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Human Capital Pipelines: Competitive Implications of Repeated Interorganizational Hiring

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This article offers pipelines as a new perspective on human capital heterogeneity between firms. Using resource-based theory logic, we define pipelines as repeated interorganizational hiring and a practice firms use to differentially acquire and accumulate human capital and mitigate human capital risks. Pipelines are a ubiquitous staffing practice with ambiguous implications for firm performance that to date have eluded scholarly examination. Thus we use a systems framework to highlight input, output, and process contingencies in which pipeline hiring can create advantage over rivals—contingencies of human capital scarcity in the labor market, the choice of firm activity system, and product market ambiguity (i.e., credence qualities), respectively. Collectively, the article's theoretical foundations provide new insights for human resource, strategy, and human capital fields and open the conceptual space of pipelines for examination by organizational scholars. We discuss the theoretical, empirical, and practical implications accordingly.

Keywords: *resource-based theory; acquisition/strategic factor markets; recruitment; selection/staffing*

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Resource-based theory's central tenet is that resource heterogeneity underlies competitive advantages (Amit & Schoemaker, 1993). Heterogeneity in human capital stocks is increasingly recognized as a vital foundation of competitive advantage (Armstrong & Shimizu, 2007; Campbell, Coff, & Kryscynski, 2012; Lepak & Snell, 2002; Ployhart & Moliterno, 2011). Like other resources, human capital heterogeneity arises from differences in firms' resource acquisition and accumulation processes (Barney, 1986; Dierickx & Cool, 1989; Garbuio, King, & Lovallo, 2011; Sirmon, Hitt, & Ireland, 2007; Wernerfelt, 2011).

Yet, as scholars have recently acknowledged, the specific mechanisms underlying human capital acquisition and accumulation differences across firms and the implications of such differences are unclear (Campbell et al., 2012; Maritan & Peteraf, 2011). In part, this is due to our primary understanding of these firm processes in acquiring *general* strategic factors. While labor markets are strategic factor markets for human capital (Fulmer & Ployhart, 2014), they differ in fundamental ways from other strategic factor markets. Labor markets require two-sided matches: Not only must the firm select an individual to hire, but that individual must also choose to work for the firm (Roth & Sotomayor, 2012). Asymmetric information on both sides of the employment negotiation can underlie misrepresentation, high search and information costs (Akerlof, 1970; Alchian, 1969), and poor fit between the new hire and hiring organization (Kristof-Brown, Zimmerman, & Johnson, 2005). Simply put, human capital acquisition exposes firms to substantial strategic and financial risks including lost productivity, turnover, and replacement costs.

One staffing practice firms commonly use to mitigate these risks is repeated interorganizational hiring. This practice, however, has eluded scholarly definition and examination. Recent qualitative (Ho, 2009; Rivera, 2012) and quantitative (Carnahan & Somaya, in press; Somaya, Williamson, & Lorinkova, 2008) studies confirm earlier suggestions that some firms hire primarily from a limited set of organizations such as universities or professional service firms (Boudreau, 2006; Starbuck, 1993). For example, Boeing repeatedly hires from a select group of top engineering schools, giving Boeing access to top candidates (Fischer, 2013), and creating what we call *human capital pipelines* (*pipelines* for short). While academic scholarship (e.g., Cappelli, 2009; Rivera, 2012) and the media suggest pipelines are ubiquitous and beneficial for firms and individuals, management theory on pipelines and their competitive implications does not exist.[1]

Our article addresses this void. Because the value of human capital depends heavily on contingencies both internal and external to the firm (Barney & Wright, 1998; Brush & Artz, 1999; Coff & Kryscynski, 2011; Fulmer & Ployhart, 2014; Ployhart, 2004; Ployhart & Moliterno, 2011; Ployhart, Nyberg, Reilly, & Maltarich, 2014), we identify contingencies influencing the competitive potential of pipelines. Specifically, this article draws on resource-based theory and prior work on alignment between strategy and human resource practices to address this theoretical gap. We first conceptualize human capital pipelines and provide illustrative examples. Because pipelines yield resources that vary in value depending on internal and external contingencies (Amit & Schoemaker, 1993; Kaufman, 2012), we apply a systems input-process-output framework used in prior strategic human capital theory (Snell, 1992; Wright & Snell, 1991) to isolate conditions in which pipelines can (and cannot) be associated with proximal outcomes that can lead to competitive advantage. Specifically, we consider (a) scarcity of human capital in the labor market as the input contingency (e.g., Campbell et al., 2012; Chadwick & Dabu, 2009), (b) internal activity systems aligning with human capital as

the process contingency (Porter, 1996; Sirmon & Hitt, 2009; Zott & Amit, 2008; Zott, Amit, & Massa, 2011), and (c) the ambiguity (or credence good qualities) in a firm's product market as the output contingency (Brush & Artz, 1999; Hunt & Morgan, 1996; Snell, 1992).

Our work takes an important step toward a general theory that explains how firms' heterogeneous management of human capital contributes to performance differences across firms. It also responds to recent calls to investigate how firms create human-capital-based advantages by hiring from particular sources and exploiting labor market imperfections (Bonet, Cappelli, & Hamori, 2013; Campbell et al., 2012). By defining the human capital pipeline construct and providing three contingencies when pipelines support competitive advantages, we offer a new theoretical lens for understanding the selection, retention, and emergence of firms' human capital resources. Our model builds on previous resource-based theory demonstrating that human capital can become less imitable and more firm-specific through effective management actions (Denrell, Fang, & Winter, 2003; Miller, 2003; Sirmon et al., 2007) and extends that logic to explain conditions in which the common practice of pipeline hiring can create advantages over competitors. We outline some implications of these contributions for research and practice in the discussion. Taken together, this article provides the theoretical grounding for scholars and practitioners to examine and better understand this important but overlooked phenomenon.

Human Capital Pipelines

Before explicating the conditions under which pipelines would lead to competitive advantage, it is necessary to first conceptualize pipelines and understand their potential usefulness. In this section, we define human capital, identify the acquisition and accumulation risks human capital presents, and define pipelines and their components. We outline the necessary conditions for hiring phenomena to be considered human capital pipelines and categorize the sources to which firms may form pipelines. We offer examples that illustrate the prevalence of pipelines across industries and occupations. Collectively, this section establishes the necessary theoretical foundation for the propositions that pinpoint when human capital pipelines enable competitive advantage.

Human Capital, Academy Sources, and Pipelines

Human capital is knowledge, skills, abilities, and other characteristics of individuals or collectivities of individuals that can be put to productive use (Ployhart, 2004). It is of scholarly and practical interest because it is one of a firm's most varied and malleable resources and differs from other resources in important ways (Coff, 1997). For example, as an embodied resource, human capital is neither acquired nor "owned" the way that nonembodied resources—including physical capital, real estate, and technology resources—can be. Labor markets differ from other strategic factor markets in that they are two-sided matching markets where firm and worker must mutually agree to an employment relationship (Abowd, 2012; Roth & Sotomayor, 2012). As such, the individuals' (and firms') preferences and intentions are often unclear, and the benefits of one's human capital (or of working at the firm) are often, perhaps unwittingly, misrepresented (e.g., Ellingson, Sackett, & Connelly, 2007). Moreover, human capital is subject to moral hazards because individuals control the amount of effort and commitment they apply toward the firm's objectives.

