Optimal matching analysis computes the dissimilarity for each pair of career sequences in a sample as the number of operations required to transform one sequence into another (Biemann and Datta 2014; van der Laken et al. 2018). Possible operations are the substitution, deletion, or insertion of an element. Each operation has 'costs' which are then added to compute career dissimilarity. The more dissimilar two career sequences are, the more operations are necessary to align one sequence with another.

When computing sequence dissimilarity, different costs for the substitution operations can be used, as some positions are more equal than others. For example, experience as an assistant professor is typically more comparable to experience as an associate professor than to experience as a medical doctor. For this reason, researchers can implement costs that are based on a theoretical rationale (Biemann and Datta 2014). In our study, we coded each position along three dimensions: (1) research intensity, (2) administrative experience and (3) current university (see Table 1). We coded research intensity and administrative experience as 1 = high when we considered the respective activity (i.e., research or administrative tasks) a main task in the respective position. When two positions were alike on all three dimensions, the substitution cost was zero. For example, a year as an associate professor at an individual's current university and a year as an associate professor at the current university received substitution costs of zero, because both positions (1) are research intensive, (2) were not administrative positions and (3) were both at their current university. If they differed on all three dimensions, the substitution cost was three (e.g., associate professor at current university vs. dean at another university). Based on these rules, we computed the substitution cost matrix which compares all possible positions and indicates low substitution costs for equal positions and high costs for unequal positions (see Supporting Information S1: Appendix B for more detail). Following the standard procedure, costs for insertion and deletion ('indel') operations were set to half of the maximum substitution costs (i.e., 1.5; Biemann and Datta 2014).

Based on substitution and indel costs, the optimal matching algorithm finds the optimal solution for aligning each pair of sequences. The result of this pairwise sequence comparison is an $n \times n$ dissimilarity matrix that contains the dissimilarity between each pair of n career sequences in the sample. The lowest career dissimilarity is zero, while higher values in the matrix indicate higher career dissimilarity.

3.3.2 | Calculating Cultural, Labour Market and Organizational Dissimilarity

We were interested in relating career dissimilarity among individuals with other dissimilarities. Accordingly, we computed

TABLE 1 | Positions in university leaders' careers.

Position	Years coded	Research position (yes = 1; no = 0)	Administration position (yes = 1; no = 0)
Assistant professor	489	1	0
Associate professor	462	1	0
Dean	805	0	1
Director (academic organization)	1497	0.5	1
Full professor	1745	1	0
Graduate student	464	1	0
Investigator (no academic organization)	121	1	0
Lecturer	694	1	0
Other (no academic organization)	1433	0	0
PhD student	889	1	0
Postdoctoral researcher	303	1	0
Provost	208	0	1
Researcher (academic organization)	153	1	0
University leader ^a	97	0	1
Vice university leader	513	0	1
Total	9873		

^aPrevious position as university leader (rector, university president, or vice chancellor) at another university.

dissimilarity matrices for cultural dissimilarity, labour markets and university characteristics. To compute cultural dissimilarity, we used the Euclidean distance metric on the nine dimensions of culture (Beugelsdijk, Ambos, and Nell 2018). As data on culture were only available at the country level, we constructed a matrix with distances on these cultural dimensions between all countries in our sample. For example, the cultural dissimilarity between Australia and Canada was 0.63, while that between Australia and China was 2.65. Larger values indicate a higher dissimilarity between countries. GLOBE data were available for 56 of the 60 countries in our sample and we, thus, generated a 56×56 cultural dissimilarity matrix (see Supporting Information S1: Appendix C for an extended example). For the dissimilarity in labour markets, we calculated the Euclidean distance on the two dimensions flexibility and meritocracy and incentivization from the Global Competitiveness Report that we described above. Data were available for all countries in our sample, resulting in a 60×60 labour market dissimilarity matrix. For dissimilarity between organizations, we calculated the Euclidean distance of the organization characteristics from the THE ranking on the five dimensions—teaching, research, citations, international outlook and industry. Only 214 of the 280 organizations in our sample were listed in the THE ranking and we, therefore, generated a 214×214 organizational dissimilarity matrix.

