Corporate Talent Management,
Digital Technologies and the Future of Work

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Abstract

Multiple studies of earlier periods of technological change highlight the crucial role that the social relations of production play in shaping technological deployment. However, this perspective is seldom considered when anticipating work opportunities during the fourth industrial revolution, with future-of-work studies predominantly concentrating on technological possibilities. This study plugs this gap. Using Singapore as a case study, it uses corporate talent management as a framework to examine how the social relations of production at the firm level shape digital programmes and the likely impact on the division of labour in firm and national contexts.

A mixed-methods approach is utilised. The quantitative dataset includes 3,800 firms, complemented by qualitative investigations in 30 selected firms in Singapore. The research identifies four corporate talent management models prevalent in the Singapore economy: 'wealth of talent,' 'war for talent,' 'constrained talent,' and 'zero-talent'. The pattern of skills-biased technological change corresponds exclusively to 'wealth of talent' firms, distinguished by their business model that seeks to empower the broad workforce to engage in collaborative customisation with clients using digital tools. With 'wealth of talent' firms at only 25% of the dataset, it suggests that the Singapore economy is unlikely to experience skills-biased technological change. 'War for talent' is the dominant talent model in Singapore, accounting for 30% of the dataset. In these firms, digital technologies are employed to automate and standardise tasks typically performed by knowledge workers, forming part of firms' value-capture strategies. Meanwhile, a substantial portion of the dataset is represented by 'constrained talent' and 'zero-talent' firms (45%) that use digital technologies to sustain price competition strategies without upgrading the skills demand of non-professional workers.

Combined, the evidence suggests a new risk of high skill precarity in Singapore, with the fortunes of non-professional labour not being enhanced by digital technologies either. Coming at a time when more well-qualified Singaporeans enter the workforce due to a policy of mass university education, Singapore risks a shortage of quality jobs despite the good intent of its industrial policy to embrace digital transformation activities to grow the pipeline of high-skilled jobs in the economy.

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Chapter 1 | Introduction

Towards a study of social relations of production in the 'fourth industrial revolution'

This research, unique in its focus on the social relations of production in the 'fourth industrial revolution', explores how these relations at the firm level may shape future work opportunities. It presents Singapore as a case study and employs corporate talent management as a conceptual framework.

It is a study that is both empirical and methodological. As an empirical study, it investigates the extent to which social relations of production in firms shape digital technology strategies around the use of labour. Does the existing structure of social relations in a firm mediate organisational decisions on which tasks and job roles are to be substituted with or augmented by digital technologies? As a methodological study, the study seeks to establish the extent to which the pattern of social relations at the firm level can forecast the impact of technological change on work opportunities at the national level. If existing patterns of social relations in a firm can be successfully established to be one of the critical factors that shape work opportunities to come, it is arguably a less demanding proposition to inform, in a sufficiently rigorous manner, the actions within reach of societal actors today.

In doing so, the study shifts the locus of analysis away from technological possibilities that have dominated much of current studies on the future of work and have yielded unsatisfactory and often contradictory accounts of the shape of work opportunities to come. In this introductory chapter, I begin by describing technology-centric studies anticipating the future of work and their limitations. I propose that the theoretical perspectives of the social relations of production may offer new understandings of the future of work. I draw on past and current studies of social relations of production to illustrate how they have provided novel understandings of the social shaping of technologies and the ensuing impact on labour. I contextualise the primary contribution of this study, which involves interpreting corporate talent management as a manifestation of the social relations of production at the firm level. This involves investigating its correlation with digital technology programs and their effects on labour outcomes. I outline how the study will proceed through a mixed-method empirical investigation of firms' talent and digital technology programmes in Singapore.