Ex ante, individuals' knowledge, skills, and styles of work cannot be fully or accurately assessed for fit with the job or organizational culture, potentially leading to costly mis-hires (Murphy, 2010). A mis-hire can poison an organization's climate, influencing the learning and productivity of other employees and consequently altering the human capital the firm accumulates (e.g., Sutton, 2007). Counseling a mis-hire for performance problems is a resource-intensive undertaking that is often unsuccessful (Aguinis, 2008). In addition, if termination is necessary, labor market institutions (such as European works councils and full-employment laws) constrain the actions firms can take and expand the time required to take them (see Berg, 2012).

The potential for costly mis-hires necessitates hiring strategies that minimize human capital acquisition and accumulation risks. The human capital that can underlie competitive advantage presents high supply risk, as individuals with valuable and rare human capital are in short supply (see Kraljic, 1983). Theory suggests firms can mitigate supply risks with intentional supply strategies that are repeated, relational (rather than transactional) exchanges between the firm and source organization (Olsen & Ellram, 1997; Svahn & Westerlund, 2009). Simply put, a pipeline is an intentional supply strategy.

Academy sources. The pipelines that are the focus of this article occur in labor markets between firms with jobs to fill and entities we call *academy sources.* Academy sources are repositories of human capital, such as universities (and their associated schools and programs), academy companies known for identifying and developing highly qualified individuals (such as GE and McKinsey & Company), and affinity groups such as professional organizations. To be considered an academy source, entities must (a) place heavy emphasis on training and development, (b) have relatively high selection standards, creating an exclusive group, and (c) apply social processes that either directly or indirectly homogenize professional (and possibly other) aspects of members' human capital, such as inducing shared skills or expertise, similar work styles, shared work ethic, or other individual attributes (Schneider, 1987).

Academy sources serve several beneficial functions for firms and individuals. Academy sources often provide information about candidates and facilitate matchmaking, which provides firms and individuals with search and informational economies. In addition, academy sources can assist with employment contracting, such as the outsourcing partners that Lepak and Snell (1999) identify. In these ways, academy sources can perform similar functions to labor market intermediaries (Bonet et al., 2013), even when it is not in the academy source's core mission to do so (cf. Somaya et al., 2008).[2]

Pipelines. For clarity, we now elaborate on our definition of a pipeline as repeated interorganizational hiring from academy sources. The pipelines we consider are used to access human capital that presents high supply risks for the firm, and thus can be considered a strategic resource (Kraljic, 1983). Lepak and Snell (1999, 2002) characterize such human capital as having high strategic value and thus warranting internalization using human resource configurations that create (a) longer-term, commitment-based employment relationships or (b) shorter-term, productivity-based employment relationships (see Lepak & Snell, 1999). Importantly, such human resource configurations and practices are distinct from the pipelines themselves, which are used only to access individuals with the human capital.

A nontrivial question is how much hiring must occur from an academy source for a pipeline to exist. The human capital stocks left within organizations by hiring patterns are indicative of pipelines. Three necessary characteristics must be in place for hiring phenomena to be considered a pipeline, and we illustrate these characteristics using the following example of hiring tenure-track accounting faculty. The hiring university is a U.S. midwestern public business school. The academy sources in this example are the hundreds of universities graduating accounting doctorates. All seven of the accounting department's hires in the past 6 years graduated from four of the hundreds of accounting doctoral programs. Moreover, three quarters (76%) of the tenured and tenure-track faculty in this accounting department have PhD degrees from these same four universities. For purposes of this article, this accounting department is said to use a pipeline hiring strategy because (a) there is evidence of disproportionately abundant hiring from one or more academy sources relative to the occupational labor market as a whole, (b) this disproportionate hiring persists, yielding multiple hires temporally dispersed over an extended period of time (i.e., years, not months) from these sources, and, in turn, (c) a unit human capital resource that has composition (i.e., homogeneity) characteristics that differentiate it from external rival units (e.g., Garbuio et al., 2011). Simply put, the accounting department uses a pipeline strategy, with pipelines to the four universities. Over time, these pipelines differentiate the hiring university's accounting unit's aggregate human capital from accounting units at other universities, which can have important competitive implications for the human capital resource that ultimately emerges in this hiring department (Ployhart et al., 2014; Ployhart & Moliterno, 2011).

Types of Pipelines

Pipelines differ with the type of academy sources (universities, academy companies, and affinity groups).

University pipelines. Universities are the quintessential academy source, given that their central mission is education. Although there are certainly exceptions, universities are leveraged most often to hire entry-level workers (Barber, 2002). Many scholars have noted firms' repeated hiring from certain universities and programs. For instance, the most prestigious investment banks (e.g., Goldman Sachs) and managerial consulting firms (e.g., McKinsey & Company) draw heavily on a very small set of elite universities for boundary-spanning (e.g., client-facing) firm functions, which helps to signal quality and reinforce the hiring firm's elite status (Ho, 2009; Rivera, 2012; Useem & Karabel, 1986). Isomorphic top management staffing from these elite universities also occurs when industry-leading firms establish pipeline relationships, causing rival firms to follow suit (DiMaggio & Powell, 1983).

Skill sets develop differently across universities due to selection, curriculum, and cultural differences. Firms requiring particular requisite skills are motivated to hire from programs supporting their needs (Porter & Rivkin, 2011). For example, Hewlett-Packard (H-P) hires engineers and service consultants for entry-level positions from a limited number of schools that emphasize high selection criteria, greater proportions of analytical majors, and a culture consistent with the inventive ethos of H-P.[3] Another example is Lockheed Martin, which hires from Penn State University (PSU) for various occupations and embeds the hiring relationship through research agreements. The highly disproportionate numbers of Lockheed

Martin's incoming knowledge workers are PSU alumni. Lockheed Martin even hired during the recent economic decline to maintain the PSU relationship (Evans, 2010).

Academy company pipelines. Academy companies are firms with distinctive screening criteria, socialization, and personnel development (Cappelli & Hamori, 2005). Employees typically join these firms early in their career, often just after graduation. The academy companies then make significant financial investments in training and work experience diversity early in the employees' tenure. For instance, Lehmberg, Rowe, White, and Phillips (2009) note that many of the largest international firms staff their middle and top management with GE alums, who went through their rigorous leadership development program. Indeed, hiring from academy companies is most often for midcareer, senior-level, or specialized hiring needs (e.g., Barber, 2002). Because being hired into these academy companies is difficult, employment at these firms is a market signal of the individual's quality (Spence, 1973), and the early career experiences academy companies provide imprint individuals' problem solving and work styles for their career (i.e., career imprints; Higgins, 2005a). A prototypical example of an academy company source is GE's leadership program, which has led some executive search consultants to form the mantra "If all else fails, pick a manager from GE" (Higgins, 2005b). Similarly, empirical research finds that a disproportionate number of senior executives at various companies have GE career imprints. These individuals have benefited from what is often viewed as world-class leadership development and are a testament to GE's exclusive standards for hiring and training (Lehmberg et al., 2009).