3.3.3 | Testing Relationships Between Dissimilarity Matrices

To relate the dissimilarity matrices, we used the Mantel test, which is common in scientific disciplines such as geography and ecology (Lichstein 2007) and has been recently introduced to career research (Biemann, Mühlenbock, and Dlouhy 2020). The

Mantel coefficient is comparable to a Pearson correlation coefficient but takes into account the non-independence of distances in a matrix. This non-independence results from the fact that changing one initial value affects the distances between this value and all other values in the matrix. Consequently, a statistical test that does not take this dependence into account would be biased. The Mantel test addresses this problem via simultaneous permutation of matrix rows and associated columns (Lichstein 2007). As in the case of other correlations, a positive coefficient indicates that higher distances or dissimilarities in one variable are related to higher distances or dissimilarities in another variable (see Supporting Information S1: Appendix D for details). All analyses were conducted using the software *R* for statistical computing (R Core Team 2023). We used the TraMineR package (Gabadinho et al. 2009) for optimal matching analysis and the *ecodist* package for dissimilarity computation (Goslee and Urban 2007). The R code used for the analyses can be obtained from the second author upon request.

4 | Results

4.1 | Hypothesis Tests With Career Dissimilarities

We first report the tests for Hypotheses 1, 2a, 3a and 4a. Examining how societal, labour market and organizational characteristics are related to the prevalence of different career patterns requires the identification of career patterns as an additional step that we will take before reporting the tests for Hypotheses 2b, 3b, and 4b. In Hypothesis 1, we predicted that careers are more dissimilar across countries than within countries. The mean career dissimilarity for individuals from the same country was 33.47, while the mean career dissimilarity for individuals from different countries was 40.05. A *t*-test revealed

a significant mean difference ($p < 0.001$). As tests that do not take into account the non-independence of dissimilarities might be biased (Lichstein 2007), we also applied a bootstrapping approach. The hypothesis was supported if the true mean career dissimilarity of 33.47 was smaller than the value from 95% of random draws (i.e., $p < 0.05$). Based on 100,000 random draws from the matrix with mean career dissimilarities across countries, the bootstrapped cut-off value was 36.17. Thus, Hypothesis 1 was supported.

To test Hypothesis 2a, a matrix with cultural dissimilarity was related to a matrix with mean career dissimilarities of individuals in each country. As GLOBE measures for culture do not vary within countries, we aggregated the career dissimilarity of individuals to the country level by computing the mean career dissimilarity as an average of the career dissimilarities of all pairs of individuals from two countries (see Supporting Information S1: Appendix D). From the 60 countries in our sample, full data were only available for 56 countries, resulting in two 56×56 matrices. For the two matrices (cultural dissimilarity and mean career dissimilarity), the Mantel correlation coefficient r_{Mantel} of -0.01 was not significant ($p > 0.05$), so that Hypothesis 2a was not supported.

To test Hypothesis 3a, a matrix with labour market dissimilarity was related to a matrix with mean career dissimilarities of individuals in each country. As with Hypothesis 2a, we aggregated career dissimilarity to the country level and generated two 60×60 matrices, as labour market data were available for all 60 countries. The Mantel correlation coefficient r_{Mantel} of -0.05