The term 'fourth industrial revolution' is used in this study as a frame of reference or a discursive approach to the current imagined state of play of digital innovation. Popularised by Schwab (2017), comparable descriptors to the 'fourth industrial revolution' include terms such as the 'second machine age' (Brynjolfsson & McAfee, 2014) and the 'globotics upheaval' (Baldwin, 2018). Undoubtedly, the

term 'fourth industrial revolution' is contested. For some, it is a fair description of the evolution of technological change in the last 200 years (Klingenberg et al., 2022). Others are more critical, describing views of 'fourth industrial revolution' as a "myth" (Moll 2021: 1), a "techno-infused vision of the future" dominated by influential global players (Trauth-Goik, 2020: 2), or an inaccurate reflection of technology's history given that technology trends suggest "a rather natural prolongation of the ICT macro-trajectories" than the advent of a new category of technologies (Cetrulo & Nuvolari, 2019: 391). For the purpose of this study, the term 'fourth industrial revolution' is used as a discursive representation of the current period of technological change relating primarily to the proliferation of artificial intelligence (AI) and related digital technologies that are now at sufficiently low-cost points to take on the character of a general-purpose technology that enables the restructuring of work processes, jobs and industries (Brown et al., 2022; Brynjolfsson & McAfee, 2014; Steinhoff, 2021).

Techno-centric studies on the future of work opportunities and their limitations

Indeed, it is the general-purpose potential of digital technologies to offer firms cost-effective ways to experiment and create new value, which has led to substantial concerns about their implications for wage employment (Brown et al., 2022; Lane & Saint-Martin, 2021). The dominant approach to studying the future of work in the context of digital innovation is to focus on technological possibilities, which can be described as techno-centric studies on the future of work. Below, I outline briefly three strands of such studies and explain why they have been found wanting:

- **Forecasting studies:** The first strand involves estimates of the labour-substituting potential of digital technologies. These are often in the form of automation studies based on experts' predictions of the potential of digital technologies to substitute occupations or job tasks. Outcomes vary significantly depending on the methodological approach taken. The work by Frey and Osborne (2013) that has caught the attention of global players in research and policy is illustrative of this strand of studies. Their focus is on occupations, estimating that 47 per cent of total employment in the USA is at high risk of automation. Taking issue with the focus on occupations, Arntz et al. (2016) and Manyika et al. (2017) argue that task-level analysis is a more accurate depiction of the impact of technological change on jobs. Using this methodology, Arntz et al. (2016) conclude that only 9 per cent of jobs are fully automatable. Manyika et al. (2017) comes to a similar conclusion that fewer than 5 per cent of occupations are at risk of full automation at present but adds that about half of job tasks could potentially be automated by adapting currently demonstrated technologies. Expert estimations risk underestimating or overestimating the potential of technologies to impact jobs. At one level, cost considerations may deter the deployment of automation technologies when cheap and plentiful labour is available. At another level, corporate agendas may push for automation at all costs, demonstrated by the observation by Acemoglu and Restrepo (2019:10) of the US economy that "so-so technologies" are being pushed out that are productive enough to disrupt

employment but not sufficient to lead to a substantial boost in productivity. Osborne himself (in Schwab 2017) observes that a critical enabling factor for automation is the fact that companies have worked hard to define better and simplify jobs in recent years as part of their efforts to outsource and offshore. Discrete, well-defined tasks lead to better monitoring and more high-quality data around the task, creating a better base from which algorithms can be designed to substitute human labour. Here again, we see the effects of corporate restructuring interplaying with technologies to lead to a model of standardisation that arises not from the technology itself but from corporate decisions on how work should be restructured to take advantage of labour arbitrage.