Indelible career imprints also occur in prestigious professional service firms (PSFs) and can provide valuable expertise to client organizations. Thus, consistent with the Lepak and Snell (1999) human capital architecture, firms can internalize human capital previously employed through outsourced or contracted relationships by hiring former consultants into full-time commitment- or productivity-based employment relationships. If this hiring is repeated disproportionately high relative to the general labor market, it creates a pipeline. In this way, pipelines provide firms a mechanism for internalizing human capital when it becomes more valuable in an internal versus external relationship. For example, *Fortune* 500 companies frequently hire in-house legal, accounting, and managerial staff directly from major law firms, Big Four accounting firms, or high-profile managerial consultancies, respectively. Fannie Mae, for example, hires many Ernst & Young employees, many of whom previously worked on Fannie Mae projects as consultants or contracted auditors. PSFs often encourage such hiring because the accumulation of alumni at the client firms draws repeat business (Somaya et al., 2008). Indeed, McKinsey & Company is known for placing its consultants in client organizations (Rasiel, 1999). In these instances, repeated hiring provides mutual benefit to both the focal firm and the academy source.

Academy companies have (perhaps unknowingly) supported new industries and entrepreneurial activity ranging from biotechnology firms to microbreweries. A classic example is the alumni of Fairchild Semiconductor, "Fairchildren," who created or joined several Silicon Valley semiconductor firms (Rousseau, 2003). Similarly, founders and executive teams of biotechnology firms were commonly alumni of Baxter pharmaceuticals (Higgins, 2005b). Comparing the early career experiences these executives had to similarly situated individuals in other pharmaceutical companies, Higgins found that Baxter's human resource systems, structure, strategy, and entrepreneurial culture created management skills well suited to the

challenges of starting a biotechnology firm. Moreover, the network of former Baxter employees, the "Baxter Boys" (Higgins, 2005b), proved instrumental to their later success. The experiences at Baxter influenced their worldviews, assumptions about how to lead and manage a firm, and social connections (Higgins, 2005a). Finally, beer behemoth Anheuser-Busch, a major employer in Fort Collins, Colorado, has contributed to one of the nation's most successful microbrewery clusters, with many local craft breweries hiring former Anheuser-Busch alumni for their large-scale production and distribution expertise.

Affinity group pipelines. Affinity groups have received relatively less research attention despite the selectivity and human capital development they entail. Affinity groups collect people with shared interests, skills, values, or personal attributes, such as athletic teams, fraternities and sororities, professional organizations, Mensa clubs, selective hobby groups, or ethnically based community groups. For some firms, affinity group membership plays a significant role in the hiring process (Rivera, 2011). For example, the Cape Cod League, a prestigious summer baseball organization that invites only top collegiate baseball players, develops players who are often hitting with wooden bats for the very first time. This adjustment is important for anyone aspiring to play Major League Baseball (MLB), where wooden bats are required. Some professional baseball teams scout talent from this league, leading to an eventual accumulation of players who have been drafted from the Cape Cod League to particular clubs in MLB.

In summary, this review presents a conceptualization of pipelines and the necessary requirements hiring phenomena must have to be considered a pipeline. The review shows that many firms use pipelines across myriad contexts. Despite pipelines' prevalence, scant research discusses the benefits and costs of pipelines or their acquisition and accumulation effects.

Benefits, Costs, and Homogenization

Before specifying conditions in which pipelines can enable attainment of competitive advantage, a management theory of pipelines must include information about the benefits and costs of pipelines and mechanisms through which they can influence firm's human capital stocks. This section addresses these topics. Importantly, the net effects of the pipeline benefits and costs outlined in this section are ambiguous; statements cannot be made that pipelines universally lead to human-capital-based advantages. Once this section provides details regarding pipelines and their likely typical proximal benefits and costs, the foundation is then present to outline the conditions in which pipelines can lead to competitive advantage.

Benefits

Since labor markets constitute a two-sided matching process, human capital acquisition risks are exacerbated over those of other resource markets (Roth & Sotomayor, 2012). Pipelines mitigate associated hiring risks by creating focused and relational resource-acquisition channels relative to the general labor market that is fraught with uncertainty. Pipelines reduce many search, information, and integration costs that are inherent in labor market acquisition (Akerlof, 1970; Alchian, 1969).

For the firm, attracting qualified candidates can be done through pipeline social ties, that is, current employees encouraging candidates from their own academy source to apply and accept positions if offered. These ties reduce asymmetric information about the quality of job candidates from pipeline sources. For example, current employees and academy source gatekeepers (e.g., account representatives for PSFs and professors at universities) vouch for the quality of candidates. The flow of information between the firm and labor market may also reduce negotiation costs, as "back channels" of information about inducements required by a job candidate to accept an offer can be used. These back channels can also prove useful for conveying information to the candidate (e.g., reservations that need to be addressed before an offer will be extended).

From a job candidate's perspective, academy source social ties with the firm can provide detailed information and enhance confidence in how the firm will implement employment agreements. Once a pipeline candidate is hired, assimilation costs are reduced and the existing social ties between the candidate and alumni of the academy source facilitate socialization. Therefore, once employed, a new employee is essentially "wired when hired" through his or her connections to other academy alumni. As firm-specific knowledge is transferred through trusted social ties (Zander & Kogut, 1995), these connections reduce information assimilation costs related to the culture and task environment. Prewired connections also increase the propensity for new hires to successfully acclimate to a firm's culture. Similarity in mental models and other knowledge shared with those already in the firm reduces time to competency for pipeline hires (Brymer, Hitt, & Schijven, 2011).

Costs

To establish, maintain, and deepen pipelines with academy sources, hiring firms commonly commit resources. For universities, these investments often include scholarships, research sponsorship, professorship funding, campus construction seed funding, and outreach centers (e.g., engineering centers) that facilitate greater firm access to the talent pools graduating from those universities. For example, two large global oil and gas firms solidify their university pipelines with regular donations, human resource employees solely dedicated to maintaining recruiting relations, and hiring almost exclusively from these select universities. Such examples cross industries. For example, Ho (2009) observes that investment banks seeking to hire Princeton and Harvard University graduates almost exclusively hold weekly campuswide recruiting events and occasionally extravagant dinners and cocktail receptions to maintain their pipelines to Princeton and Harvard.

For PSFs that are academy companies, a focal firm's resource commitments to maintain the pipeline likely manifest themselves through continued work sent to the PSF and diligent management of all aspects of the relationship. For other academy companies, a hiring firm's managers may search LinkedIn for their employees or seek to connect during professional conferences or non-work-related events such as religious meetings or neighborhood barbeques. Such approaches were used by Facebook to hire Google and Microsoft talent (Carlson, 2009) and suggest that Facebook used Google and Microsoft as academy companies.

Affinity group investments commonly occur when hiring firms provide guest speakers or sponsor conferences and meals to create and maintain pipelines. For example, the National

Center for Women and Technology (2013), a group of women working in information technology, has many high-tech firms such as Microsoft supporting the organization. Likewise, the PhD Project (2013), an affinity group for minority business doctoral students, is supported by at least 20 corporations that hope to access diverse employee pools and more than 200 universities that seek to hire minority business professors.