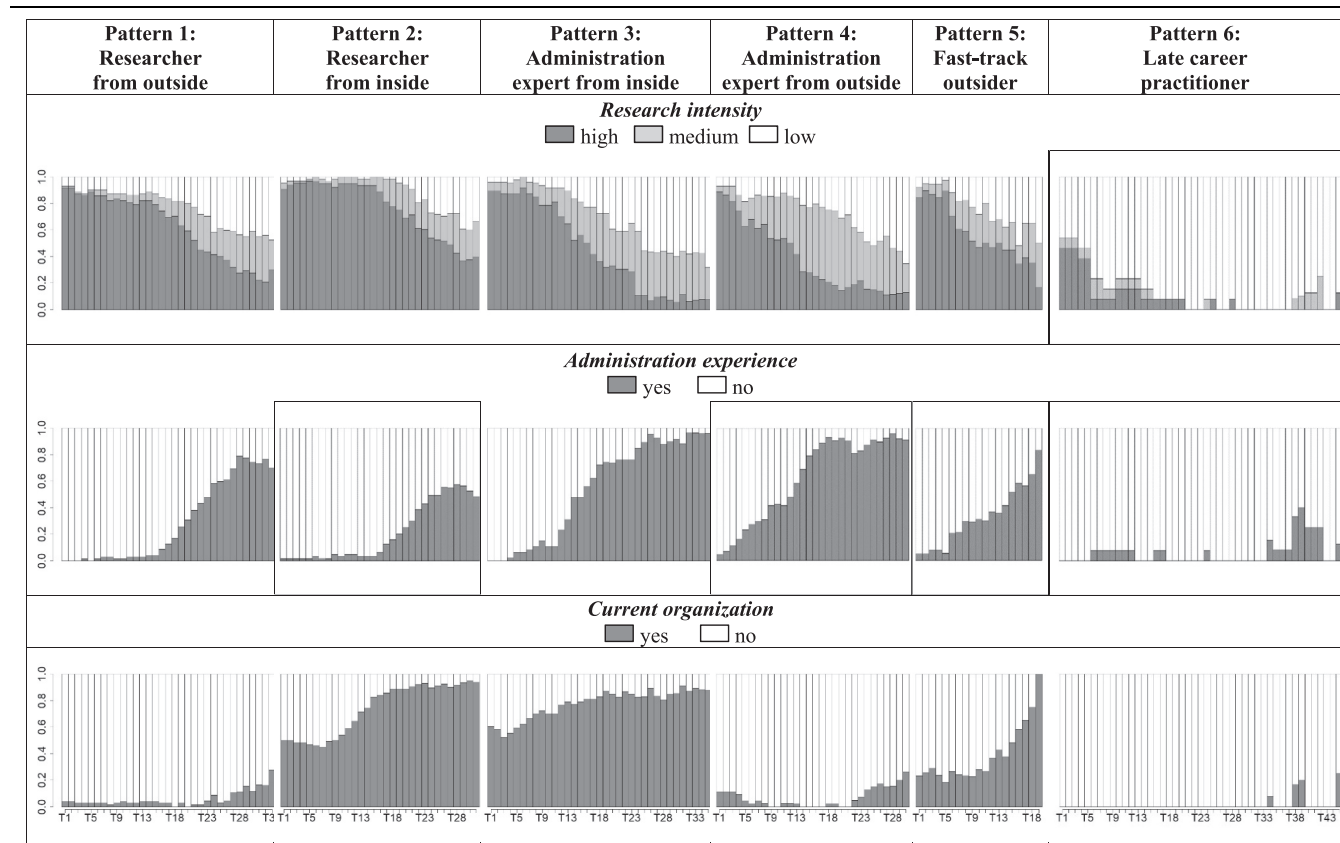
was not significant ($p > 0.05$); hence, Hypothesis 3a was not supported.

To test Hypothesis 4a, a matrix with organizational dissimilarity was related to a matrix with career dissimilarities of individuals. Full data were available for 214 organizations; thus, we had two 214×214 matrices for the Mantel correlation. Dissimilarity in organization characteristics was positively and significantly related to dissimilarity in careers ($r_{\text{Mantel}} = 0.07$, $p < 0.01$), so that Hypothesis 4a was supported.

4.2 | Career Patterns to the Top of Higher Education Organizations

Using the Ward clustering algorithm that has been recommended for use in optimal matching analysis (Biemann and Datta 2014), we derived six clusters from the career dissimilarity matrix. We chose six clusters based on measures of the quality of a cluster solution (i.e., Point Biserial Correlation, Hubert's Gamma, Hubert's C, Average Silhouette Width (Studer 2013)). Each cluster contains individuals with similar careers, thereby forming six differing career patterns. Those are depicted in the tempograms in Table 2. The vertical axes indicate the share of individuals in research-intensive positions (top row), in administrative roles (middle row) and in their current organization (bottom row); the horizontal axes indicate career years. For example, in pattern 1, nearly all careers started with a position characterized by high research intensity, involving no administrative roles, and not at the current organization. In

TABLE 2 | Tempograms of career patterns.



early, indicated by an average of 18.19 years of experience in administrative roles.

4.2.4 | Pattern 4: Administration Expert From Outside

Individuals following this pattern ($n = 44$) started very early in their careers to gather administrative experience at one or more other organizations before being appointed as leader in their current organization. The median career length is 30 years.