- **Historical labour market data analysis:** The second strand of technology-centric studies focuses on historical labour market data analysis of the increase in skills demand as a result of an exogenous shift in technology, or what has been described as skills-biased technological change (SBTC) leading to rising wage inequalities. Specifically, it examines the extent to which introducing a new technology increases the demand for more-skilled labour relative to less-skilled labour to explain income inequality (Autor et al., 2008; Goldin & Katz, 2008). Using US labour market data since the 1900s, Goldin and Katz (2008) describe a race between education and technology, whereby the first half of the century saw education producing enough skills for the labour market, but that technology "sprinted ahead of limping education" since the 1980s. In the face of evidence that low-wage jobs remain plentiful, Autor and Dorn (2009) and Goos et al. (2014) suggest a different regulating mechanism of technology removing routine jobs in the middle of the labour market in a phenomenon described as 'job polarisation' or 'hollowing out'. Historical analyses of the second strand have been suggested to have underestimated the impact of non-technology factors that give rise to SBTC. This is particularly profound as recent work shows a significant decline in the explanatory value of the SBTC theory. Autor et al. (2020) now find that increased educational wage differentials account for only 38 per cent of US wage inequality from 2000 to 2017, a sharp decrease from 75 per cent between 1980 and 2000. Brown et al. (2020) highlight that income inequalities in the US have been found to increase more within the category of the college-educated than between those with and without a college education. The increasingly unsatisfactory explanation of SBTC has led economists such as Green (2007) to call on sociologists to offer alternative explanations for income inequality.

- **Conceptual assessment of intelligent technologies:** The third strand of technology-centric studies is neither prospective estimates nor analyses using historical data, but conceptual discussion of the potential of intelligent technologies to displace humans on such a scale that waged employment is no longer possible. In sharp contrast with the first and second strands of analysis, the third strand focuses on the fate of professional activities as the character of digital technologies is said to be capable of targeting jobs and occupations that hitherto have been associated with knowledge work

(Brynjolfsson & McAfee, 2014; Ford, 2015: Kaplan, 2015; Mason, 2015; Rifkin, 2014; Susskind & Susskind, 2015; Susskind, 2020). Specifically, studies in this strand argue that economic activities in a society will be organised in small groups comprising highly skilled professional and technical workers overseeing intelligent technologies, giving rise to technological unemployment that can only be resolved by organising society differently in lieu of mass employment. This is reminiscent of Keynes' famous prediction of technological unemployment due to the rapid spread of automation technologies in an earlier period (Keynes, 2010 [1930]). Conceptual discussion of the potential of intelligent technologies to displace professional work is similarly at risk of technological determinism as there may be other forces at play. For instance, Daly and Willis (1989) outline how early radiologists in Australia enjoyed autonomy and discretion. However, the ideological maintenance of a medical professional class in healthcare through state licensing in Australia led to the subordination of the radiographer as an allied health professional.

Indeed, accounts of the future of work based on technological possibilities are helpful in as much as they outline various potential outcomes of the impact of technology on work. There remains crucial work to describe factors that accelerate or deter technological adoption, as technology is not destiny, nor is labour an easily substitutable input in production. As Acemoglu and Restrepo (2018: 1) note, "We are far from a satisfactory understanding of how automation in general, and AI and robotics in particular, impact the labour market and productivity". Therefore, the lens for understanding the future of work should not be restricted to a technical view. That a technology exists does not indicate whether or how it will be used. This has led to calls for greater use of the social lens to study technology deployment and its implications for labour (Briken et al., 2017; Green, 2007; Shestakofsky, 2017; Souto-Otero et al., 2021; Stroud et al., 2020).

Applying the lens of social relations of productions to 'future of work' studies
Arguably, if Harry A. Braverman (1974) were to study the future of work today, his focus would be on the firm and the social relations of production within it, specifically the use of technology to change the existing division of labour. Multiple studies of earlier periods of technological change have identified the critical role of social relations of production in determining the character of technological deployment. Braverman (1974) outlined how the shift to Taylorist techniques in manufacturing at the turn of the 20th century took place in the context of shifting power relations between capital and labour. Specifically, capital facilitated the implementation of scientific management (Taylorism) to seek greater control of the production process. This resulted in the deskilling and routinisation of tasks performed by blue-collar and lower-level white-collar workers. Technology was deployed to standardise work processes so employers would be less reliant on workers' intellectual and tacit skills, making them easier to control and replace. At the core of the labour process theory, as advanced by Braverman, is the

separation between conception and execution that is delivered through a reengineering of the manufacturing process (Burawoy, 1979).