In summary, while pipelines reduce the costs associated with searching, recruiting, gathering information, and developing and socializing new employees, there are direct costs associated with the establishment and maintenance of pipelines.

Homogenization

Through a pipeline to an academy source, a firm can better attract, select, and socialize prospective hires who hold professional attributes that fit within its existing culture. All else equal, the human capital acquired through pipelines is more similar to that in the firm than human capital acquired through general labor markets. Chosen academy sources yield this alignment through their own selection and development processes, which tend to homogenize the human capital of academy source members. Managers are more familiar with human capital that might be acquired through an established pipeline than from other sources. This familiarity, coupled with the search, information, and integration benefits of pipelines, biases managers to preferentially accumulate similar human capital through pipelines (Garbuio et al., 2011). Many management studies have recognized a tendency toward homophily among firms, even when firms are hiring from the broad labor market (e.g., Ployhart, Weekley, & Baughman, 2006; Schneider, Smith, Taylor, & Fleenor, 1998). Indeed, such homosocial reproduction is a hallmark of most organizations, to varying degrees (Rivera, in press; Schneider, 1987), but homogenizing tendencies intensify when pipelines are in use because of the shared academy source experience and selection filters at those academy sources.

Accumulating human capital through pipelines increases the strength of network ties between the academy source and focal firm. Thus, pipelines deepen the embeddedness of the acquiring firm (and its managers) and the academy sources (and its incumbent representatives; Moliterno & Mahony, 2011). Over time such patterns of hiring from academy sources can become unquestioned organizational routines (DiMaggio & Powell, 1983). Both the acquiring firm and academy sources have little incentive to pursue other pipeline partners if their hiring/placement needs are met by established network relationships.

Homogenization in a firm's human capital has the potential to drive performance. Ployhart and colleagues (2006) found that composition (i.e., homogeneity) in personality attributes can improve unit performance. Pipelines can explain some homogenization on personality, values, and other traits to the extent that academy sources attract and select based on those traits. Perhaps more important, pipelines provide composition mechanisms among professional aspects of human capital, as academy sources impart similar work-related mental models and knowledge to its alumni. Indeed, there is evidence that such professional human capital homogeneity from shared academy sources can drive improved performance (Zardkoohi, Bierman, Hitt, & Chakrabarty, 2013). However, homogeneity among employees also has potential costs, such as groupthink and organizational inertia (Milliken & Martins, 1996). Thus, accumulation of human capital through pipeline hiring produces professional similarity and possibly demographic similarity, but firm outcomes for such homogenization are not clear and likely depend on the organizational context.

Pipeline hiring has ambiguous effects when considering the total costs and benefits of acquisition and accumulation effects. Thus, we turn to the organizational contingencies in which pipeline hiring creates competitive advantage.

Competitive Advantage: Input, Output, and Process Contingencies

Pipelines can yield important advantages for employees and hiring firms. However, due to higher associated recruiting and indirect costs, whether value is created (or destroyed) by pipeline hiring depends on internal and external contingencies (Brush & Artz, 1999; Snell, 1992). Following prior strategic-human-capital-based theory, one can holistically consider these contingencies to be grounded in the inputs, processes, and outputs of the firm's broader competitive context (Snell, 1992; Wright & Snell, 1991).

To achieve human-capital-based advantages, incoming human capital must complement organizational attributes (Nyberg, Moliterno, Hale, & Lepak, 2014; Ployhart et al., 2014; Ployhart & Moliterno, 2011). For that advantage to materialize, resource-based theory asserts that (a) the human capital's use value must exceed its total costs for search, recruiting, socializing, developing, and compensating the employee and (b) the use value in the focal firm must be greater than that gained by a typical competitor (Campbell et al., 2012; Lepak & Snell, 1999; Molloy, Ployhart, & Barney, 2013).

These conditions are often difficult because competition for human capital inputs can be fierce when individuals are strategically valuable enough to hire as exempt employees (Lepak & Snell, 1999). Therefore, scarcity in labor factor markets for exempt employees heightens the stakes for firms to maintain strategic access to these markets (Markman, Gianiodis, & Buchholtz, 2009). Pipelines are a mechanism for greater access; thus, labor market scarcity is a critical input contingency.

Several scholars argue that human capital alignment with firm activity systems is important support for the processes that establish advantages (e.g., Chadwick & Dabu, 2009; Delery & Doty, 1996; Sirmon & Hitt, 2009). Firm activity systems create the basis for how a firm differentiates itself among competitors (Porter, 1980, 1996). The fit between firm activity systems and other firm attributes can drive firm performance variation (Zott & Amit, 2008). Thus, a critical process contingency for pipeline advantage is the firm's choice of activity system. Four basic activity systems types that identify empirically and generalize to most industries include novelty, lock-in, complementarity, and efficiency-based systems (Zott & Amit, 2010; Zott et al., 2011). For each of these activity system types, we consider the implications of pipeline hiring and whether they support human-capital-based advantages.

For most firms, its human capital comprises a portion of the product or service it offers to the market (e.g., tax services for an accounting firm, or technical advice for a consumer electronics retailer). One particularly salient aspect of human capital as a product or service is its credence good qualities, that is, the extent to which information asymmetry exists between a customer and supplying firm on the human capital's product or service quality (Dulleck & Kerschbamer, 2006; Emons, 1997). Prior resource-based and strategic human capital scholarship has found that the credence good qualities of the firm's product market output are an important contingency for realized value in the firm's capabilities and practices (Brush & Artz, 1999; Snell, 1992). As such, we consider the credence quality of a firm's product/service as an important output contingency that determines the value of pipeline hiring.

Input Contingency—Human Capital Scarcity

Hiring or promoting managers with elite educational degrees or academy company experience can provide firms with marketplace advantages (Chen, Hambrick, & Pollock, 2008; D'Aveni, 1990). Naturally, multiple firms attempting to hire limited specialized talent will create labor scarcity in those niche markets. Pipeline hiring gives firms both improved access to academy source human capital through its network ties and the potential to block rival firms from the resource by accumulating high quantities from that source (Markman et al., 2009). Under labor market scarcity condition, the value of acquiring scarce resources is heightened, as managers favor resources with similarity or complementarity to those already in the firm. Such acquisitions deepen firm specificity and related asset portfolios as inimitable human capital becomes scarcer in the job market (Garbuio et al., 2011).

Despite these strengths, overreliance on pipelines can also yield competitive drawbacks. Political pressure in a focal firm may lock out potentially more qualified candidates who are not affiliated with a pipeline academy source. Furthermore, even when there is relatively high labor supply, firms expend resources to maintain pipelines. For instance, in a confidential interview, a recruiter from a *Fortune* 500 information analysis firm noted continued hiring from a large U.S. midwestern public university for several years despite "no business needs" to "maintain the recruiting relationship." Such investments are clearly made to sustain access to academy sources during times of increased human capital scarcity. These arguments surrounding pipeline advantages based on improved niche market access during times of human capital scarcity lead to,

Proposition 1a: Firms practicing pipeline hiring are more likely to gain human capital acquisition cost advantages under conditions of human capital scarcity.

Proposition 1b: Firms practicing pipeline hiring are more likely to gain high-quality human capital access advantages under conditions of human capital scarcity.