4.2.5 | Pattern 5: Fast-Track Outsider

This pattern ($n = 39$) has two phases. Individuals spent the first 5–10 years of their career as researchers at other organizations but then quickly took over administrative roles. This pattern has the shortest median career length of 19 years.

4.2.6 | Pattern 6: Late Career Practitioner

This is the least frequent pattern ($n = 13$) and comprises individuals who moved into the leadership position late in their careers, mostly with little or no research and administrative experience (e.g., CEO, engineer, politician). The pattern is characterized by the highest median career length of 45 years, mostly spent outside academia.

4.3 | Hypothesis Tests With Career Patterns

We hypothesized that societal culture, labour market and organizational characteristics would differ across career patterns. Thus, we computed ANOVAs to compare the differences among mean values in the six patterns that we previously identified, as well as *t*-tests for pairwise comparisons. The results are shown in Table 5.

For societal culture, we found pattern differences for uncertainty avoidance ($F = 3.60$, $p < 0.01$), future orientation ($F = 5.08$, $p < 0.001$), power distance ($F = 2.90$, $p < 0.05$), performance orientation ($F = 2.30$, $p < 0.05$) and gender egalitarianism ($F = 3.59$, $p < 0.01$) as reported in Table 5. The other four dimensions of societal culture did not differ significantly across patterns. Thus, Hypothesis 2b was partly supported. There are also noteworthy differences across patterns; for example, administrative experts from inside (pattern 3) and outside (pattern 4) were more prevalent than researchers from outside (pattern 1) and fast-track outsiders (pattern 5) in societies with high uncertainty avoidance. Researchers from outside (pattern 1) were more prevalent in societies with higher power distance than researchers from inside (pattern 2) and administrative experts from inside (pattern 3). Late career practitioners (pattern 6) were prevalent in countries with high uncertainty avoidance and high future orientation, and with low gender egalitarianism. Moreover, the highest percentage of women (19.4%) was found in pattern 1, which was prevalent in countries with high gender egalitarianism.

A comparison of labour market characteristics across career patterns revealed significant differences for both flexibility ($F = 2.87$, $p < 0.05$) and meritocracy and incentivization ($F = 3.56$, $p < 0.01$), which supports Hypothesis 3b. Researchers from outside (pattern 1) and fast-track outsiders (pattern 5) were more prevalent in labour markets with higher flexibility and meritocracy than researchers from inside (pattern 2), administrative experts from inside (pattern 3) and administrative experts from outside (pattern 4).

Regarding organizational characteristics, there were significant differences across patterns for citations ($F = 3.71$, $p < 0.01$) and international outlook ($F = 2.48$, $p < 0.05$), but not for the other three organizational characteristics, such that Hypothesis 4b was partly supported. A closer inspection reveals that, for example, researchers from outside (pattern 1) were more prevalent in universities with higher scores in teaching, research, citations and international outlook than the two insider patterns, researcher from inside (pattern 2) and administrative expert from inside (pattern 3).

5 | Discussion

The use of sequence analysis methods and a global sample allowed us to answer the call for an examination of careers to the top of higher education organizations (i.e., to the position as ‘university president’ or ‘rector’) in diverse societal and organizational contexts (Andresen et al. 2022; Koch, Forgues, and Monties 2017; Mayrhofer et al. 2020). Answering our first research question, our study shows that societal and organizational actors within career ecosystems affect individuals’ careers. Prior research has shown that career trajectories differ among single countries (Biemann and Wolf 2009; Brzinsky-Fay 2007; Scherer 2001), and our results support these findings on a larger scale across 60 countries. Relating to our second research question, we identify six career patterns to the top of academic organizations—(i) researcher from outside, (ii) researcher from inside, (iii) administrative expert from inside, (iv) administrative expert from outside, (v) fast-track outsider and (vi) late career practitioner—and show that the specific dimensions of societal culture, the labour market and organizational characteristics impact the emergence of career patterns.