Hanley (2014) also observed that shifting workplace relations were decisive in shaping the automation of white-collar work at General Electric in the middle of the 20th century. She observes how the language of business growth was used to legitimise white-collar automation as strengthening managerial responsibilities. This was an attempt to deny white-collar workers the rewards of the productivity gains from the automation process and to avoid antagonistic industrial activities of white-collar workers being drawn into the folds of unionisation. Managers were valorised at the expense of production and clerical workers, with the distinction between managerial and clerical roles reinforced to legitimate unequal rewards. Here, new workplace technologies developed in the context of corporations' labour control strategies to weaken organised labour and prevent its growth in the service sector.

In other words, rather than technology as an external stimulus that reshapes labour demand due to its inherent attributes, technology is harnessed into tools by powerful actors to reshape jobs, often by degrading them. By the same token, technology can transform an existing division of labour more equitably. For example, Noble (1986) observes how the introduction of computers in the 1970s undermined skilled machining as an occupation in the US. In contrast, in Germany, the technology was used to further the evolution of skilled engineering trades.

In this academic tradition, the social division of labour is understood to take precedence over the technical division of labour, with technologies being deployed to mirror the changing social division of labour when tasks get narrower for specific categories of labour. As Fox (1974) reminds us, situations have been frequent in which a narrowing of task range comes with the simplification of tasks by machinery or new methods, thereby transferring discretion upwards to machine designers, managers and other specialists. (Fox, 1974: 17).

Extending the argument of Avent-Holt and Tomaskavic-Devey (2010) and Avent-Holt et al. (2020), I put forth that workplaces are not just sites generating and mediating the current state of social inequalities, but they may prefigure the emergence of new forms of social inequalities. In the methodology for anticipating the future of work by Moniz et al. (2009), the authors outline that observing company-level activities provides a good entry point for understanding how work is changing. If the social relations of production shaped dramatic changes to work in earlier periods of technological change, can we study it as a leading indicator of the character of work opportunities in the fourth industrial revolution? This study investigates such possibilities. It is, therefore, a contribution, both as an empirical study and a methodological exploration, of how the social relations of production

at the firm level can inform us on the direction of change of how digital technologies may change the existing division of labour at the national level.

Theoretical and conceptual frameworks guiding the study

Theoretical position

The theoretical framing of this study draws from an underlying Marxian framework of the social shaping of technology (MacKenzie & Wacjman, 1999). Mackenzie (1984: 473) observes that Karl Marx argued that "in the most significant complex of technical changes of his time, the coming of large-scale mechanised production, it was social relations that moulded technology rather than vice-versa". By social relations of production, I refer to the ongoing negotiation, contradictions and tensions structuring the capital-labour relations. On the one hand, the capitalists have control not only over the "means of material production" but also the "means of mental production" (Marx & Engels, 1970 [1845]: 64). On the other hand, waged labour has leverage in terms of the indeterminacy of its labour power in that the precise amount of effort it puts in cannot be fixed at the point of engagement (Smith, 2006). The social relations structured between capital and labour manifest at times in conflict but also in cooperation (Adler, 2004; Rikowski, 2002; Sawchuk, 2006). The contradictions and tensions in the capital-labour relationship are due to the production process being simultaneously a creative process and a control process, as a consequence of the valorisation objective of capital and its managerial agents to deploy labour to produce goods with surplus value that can be reinvested (Cleaver, 1992). Within this theoretical paradigm, while new technologies are understood to expand the range of productive powers, the eventual selection of those productive powers is ultimately determined by the state of social relations of production under capitalism (Suchting, 1982).