Process Contingencies—Activity System Types

The choice of activity systems forms the basis of firm differentiation from competitors (Porter, 1980, 1996). Zott and Amit (2010; Zott et al., 2011) provide theoretical and empirical evidence that there are four basic types of activity system that firms can adopt—novelty, lock-in, complementarities, and efficiency. These types tend to be mutually exclusive. Each activity system represents a different internal process context in which pipelines operate and create (destroy) value. We consider the differential value of pipeline hiring for each of these activity systems.

Novelty activity systems. Firms that adopt a novelty-centered activity system rely on constantly adapting approaches to organizational routines, new ways of bundling resources, and new ways of governing behaviors (Zott & Amit, 2010; Zott et al., 2011). This activity system type may be particularly prominent in firms that are in fast cycle markets or as an innovative differentiator in standard cycle markets (Hitt, Ireland, & Hoskisson, 2011). In such internal organizational contexts where pace of change is fast, the homogenization induced by pipeline hiring likely inhibits creativity and creates organizational inertia (Milliken & Martins, 1996; Ruef, 2002).These pipeline hiring implications likely interfere with efforts by the firm to

encourage activities to constantly evolve and stay novel in the competitive environment. Novelty-based activity systems likely gain more benefit from "knowledge mixing," or hiring from a diverse set of professional human capital backgrounds rather than a disproportionately small set of academy sources (Makri, Hitt, & Lane, 2010). Thus,

Proposition 2a: Firms practicing pipeline hiring are less likely to gain breakthrough operational advantages in a novelty-based activity system.

Lock-in activity systems. Firms that operate with lock-in create switching costs for their customers, or induce them to stay with positive externalities for continuing as customers (Zott & Amit, 2010; Zott et al., 2011). Apple, eBay, and Facebook are examples of these firms, with customers (and/or users) that are loyal to their products because of the benefits of continued patronage. These firms are typically in the enviable position of having strong brands and already part of many prospective hires' consideration sets as potential employers (Collins & Han, 2004; Highhouse, 1999; Turban, 2001). These firms can attract large, high-quality labor pools by using a relatively passive recruitment strategy in which individuals initiate contact with the firm given their personal interests, lifestyles, or unique attributes. As such, lock-in-based firms may benefit more from applying passive recruitment strategies, that is, where little is spent on recruitment. These firms already draw applicants to seek out the firm and have greater success in retaining employees (Zott et al., 2011). Using pipeline hiring for these firms would increase recruiting costs without commensurate benefits of access to human capital. Two noteworthy examples of such firms are Iams, the pet product company, and the Container Store, both of which are known to hire from their customer base (*Fortune*, 2012). For such firms, lock-in with its products, identity, and lifestyle (e.g., love of animals or an organized, clutter-free life) alone may attract highly qualified applicants.

Simply put, for firms with successful implementing the lock-in activity system with their stakeholders, the direct costs of establishing and maintaining pipelines likely outweigh their marginal benefits. Relying exclusively on academy source pipelines could eliminate candidates with the valued lifestyle affinity and who might be predisposed to accept lower wages to work at that particularly attractive firm long term (Campbell et al., 2012). Thus, for these firms, pipeline hiring is not likely to be beneficial.

Proposition 2b: Firms practicing pipeline hiring are less likely to hire the most valuable long-term employees in a lock-in-based activity system.

Complementarities activity systems. For firms that have activity systems based on complementarities, resource bundling provides greater value than stand-alone resources (Zott et al., 2011). Applied to human capital, increased bundling activity is reflected in higher degrees of organizational interdependence (Teece, 2000; Zott & Amit, 2010).

In interdependent organizational contexts, professional homogeneity plays an important role. Similar experiences among coworkers foster quick trust and cognitive similarity, which allows for expedient cooperation among coworkers. For example, Hollywood production and consulting project teams need to collaborate and perform quickly upon formation. Thus, pipeline hiring to affinity groups (like Sundance Film Festival boards), technical schools, or film schools are likely to improve the speed of integration among the team's dispersed human

capital team. In many firms that use teams for client project work, similar professional backgrounds help the team to work well together.

Managers that use pipelines to identify human capital with a higher use value in their firms (vs. rivals) demonstrate a demand-side capability that can support sustained competitive advantage (Campbell et al., 2012). We contend that such demand-side capabilities are more likely in firms with managers who can identify complementarities between human capital via the pipeline and other firm resources—they can do so because of nuanced familiarity and expertise with human capital from that labor market niche (Garbuio et al., 2011). Furthermore, as years of pipeline hiring accumulates comparable human capital, high interdependence can lead to higher levels of employee embeddedness and specificity within firms. As a result, employees in complementarity-based activity systems face high personal costs due to firm-specific human capital (FSHC) development and socialization if they choose to switch employers. Interdependent organizational designs impose a supply-side mobility constraint. In sum, the complementarities activity systems simultaneously support demand- and supply-side considerations that can underlie human capital advantages (Campbell et al., 2012).

In firms that do not adopt complementarities activity systems, the levels of interdependence are lower so the value of new hires is less contingent on their ability to assimilate with coworkers and more dependent on their ability to complete the task. For these firms, complementarity between individuals' human capital is less likely to be a differentiating factor. Since pipeline hiring can limit the range of human capital resources available for accumulation (Garbuio et al., 2011), reducing the labor pool through "pipeline discrimination" and yielding overall lower value hires (Becker, 1957) when that value is not based on complementarity with existing human capital stocks (Maritan & Peteraf, 2011). Firms such as bond brokerages, consumer electronics retailers, and interior design firms, which do not exhibit complementarities activity systems, are not expected to benefit from pipeline hiring.

Proposition 2c: Firms practicing pipeline hiring are more likely to gain human capital bundling advantages in a complementarities activity system.

Efficiency activity systems. Firms that choose to practice efficiency activity systems draw value from reducing search, information, and coordination costs (Zott & Amit, 2010; Zott et al., 2011). We previously submitted that pipeline hiring results typically in these cost reductions for human capital. In addition, firms centered on efficiency often choose vertical integration to reduce costs. We submit that pipeline hiring allows for quasi-integration with the academy source organizations for purposes of creating FSHC prior to hiring.

To date, conventional wisdom has suggested that human-capital-based advantages come from FSHC, that is, knowledge and skills that are most valuable within the firm where they are created (Campbell et al., 2012; Hatch & Dyer, 1994; Molloy, Ployhart, & Wright, 2011; Wang & Barney, 2006; Wang, He, & Mahoney, 2009). An implicit assumption underlying this scholarship is that FSHC is developed only *after* employees are hired by a focal firm and accrues over time as employees gain knowledge of internal firm politics, idiosyncratic firm processes, and fellow employees, among other particularities.

However, pipelines have the potential to facilitate FSHC development even *prior to* the onset of a formal employment relationship. Repeated hiring from the same academy source creates social ties and increases a focal firm's familiarity to members of the academy source. New pipeline hires may either already know several focal-firm employees from academy source associations or, due to shared experiences and knowledge, social ties are more easily developed with incumbent employees from the same academy source (Lee & Brinton, 1996). Incumbent employees communicate firm-specific information to potential new hires, such as promotional practices, characteristics of firm culture, idiosyncrasies of colleagues' work styles, and the politics between departments, which are prototypical examples of FSHC (Campbell et al., 2012; Lazear, 2009; Morris, Alvarez, Molloy, & Barney, 2010; Ployhart & Moliterno, 2011). Such information is not easily garnered through public job postings. Thus, pipelines facilitate the development of FSHC even before employees are hired and speed its development upon hire.