5.1 | Theoretical Implications

We find support for and expand career ecosystem theory (Baruch 2015; Baruch and Rousseau 2019) in the higher education sector, and show that there are distinct career trajectories that different societal and organizational actors prefer (Baruch and Rousseau 2019). However, we find that only overall dissimilarity in organizational characteristics—not overall dissimilarity in societal culture and labour market flexibility—relates to overall dissimilarity in individual careers. This indicates that the impact of organizational actors may be linked more directly to the development of career trajectories than to the impact of societal actors. Moreover, while overall dissimilarity in societal culture and labour market characteristics was not related to overall dissimilarity in careers, our findings, nevertheless, imply that

TABLE 5 | Career patterns and ecosystem characteristics.

	Mean/ standard deviation	Pattern 1: Researcher from outside	Pattern 2: Researcher from inside	Pattern 3: Adm. expert from inside	Pattern 4: Adm. expert from outside	Pattern 5: Fast- track outsider	Pattern 6: Late career practitioner	F-values from ANOVA
Societal culture by cluster ($N = 274$)								
Uncertainty avoidance	4.43/0.61	4.33 ^(3,4,6)	4.39 ⁽⁶⁾	4.57 ^(1,5)	4.63 ^(1,5)	4.24 ^(3,4,6)	4.80 ^(1,2,5)	3.60**
Future orientation	5.40/0.36	5.35 ⁽⁶⁾	5.39 ⁽⁶⁾	5.45 ⁽⁶⁾	5.41 ⁽⁶⁾	5.30 ⁽⁶⁾	5.83 ^(1,2,3,4,5)	5.08***
Power distance	2.74/0.30	2.81 ^(2,3)	2.65 ^(1,6)	2.67 ^(1,6)	2.75	2.75	2.88 ^(2,3)	2.90*
Institutional collectivism	4.61/0.48	4.55	4.64	4.68	4.67	4.48 ⁽⁶⁾	4.71 ⁽⁵⁾	1.34
In-group collectivism	5.64/0.33	5.61	5.60	5.67	5.67	5.66	5.73	0.72
Humane orientation	5.44/0.22	5.39 ⁽²⁾	5.48 ⁽¹⁾	5.47	5.42	5.47	5.45	1.42
Performance orientation	5.93/0.32	5.92	5.84 ^(4,5,6)	5.90 ⁽⁶⁾	6.00 ⁽²⁾	5.98 ⁽²⁾	6.09 ^(2,3)	2.30*
Gender egalitarianism	4.65/0.45	4.75 ^(2,4,6)	4.56 ^(1,5,6)	4.64 ⁽⁶⁾	4.55 ⁽⁵⁾	4.79 ^(2,4,6)	4.32 ^(1,2,3,5)	3.92**
Assertiveness	3.91/0.67	4.00	3.74 ⁽⁶⁾	3.87	4.02	3.93	4.16 ⁽²⁾	1.45
Labour market characteristics by cluster ($N = 280$)								
Labour market flexibility	61.5/9.20	64.6 ^(2,3,4)	60.4 ^(1,5)	60.4 ^(1,5)	59.8 ^(1,5)	64.5 ^(2,3,4)	63.0	2.87*
Meritocracy and incentivization	69.6/11.6	73.2 ^(2,3,4)	67.0 ^(1,5)	68.4 ^(1,5)	67.4 ^(1,5)	73.7 ^(2,3,4)	69.8	3.56**
Organizational characteristics by cluster ($N = 214$)								
Teaching	43.04/ 22.45	46.4	38.5	42.2	42.9	47.1	36.1	0.99
Research	43.16/ 25.92	48.2 ⁽²⁾	38.2 ⁽¹⁾	39.8	43.2	48.4	32.3	1.35
Citations	65.37/ 28.31	75.6 ^(2,3,4)	57.6 ^(1,5)	59.1 ^(1,4,5)	60.5 ^(1,3)	73.8 ^(2,3)	57.3	3.71**
Industry income	52.13/ 18.69	51.7 ⁽⁶⁾	52.9 ⁽⁶⁾	52.9 ⁽⁶⁾	51.5 ⁽⁶⁾	52.2 ⁽⁶⁾	38.5 ^(1,2,3,4,5)	0.88
International outlook	59.65/ 22.81	66.6 ^(2,3,4)	55.7 ⁽¹⁾	53.9 ^(1,5)	56.2 ⁽¹⁾	65.0 ⁽³⁾	55.6	2.48*

Note: A superscripted number in parentheses for cluster values indicates a significant mean difference with another cluster based on a t -test with $p < 0.05$ (e.g., uncertainty avoidance is significantly lower in pattern 1 than in patterns 3, 4 and 6).