Despite the powerful proposition of this theoretical paradigm and demonstration of rich evidence of how social relations of production have shaped dramatic changes to work in earlier periods of technological change, the field is generally not seen as forefront in advancing understanding of changing opportunities for waged labour in the 'fourth industrial revolution' that has tended to be dominated by economics research (Green, 2007). Elsewhere, my co-authors and I have argued that it is pressing that the theoretical paradigm of the social shaping of technology be harnessed fully, considering the significant potential of digital technologies to profoundly alter the design and distribution of work worldwide (Brown et al., 2022). After reviewing recent academic literature on the social relations of production, I conclude that there is a necessity to enrich the field with conceptual and methodological diversity. Certain scholars have noted a conceptual "impasse" (Sawchuk, 2006: 593) and a trend towards "narrowing and dulling" (O'Doherty & Willmott, 2009: 936) within this field. In Chapter 2, I outline in-depth the range of scholarly critiques. Sufficient for our purposes, here are a few core issues.

First, there is a need to expand the scope of analytical focus beyond social relations at the point of production, which has captured much scholarly attention in this field. Scholars have noted that the conceptual toolbox drawing from labour process theory, as outlined by Braverman (1974), primarily emphasises examining social relations at the point of production, which is vital but incomplete. As observed by Jaros (2005), Littler and Salaman (1984) and Tinker (2002), decisions that impact labour are often made away from the point of production. This reflects capitalists' upper hand due to their ownership of both the means and the 'mental model' of production. Workers' resistance at the point of production might be limited once specific technological paths and investments have been taken. This holds particular significance in today's context, given that digital technologies have generated extensive opportunities for large-scale redesign of work processes. The study by Brown et al. (2011) stands out as exemplary in its approach of going upstream to capture the views of senior leaders in transnational corporations (TNCs). Their research explores how these leaders envision restructuring global value chains to take advantage of the availability of high-quality graduates at a lower cost in emerging economies. The authors conclude that knowledge work is being unbundled and codified using digital technologies in a process that they describe as "digital Taylorism" occurring across national borders (Brown et al., 2011: 69). They highlight that the processes of work design are still in early stages and that there are opportunities to reshape the use of digital technologies in ways that complement labour.

A second area to advance scholarly work on the social relations of production is the need for more firm-level conceptual tools that allow for a comparative discovery of variance in cases to capture digital technologies' positive and negative impact on labour power. As Hanley (2014) observes, much of the focus on theoretical and empirical work to support labour's struggle has been on the role of institutions through, for example, collective bargaining, minimum wage and regulation. In the digital literature, there are important works by authors such as Genz et al. (2018), Lloyd and Payne (2019), and Stroud et al. (2020), who have identified the critical role of institutional contexts in mediating the patterns of innovation at the workplace. An equally important agenda is to identify firm-level, occupational-level, and industry-level factors that act as a bulwark against technology-enabled automation and standardisation (Adler, 2004; Aneesh, 2001; Brown et al., 2022; Sawchuk, 2006; Vidal, 2020; Vincent et al., 2020). Such an approach aligns well with the Marxian perspective, recognising the inherent contradictions within capital-labour relationships. These contradictions manifest in capital's simultaneous demand for control yet also the cultivation of workers' creative capabilities, both of which are integral components of the production process. The work by Souto-Otero et al. (2021) is instructive in singling to us firm-level factors that shield workers from being substituted by technologies, namely high value-add business strategies and management's positive perception of workers. Firm-level factors are potentially powerful because they suggest the ability of the corporate sector to self-regulate, mutually enhancing firm and labour outcomes, even without institutional intervention. Such discoveries

have the potential to broaden the spectrum of strategies available to societal actors to secure mutually favourable outcomes for firms and workers.