Moreover, once established, focal firms can influence human capital development within the academy source. For example, Boeing partners in research with its pipeline universities and influences their curricula for its particular needs (Fischer, 2013). Consequently, pipeline relationships resemble quasi-vertical integrations that also create (or at least prime) FSHC development prior to employment. As knowledge and routines flow from academy source to the hiring organization, such as when Big Four accounting firm processes are adopted by the hiring organization, the adoption eases the transition for future hires, in this example, from Big Four academy sources. In this way, pipeline hiring generates similarity in skills and knowledge between two organizations and creates FSHC prior to hire.

FSHC can be especially important when the task environment is challenging, competitive, and demanding. Such environments prevail in organizations with up-or-out promotion systems, or environments where individuals tend to work exceptionally hard but stay for only a limited time (i.e., "burn and churn" business models; Pfeffer, 2007). These firms typically demand fast development of expertise, high workplace output, and long, grueling hours for new hires. This context is most common in PSFs such as law and consulting firms, investment banks, advertising agencies, and professional baseball teams. Their model involves getting to productivity fast and promoting only those who perform best (Sonnenfeld & Peiperl, 1988). Therefore, by design, such firms experience high voluntary and involuntary turnover.

In these environments, a new hire's efficiency in reaching value-added productivity can be accelerated through initial assistance from social ties. Furthermore, a preestablished social network may embed the new hire more quickly, increase new hire loyalty to the firm, and reduce the chance for voluntary exit before the firm breaks even on its employment investment (Swider, Boswell, & Zimmerman, 2011). These integration advantages may be less impactful for firms that emphasize retaining employees for longer periods. In these commitment-based employment conditions, firms can develop and accumulate FSHC over the lengthy expected employment tenure and are less concerned with efficiency in developing this resource. For new hires in firms without efficiency activity systems, immediate competent performance is less likely, and its advantages for value realization are less strategically critical. Thus,

Proposition 2d: Firms practicing pipeline hiring are more likely to gain accelerated FSHC development advantages in an efficiency activity system.

Output Contingency—Credence Good Qualities

Resource-based and strategic human capital scholars have highlighted the credence good qualities of a firm's product or service as a critical contingency to align with the practices of the firm to gain competitive advantages (Brush & Artz, 1999; Snell, 1992). Firms that sell credence goods have ex ante information asymmetries with customers, that is, the quality of products/services provided can be assessed by the customer only after a firm is hired or the product is bought. Even then, it is sometimes difficult for a customer to determine the quantity of services that was required (Emons, 1997). These informational asymmetries make the purchase from and valuation of firms offering credence goods especially difficult (Dulleck & Kerschbamer, 2006) and necessitate that these firms employ individuals who will deliver consistent quality and character on its behalf. Consider, for example, professional services such as law and consulting firms. Clients cannot evaluate a law firm's performance until after the firm has been hired and the trial's result is known. At that time, the client may not be able to retry the trial with a different attorney. Similarly, a failed product launch that a consulting firm has managed can seldom be redone without adverse consequences to a focal firm.

Therefore, given the ex ante uncertainty surrounding their final outcomes, firms that sell credence goods have additional incentive to apply stricter control on the quality and types of human capital they accumulate. Co-opting legitimacy from academy source hires is one tactic used to counter this uncertainty (Stuart, Hoang, & Hybels, 1999). By leveraging the prestige of having employees from selective academy sources, firms can essentially co-opt the accepted status that the academy source has (Meyer & Rowan, 1977) and use it as a signal of its quality (Spence, 1973). Indeed, it is often true that such pipelines are utilized to access the more scarce human capital of reputable academy sources (e.g., Ho, 2009; Rivera, 2012). Therefore, firms that sell products or services more affected by quality uncertainty are more likely to gain advantage through pipeline hiring.

Proposition 3: Firms practicing pipeline hiring are more likely to generate revenue advantages when selling products/services of high credence quality.

Discussion

Human capital pipelines are pervasive yet understudied phenomena. Sociologists have considered their implications for social mobility and their function in maintaining the corporate elite. This article is a significant departure from this scholarship as we consider the competitive—rather than social—justifications for pipelines. In this section, we summarize the importance of pipelines and our contributions, explain the theoretical assumptions this article alters, and specify the theory's boundary conditions. We then explain how the propositions redirect research on human capital heterogeneity and firm performance, and conclude with the theory's practical implications.

Theoretical Contributions, Assumptions, and Boundary Conditions

Our theory presents pipelines as a staffing practice firms use to cope with the many challenges labor markets present, such as applicant scarcity, two-sided matching (Roth & Sotomayor, 2012), the lemon problem (Akerlof, 1970), and mis-hires due to individuals

engaging in socially desirable responding (Ellingson et al., 2007) and poor fit between the hiring firm and new hire (Kristof-Brown et al., 2005). Pipelines help firms mitigate the potential financial and strategic burdens of mis-hires, including lost productivity, turnover, and replacement costs.

For its benefits, pipeline hiring is not advantageous for all firms or in all conditions. Establishing, maintaining, and fostering pipelines have associated costs—both direct (e.g., recruiting relationships) and indirect (e.g., reducing the available labor pool; Becker, 1957). In addition, pipelines foster homogenization of human capital—the firm performance implications of which are ambiguous (Milliken & Martins, 1996; Ployhart & Moliterno, 2011; Schneider et al., 1998; Zardkoohi et al., 2013). Therefore, we built a theoretical model specifying the conditions in which pipelines support (or do not support) proximal outcomes that can lead to competitive advantage. Applying a systems input-output-process framework (Snell, 1992; Wright & Snell, 1991), we theorized pipelines as likely to provide human-capital advantages under the conditions of (a) human capital labor market scarcity, (b) firm activity system alignment, and (c) the ambiguity in the firm's product market (i.e., credence good qualities). In Table 1, we present each proposition and list the applicable system attribute (input, process, output), the human capital risk, and the basis and necessary condition for firm competitive advantage.

Under the conditions outlined in Table 1, pipelines offer a set of mechanisms for the emergence of firm human capital resources, which Ployhart and Moliterno (2011: 145) called "one of the most promising areas for future [strategic human capital] research." In so doing, we contribute to a tradition of resource-based scholarship arguing that internal firm practices and external contingencies largely determine the degree to which resources allow firms to realize advantage (Amit & Schoemaker, 1993; Barney & Wright, 1998; Brush & Artz, 1999; Coff & Kryscynski, 2011; Denrell et al., 2003; Maritan & Peteraf, 2011; Miller, 2003; Sirmon et al., 2007). Specifically, we highlighted a common firm practice that has to date eluded definition (pipeline hiring), detailed its role in acquiring and accumulating human capital within firms, and proposed conditions when it is likely to provide advantage over rivals. These advances represent important contributions to the emerging literature on strategic human capital.