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

societal actors are important through factors like cultural values and labour market characteristics for the formation and prevalence of specific career patterns.

Our results indicate which career trajectories are more conventional or valued for leaders in higher education in specific societal cultures. For example, in societies with high uncertainty avoidance, previous experience in a job and a stable employer–employee relationship seem to be chosen and valued by the actors in the ecosystem. Overall dissimilarity in culture was not

related to overall dissimilarity in careers, possibly due to the four cultural dimensions—that is, institutional collectivism, in-group collectivism, humane orientation and assertiveness—that did not differ across career patterns and, thus, did not seem to affect career behaviour. Interestingly, our results in this context thus counter previous findings that career mobility is affected by collectivism in societies (Claes and Ruiz-Quintanilla 1998; Peretz and Fried 2012). Moreover, in societies with lower labour market flexibility and meritocracy, ascent to the top within the organization was more common, while entry from outside the

organization was valued in societies with higher labour market flexibility and meritocracy. Thus, we add to previous findings that societal governance influences norms of career behaviour (Bagdadli et al. 2021). Thus, despite cultural differences, the careers that individuals pursue and how they progress in these careers might be quite similar, and other factors might shape careers more than cultural differences do.

Regarding organizational characteristics, we found differences in the importance of prior career experiences in different organizations. Although organizations in higher education usually expect academics to simultaneously conduct high-quality research, teach students and perform administrative duties (Baruch 2013), there are differences in the relative levels of importance conferred on these duties in different organizations (Canhilal, Lepori, and Seeber 2016). Previous studies have shown that the predominant career pattern for leaders in the ecosystem of higher education in the USA is an academic career pattern (Wessel and Keim 1994), and that research institutions place emphasis on research success (Beigi, Shirmohammadi, and Arthur 2018; Benz, Bühlmann, and Mach 2021; Singell and Tang 2013). Notably, our findings show that this applies to other countries too, but that, in addition to research, other types of experience matter as well, and that this depends on organization characteristics. However, this particularly applies to those universities whose researchers are highly cited across academia and who aim at attracting international students. They are more likely to hire leaders from outside; those can be either senior (researcher from outside pattern) or more junior individuals (fast-track outsider pattern).

The career patterns that we identified in the higher education sector were different from those of corporate CEOs or leaders, where, for example, an 'expert' (i.e., research) role would not lead to the top of an organization (e.g., Hamori and Kakarika 2009; Koch, Forgues, and Monties 2017). Perhaps this might be due to less competition for academic versus corporate leadership positions, or due to different motivations of individuals who aspire to such a leadership role. Furthermore, in academia, research and publications may form the foundation of an individual's reputation, allowing for the possibility of being hired by a university without prior affiliation. In contrast, in many other industries, a manager's reputation might be more likely assessed within their current organization, leading to a higher likelihood of internal promotions (Koch, Forgues, and Monties 2017). Similarly, in non-profit organizations, the emphasis on values and character in leadership selection might result in a preference for candidates from within the industry. Moreover, although it has been argued that the higher education ecosystem offers several opportunities for boundary crossing across countries (Carraher, Crocitto, and Sullivan 2014), we did not find evidence suggesting a global career model. Almost all the individuals in our sample were nationals of the country where the university that they managed was located. Furthermore, the findings on the late career practitioner pattern support the notion that leaders of academic institutions who previously worked outside the higher education system are not so common (Biemann and Datta 2014). This is the pattern with the longest time to the top, and individuals following it might

have a strong attachment to their professional identity and, therefore, decide to not retire (Altman et al. 2020) but to change to another industry where their management skills are still sought. Our findings can also be linked to the literature on career systems (Sonnenfeld and Peiperl 1988) as the career patterns that we identified fit different organizational career strategy models. For example, pattern 2 Researcher from inside might be found in an 'Academy' career system identified by Sonnenfeld and Peiperl (1988) that emphasizes entry at early career stages and individual contribution, while pattern 3 Administration expert from inside might be preferred in a 'Club' that emphasizes entry at early career stages and corporate service. The other patterns might be found in a 'Baseball team' type of career system where entry happens at different career stages and where celebrity talent or expertise specialists are hired.