Theoretical assumptions. This article alters several theoretical assumptions used in related literatures (see Table 2). For example, resource-based theory assumes that managers' human capital acquisition and accumulation decisions are boundedly rational and focused on gaining competitive advantages. In contrast, this theory assumes human capital acquisition and accumulation decisions are often driven by homophily (and may or may not be rational)—and so underlie competitive advantages only under certain conditions. Moreover, whereas labor markets are typically viewed as economic entities, pipelines frame them as socioeconomic entities. Furthermore, while staffing scholarship focuses primarily on hiring for a single position at one point in time, pipelines are focused on repeated hiring over time for multiple positions.

As Table 2 shows, a pipeline lens draws attention to social aspects of labor markets and their implications for firm heterogeneity and competitive advantage. For example, pipelines are recursive social structures because they simultaneously resolve and create labor market imperfections. That is, pipelines reduce the ex ante and ex post mobility of human

Table 1
Summary of Conditions for Human Capital Pipelines Supporting Competitive Advantage

Proposition	Firm Subsystem Affected	Focal Firm's Human Capital Risk	Advantage of Pipeline Hiring Over General Labor Market Hiring	Basis of Advantage	Necessary Condition for Human Capital Advantage	Effect of Pipeline on Human Capital Advantage
1	Input	Inability to access desired human capital	Access to labor market niches	Consistently deployable human capital stocks	Scarcity of needed human capital inputs	+
2a	Process	Misalignment with firm activity systems	N/A	Novelty-based activity systems	Human capital compilation	–
2b	Process	Misalignment with firm activity systems	N/A	Lock-in-based activity systems	Affinity hiring and retention	–
2c	Process	Misalignment with firm activity systems	Firm embeddedness	Complementarities-based activity systems	Routines depend on high interdependence between employees	+
2d	Process	Misalignment with firm activity systems	"Head start" in developing firm-specific human capital	Efficiency-based activity systems	High turnover and/or high speed-to-competence requirement	+
3	Output	Opaque quality of focal firm's products and services	Differentiation emergence	Product market perception of human capital quality and stability	Products/services are credence goods	+

Table 2
Theoretical Assumptions Surrounding the Human Capital Pipeline Construct

Disciplinary Perspective	Conventional (Typically Implicit) Theoretical Assumption	Our Revision
Resource-based theory (strategic management)	Resource acquisition and accumulation processes for human capital and nonhuman resources are roughly the same.	Resource acquisition and accumulation processes for human capital are notably different, involving two-sided matching, recursive homogenization, and social complexities that underlie significant factor market imperfections.
Staffing (industrial-organizational psychology and human resources)	Unit of theory and analysis is the individual, and focus is hiring for a single position at one point in time.	Unit of theory and analysis is at the firm level and is the pipeline a firm uses to access human capital.
Labor economics (economics)	Labor markets are economic entities.	Labor markets are socioeconomic entities.
Social stratification (sociology)	Exclusionary and repeated interfirm hiring yields important variations in individual outcomes (income, promotion, employment mobility).	Pipelines can yield important variations in firm performance and serve as mechanisms to explain persistence of human-capital-based (dis)advantages.

capital. Pipelines focus prospective hires on certain firms at the expense of others and discourage employee interfirm mobility once hired into a focal firm. The paucity of research on firm-level differences in the ability to attract and retain human capital has spawned recent calls to identify and describe these fundamental labor market forces and their implications for firm strategy (Bonet et al., 2013; Campbell et al., 2012). This article is a significant advance in our understanding of social forces in labor markets.

Boundary conditions. Our arguments and propositions are naturally subject to boundary conditions. For our propositions to hold, three boundary conditions must be met: the focal firm must not be exceptionally large, the academy source must be sufficiently small, and the academy source's disciplinary scope must be sufficiently narrow. When individuals hired through pipelines enter exceptionally large firms, many of the benefits and homogenizing forces of pipelines dissipate. Simply put, the probability of employees from the academy source working together decreases as firms get larger. Similarly, a large academy source weakens the likelihood individuals a focal firm hires from that source share social ties. In addition, larger academy sources may be less likely to have homogenizing selection criteria. Along related lines is the boundary condition of the academy source's disciplinary scope, such as range of majors or specializations. For example, large public universities and large management consulting firms each have a vast array of disciplines and approaches for professional development. In contrast, specialized professional schools and boutique consulting firms often focus on one discipline that drives professional skill development.

In summary, smaller hiring firms and smaller and narrowly focused academy sources likely amplify pipeline effects. Larger hiring firms and larger, broadly focused academy

sources likely dampen pipeline effects. Empirical tests of this model and managerial prescriptions stemming from this article should incorporate these boundary conditions.

Redirecting Theory, Research, and Managerial Practice

The propositions and shifts in theoretical assumptions redirect strategic human capital scholarship—and research in related literatures such as strategic management, human resource, organizational behavior, staffing, social stratification, and entrepreneurship literatures—in important ways. First and foremost, the propositions require empirical examination. In addition, other important questions include the origins, interactions, and implications of pipelines for the firms and academy sources. For instance, what are the antecedents of pipelines and their strength? How do they initially form? How and why do focal firms and academy sources maintain pipelines? While it is beyond the scope of this article to detail the theoretical and empirical implications for each literature we draw on, a sample of the types of research questions the theory opens is mapped in Table 3, which helps scholars from a wide variety of literatures connect this article with central questions in each literature. We also outline the practical implications of the theory for managers and firms.

Human resources and staffing. Hiring from pipelines has many implications for human resources and staffing scholarship. Future research could examine how the establishment and maintenance of pipelines explain selection processes, whether organizational politics (Ferris, Treadway, Perrewé, Brouer, Douglas, & Lux, 2007) impacts hiring from certain pipelines, and how pipelines influence the attraction and retention of human capital. Future research could consider the degree to which homophily is derived from pipelines (e.g., personality; Ployhart et al., 2006) and if individuals hired from pipelines perform better, participate in more organizational citizenship behaviors, or have greater job satisfaction.

The implications for staffing scholarship are especially profound, offering a new paradigm for staffing scholars to consider. Selection scholarship is based in industrial-organizational psychology and does not consider individuals and firms as nested within labor markets (Molloy, Ployhart, et al., 2011). This scholarship has typically focused on hiring processes at the individual, atomistic level and on understanding the predictors of job performance. Pipelines call attention to broader hiring patterns.

Future research in human capital pipelines could also reconcile the general human capital paradox (Molloy, Ployhart, et al., 2011; Ployhart & Moliterno, 2011) where strategy scholars have tended to undervalue general human capital and privilege FSHC as yielding competitive advantage. For example, our theory suggests academy sources sort individuals on general human capital traits (e.g., college admission standards) and that academy sources can infuse job candidates with FSHC before they begin employment at the firm. This combination provides insights about general human capital speeding the acquisition of FSHC, how much FSHC individuals accumulate, and how usefully they apply their FSHC to combine resources in novel ways.

The shared mental models accumulated through pipelines counter the staffing scholarship perspective that experience does not meaningfully inform hiring decisions (Schmidt & Hunter, 1998). Our work suggests that the experience new hires and existing employees share may be more predictive of job and firm performance than currently thought (Boudreau

Table 3
Map of Research Opportunities and Management Literatures

Literature	Example Research Questions
Human resources/ organizational behavior	What insights can be gained from intersecting this theory with scholarship on organizational politics?
	How can scholarship on poaching and raiding be informed by this theory—and vice versa?
	What systematic differences in job attitudes and behaviors do individuals hired through pipelines demonstrate relative to other employees?
Staffing	How does shifting the locus of analysis from individual characteristics and individual job performance to flows of human capital and their unit implications shift staffing theories?
	What are the determinants of pipelines?
	What are the theoretical and practical implications of managers recruiting and selecting through pipelines versus other channels?
	How do pipelines influence the emergence of human capital stocks?
	How would staffing theories change if academy sources were incorporated into their scope?
Strategic management	To what extent do pipelines play a role in forming internal coalitions among the management team? How would such pipeline-based coalitions alter firm strategy?
	In what ways do pipelines affect human capital lateral mobility and its outcomes?
	What are the implications of human capital (and labor markets) differing from other resources (and other strategic factor markets) for resource orchestration scholarship?
	How are the competitive implications of pipelines different for when individuals move between firms and academy sources that are (a) universities, (b) affinity groups, (c) consulting firms, (d) customer firms, (e) supplier firms, and (f) rival firms?
Social stratification (sociology)	How do pipelines used throughout individuals' education and career serve to form career ladders (or chutes)?
	What are the implications of pipelines for creating and maintaining the corporate elite?
	How do pipelines influence the separation or "mixing" of diverse groups, geographic origins, socioeconomic backgrounds, and power holders?
Entrepreneurship	How do the pipeline tactics of entrepreneurial firms differ from those of established firms? For example, are entrepreneurial firms more or less likely to have pipelines than established firms?
	How do the implications of pipelines for human capital acquisition and accumulation—and firm performance—differ from those of established firms?

& Ramstad, 2003). Taken together, pipelines are a key set of mechanisms for the emergence of human capital stocks (Ployhart & Moliterno, 2011).

Strategic management. Human capital scholars have noted minimal research on staffing and its firm-level implications (Molloy, Chadwick, Ployhart, & Golden, 2011; Ployhart, 2004). Strategic management scholars would lend important expertise on the different ways pipelines may create unique resource bundles and deepen firm specificity among its human capital resources. Pipelines likely influence persistent intrafirm networks and coalitions

among middle and top management team members, the ramifications of which would be intriguing to explore (Cyert & March, 1963). Intersecting this article's ideas with research on the movement of human capital between customer and supplier, and between rival firms (Aime, Johnson, Ridge, & Hill, 2010; Carnahan & Somaya, in press; Somaya et al., 2008), would illuminate how strategy and human capital acquisition processes interact to influence firm performance.

Social stratification. In addition, by defining and explaining the implications of pipelines, this article revises our understanding of how firms acquire human capital and offers a slightly different perspective on social stratification and human-capital-based competitive advantage. Labor markets have been understood largely as economic entities. However, sociology research has considered the stratification outcomes of pipeline-like hiring by prestigious firms in establishing the corporate elite and top socioeconomic classes in a nation (e.g., Ono, 2004; Useem, 1979). The extent to which pipelines are "layered" throughout careers would be an important study.

Human capital pipelines offer new perspective to the socioeconomic demand- and supply-side constraints experienced by firms and employees (Campbell et al., 2012). These constraints focus firms on narrow labor market options, and simultaneously influence employees to follow more traveled career paths, which may help explain the socioeconomic stratification witnessed in labor markets as workers move through pipelines. Broader implications of human capital pipelines may exist in the sorting of geographic, socioeconomic and power structures of society. Firms may create pipelines to ensure desired levels of diversity along certain dimensions, such as recruiting from women's colleges or historically black colleges and universities. Future research on human capital pipelines may explain how firms manage their internal demographics and diversity (McCain, O'Reilly, & Pfeffer, 1983).

Pipeline configurations may also explain the establishment and maintenance of the corporate elite. Goldman Sachs, Monsanto, and other firms have notably placed former executives in high-level government positions, in a sense being academy sources for the U.S. federal government (Hillman, Keim, & Schuler, 2003; Lester, Hillman, Zardkoohi, & Cannella, 2008). Future research could consider how pipelines from secondary schools feed elite universities, how those universities feed particular academy companies, how those firms feed top management teams of *Fortune* 500 firms, and how those firms' top management teams feed government appointments.

Entrepreneurship. For new companies, the founders' personal social networks serve as the labor market from which new hires are drawn (Hite & Hesterly, 2001). Given the potential for pipelines to help firms accumulate human capital that aligns with their activity systems, start-up firms would stand to benefit a great deal from pipelines. However, many start-ups are highly dynamic and require time to develop their marketplace strategies. For these firms, identifying appropriate academy sources may be difficult. This suggests an opportunity to examine the point when pipeline strategies become an option for new firms and how entrepreneurs develop these relationships. Such research could illuminate whether new firms initially connect with the alma maters of the founding teams, the resources offered to academy sources in exchange for the pipeline relationship, and how these resources might differ in quantity or scope from what larger firms with greater brand recognition offer. Such research

could bolster our understanding of the relationship between entrepreneurship and human capital acquisition and accumulation.

Managerial implications. This article also has important implications for practicing managers and the consulting firms that guide client hiring strategies. To date, these individuals have not had a framework to consider pipelines or their utility. With this framework, managers can assess existing pipelines and consider whether adjustments are beneficial for firm competitiveness. As managers undertake this work, the comparisons would be relative to rivals (e.g., between-firm differences in pipeline hiring). Moreover, the article compels managers to consider whether they are fully leveraging their pipelines, for example, by influencing curricula through university and school advisory boards or through gaining visibility for their firm in the most cost-efficient way.

Conclusion

This theory of pipelines and competitive advantage developed from the recognition that firms repeatedly hire from academy sources such as universities, academy companies, or affinity groups. While we framed our arguments primarily in resource-based and strategic human capital theories, to make this work accessible to a broad range of management scholars, we used a multidisciplinary and multilevel approach to explain pipelines and their implications (Molloy, Ployhart, et al., 2011). Our objective was to conceptualize pipelines and identify the conditions in which they underlie competitive advantage. In doing so, we provide a theoretical foundation for this prevalent yet underresearched phenomenon that has scientific and practical utility for anyone considering the effects of pipeline hiring (Corley & Gioia, 2011). It is our hope that this work serves practitioners and strategic human capital scholars as they develop their research in the new directions this article encourages.

Notes

1. Though resource-based theory considers the level of analysis as the firm, following Ployhart and Moliterno (2011) we believe that the logic of this article and of human capital pipelines applies to the advantages organizational units (such as subsidiaries, functional subunits, and business units) might gain over rival counterparts.

2. Labor market intermediaries (LMIs) focus almost exclusively on connecting employees looking for work and firms with positions to fill. These include executive search firms (head hunters), online job boards like Monster, and social media sites like LinkedIn. The interested reader is directed to Bonet, Cappelli, and Hamori (2013) for a comprehensive review of these LMIs.

3. There are approximately 20 pipeline universities in HP's U.S. Partner University portfolio, many of which strongly emphasize engineering and technology, including Stanford, Georgia Institute of Technology, and Texas A&M University.

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