5.2 | Practical Implications

Our findings have implications for different types of organizations. Top management, boards and other governance bodies should consider what characteristics of their organization they want to emphasize in the future, and how their career system (e.g., the HR practices and HR policies that they use with regard to recruitment, selection, or internal talent development) fits their strategy (Sonnenfeld and Peiperl 1988). Depending on the type of organization, there are several career patterns that could characterize a suitable candidate for the leadership role. Thus, career patterns might be another element to help organizations identify suitable leaders in addition to, for example, interests (Hoff et al. 2020) or personality (Do and Minbashian 2020) in succession planning. We also deliver practical implications for HRM professionals involved in talent identification and succession planning within academic institutions. When looking for future talent, universities should determine what type of future leaders they need, as applying the appropriate career practices (Baruch and Peiperl 2000) is instrumental in strategic HRM. This can be particularly important in academia, where university leaders are selected by committees that may partially consist of professors, that is, non-HR professionals, in some countries (Paradeise et al. 2009). Universities seeking to improve teaching, research, or international outlook might prioritize hiring external individuals with more diverse experiences as leaders.

Our study might also be relevant for head-hunter firms on which many organizations rely to select their future leaders (Reis and Grady 2018). For HR agencies, we identify career patterns that they can look for when searching for academic leadership for different types of universities and which can be included in the process of identifying success profiles for leaders. Moreover, as we find that the organizational context is especially important for career management, individuals should gather information on the type of organization that they want to lead early on, as doing so will enable them to navigate their career in the right direction. Although this study lacks a reference group of non-leaders against which to compare the individuals in our sample, some tentative implications can be

derived for individuals as well. Becoming a university leader is a possible career goal for academics who seek objective career success and wish to make an impact on an organization that generates knowledge, educates students, and influences industry, politics and society (Carree, Della Malva, and Santarrelli 2014). The career patterns that we identified might function as career scripts and help individuals to best position themselves to lead a given university with specific organizational characteristics inside a specific country. For example, individuals who want to lead a university that performs high on both teaching and research should not expect to be appointed from within but, rather, be prepared to change organizations during their career. In societies with high uncertainty avoidance, individuals who want to make it to the highest administrative rank in a university should take an administration path. In contrast, individuals in countries with more flexible and meritocratic labour markets might focus on acquiring diverse experiences and be open to external opportunities.

5.3 | Limitations and Avenues for Future Research

Our findings should be interpreted in light of their limitations. First, individuals in our sample were leaders of some of the largest and most prestigious universities in their respective countries, which ensured comparability. However, future studies should examine careers of individuals at other hierarchical levels and in other ecosystems, as specific cultural or labour market characteristics might affect career development differently than in higher education. For example, in career ecosystems that are more volatile or that require more HR practices directed at training and development, labour market flexibility might be an even more important factor for career development. Moreover, for most countries, we included a relatively small number of individuals. Although future research might try to gather a more comprehensive sample, in smaller countries, this issue will remain due to a lower number of universities (e.g., in the Czech Republic). Furthermore, we did not have information on the characteristics of all organizations in our sample, particularly in the case of universities that did not meet the inclusion criteria of the THE ranking. Future research might consider other measures of organizational characteristics, focusing particularly on recruitment, selection, career development and performance management practices to better understand how the characteristics of career systems affect career development. For instance, similar sequence analysis methods could be employed to test whether organizations with more structured and merit-based recruitment processes result in more similar career trajectories among their employees compared to organizations with more flexible or informal selection practices. Furthermore, future research could explore the relative importance of different HR practices or strategies, as well as country-level characteristics such as laws and regulations, on career development. Then, a comparison of different ecosystems (e.g., those with a for-profit vs. non-profit logic) could reveal which characteristics most affect the careers of individuals within these ecosystems.

Future research in career ecosystem theory should also explore the relationships among individuals, organizations and societies depicted in Figure 1 to further uncover the underlying mechanisms that drive outcomes at various levels. Employing qualitative research methods might offer a deeper understanding of how HR policies and processes within career ecosystems facilitate different actors' perception of 'ideal' careers or career scripts. Exploring how specific HR strategies within organizations impact talent flows and human capital development could reveal critical insights into the organizational-level factors that facilitate or hinder individuals' career advancement. Additionally, investigating the role of societal culture and labour market characteristics in shaping career trajectories across different industries can help in identifying the boundary conditions of career ecosystem theory. By focusing on under-researched factors, such as the impact of legal systems or regulatory environments on organizational succession plans, future studies could provide a more comprehensive understanding of how these societal and organizational factors interact to produce career patterns.

Moreover, HRM researchers should strive to consider the societal and organizational contexts when studying careers to the top among disadvantaged populations (Reis and Grady 2018), as females were underrepresented in our study. Most career ecosystems around the globe are similar in the opportunities available to and constraints faced by women or minorities in the sense that it is harder and less likely for them to reach managerial positions (e.g., in STEM; Quigley et al. 2024), and higher education organizations are no exception (Treviño et al. 2018). Future research could therefore explore how the career trajectories of women and members of minoritized groups are influenced by the specific characteristics of different career ecosystems. Furthermore, as individuals are looking to fulfil a variety of career success dimensions (Briscoe et al. 2021), it might be a fruitful avenue for further research to complement our study—which focuses on objective career data and individuals' hierarchical advancement—with studies that use subjective career data and focus on, for example, learning experiences or positive work relationships. Such studies might assess in more detail which interactions and interdependencies exist in career ecosystems, and how career trajectories relate to recruitment, selection, or training and development practices to inspect and scrutinize their characteristics more closely. Furthermore, putting a focus on specific characteristics of positions within or outside academia that might provide individuals with distinct aspects of human or social capital would be an interesting avenue for future research. Additionally, future studies should place greater emphasis on sustainable career ecosystems, which foster sustainable outcomes for individuals, organizations and society at large (Donald, Van der Heijden, and Baruch 2024).

To conclude, we examined the career paths of individuals who reached the highest hierarchical positions in organizations within the ecosystem of higher education. Further research on this topic is needed, as members of the academic sector within countries and, in particular, its leaders are responsible for shaping the human capital of future generations (Baruch 2013). Overall, the career ecosystem perspective that we applied as an overarching theoretical framework can be used to understand

progress and success in careers within other organizational fields and industries.

Acknowledgements

Open Access funding enabled and organized by Projekt DEAL.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

¹ Country names (number of individuals in sample): Albania (3), Argentina (3), Australia (7), Austria (5), Belgium (3), Bolivia (3), Brazil (3), Canada (6), China (4), Colombia (3), Croatia (3), Czech Republic (5), Denmark (3), Ecuador (3), El Salvador (3), Ethiopia (4), Finland (3), France (5), Georgia (3), Germany (7), Greece (3), Guatemala (3), Hong Kong (5), Hungary (4), India (7), Indonesia (4), Iran (3), Ireland (6), Israel (5), Italy (4), Japan (8), Kazakhstan (3), Korea (the Republic of) (5), Kuwait (3), Malaysia (3), Mexico (3), Namibia (1), Netherlands (the) (6), New Zealand (3), Nigeria (3), Norway (1), Philippines (the) (3), Poland (5), Portugal (5), Russia (5), Saudi Arabia (2), Singapore (4), Slovenia (3), South Africa (3), Spain (5), Sweden (5), Switzerland (7), Taiwan (5), Thailand (2), Turkey (5), the United Kingdom (9), the United States of America (40), Venezuela (3), Zambia (2), Zimbabwe (5).

² For three countries, there were two observations in the GLOBE survey (Switzerland and French Switzerland, Eastern and Western Germany, and black and white samples of South Africa). We included universities from Switzerland and Western Germany only and used the values of the black sample for South Africa.

³ See Supporting Information S1 for an extended example. For an introduction to optimal matching analysis, we refer the interested reader to Biemann and Datta (2014) and van der Laken et al. (2018).

⁴ A university may not be ranked for two reasons: either it does not fulfil the inclusion criteria for the rankings, or it did not score highly enough to be included. A university is not included if it does not teach undergraduates, if it teaches only one subject, or if it produces fewer than an average of 200 research papers a year (THE 2019).

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.