Third, the scholarly field of the social relations of productions needs to broaden the diversity in research methods to contribute to future-of-work studies at the scale required to guide societal action. As observed by Choi et al. (2008), Fernandez (2001) and Jaros (2005), the predominance of case studies in the field poses a challenge when it comes to empirically showcasing the impact of technological innovation on labour at the scale required to inform policy action effectively. There has been considerably more use of quantitative techniques in recent years (e.g. Alasoini & Toumivaara, 2022; Genz et al., 2018; Souto-Otero et al., 2021). However, a weakness of the quantitative technique is its inability to describe contextual mechanisms adequately. Thus, while Souto-Otero et al. (2021) find statistically significant findings of firm-level factors that shield workers from being substituted by technologies, the authors could, at best, hypothesise the underlying mechanisms. This study will thus make a case for the use of mixed methods. As Lin (1998) described, a mixed methods design allows researchers to combine the generalising power of the quantitative approach with the qualitative approach's intensity and richness in detail.

Therefore, this study's specific design seeks to overcome the abovementioned limitations. In tackling the initial challenge of requiring a more comprehensive set of conceptual tools to capture capitalists' 'mental model' of production accurately, I intend to leverage my previous collaboration with Brown et al. (2019) to propose corporate talent management as a conceptual framework for capturing the evolving dynamics between capital and labour. I hypothesise that corporate talent management acts as a 'mental model' upon which firms construct digital strategies with contrasting implications on labour outcomes. Given that firms may organise their workforce differently, the framework allows us to address the second challenge of identifying firm-level factors that shield or put the workforce at risk in the context of digital innovation. Finally, addressing the third challenge to broaden diversity in research methods to contribute to future-of-work studies at the scale, I will use a mixed methods design integrating quantitative and qualitative techniques to capture a range of corporate talent management models and examine how they may mediate the design of technology strategy and the effects on labour.

Corporate talent management as a conceptual framework
It is atypical to link corporate talent management to Marxian political economy theories. Corporate talent management is typically studied in human resource management (HRM), drawing from the theoretical paradigms of psychology and the resource-based view of firms (Dries, 2013; McDonnell et al., 2017). By situating corporate talent management within a Marxian political economy framing, I am responding to the call by Vincent et al. (2020) for theoretical pluralism in the study of human resource management to include the broader political economy contexts. A strength of this approach is expanding

the opportunity to understand business strategies at the firm level in ways that mutually enhance business and social outcomes, thereby going beyond "business-focused performative agendas" (Vincent et al., 2020: 472).

Following Brown et al. (2019: 12), the study defines corporate talent management as the "institutional structuring of demand" of how companies organise their labour. Corporate talent management reflects the positional competition within the firm regarding how the workforce is organised to deliver what needs to be done and the distribution of rewards. I make a distinction between old and new forms of corporate talent management. Old forms of corporate talent management manifest in the trust, discretion and rewards organisations offer to workers with high levels of education and training, as Fox (1974) described. Old forms of corporate talent management strengthen the labour-power of high-credentialed workers but undermine those without high credentials. New forms of corporate talent management refer to the stratification of those with high education and training levels. Within this category, a small group of high potential is groomed and rewarded differently for the perceived strategic value they bring to the firm (Brown et al., 2019). New forms of corporate talent management add high-credentialed workers into the category of those with weakened labour power who are now subjected to management control of their knowledge work (Brown & Hesketh, 2004; Evetts, 2009, 2013; Grugulis, 2007).

In my study with Brown et al. (2019) based on 30 leading corporations across Singapore, India and China, my co-authors and I found evidence that most were operating based on new forms of corporate talent management that can be described as 'war for talent'. 'War for talent' relates to HR policies to nurture a small group of workers, typically at 10-20 per cent of the workforce, who are attracted, developed and rewarded differently from the rest due to the perceived value they bring to the organisation. However, even those identified as talent feel constrained, as they find themselves embroiled in a complex process of performing rather than delivering performance. This is because the crucial activity is to gain the confidence of senior colleagues who play a decisive role in determining those on the 'talent' list. Of significant interest to this study is that we found early evidence that narrow views of talent may prefigure corporate technology programmes of labour substitution or standardisation of high-skilled talent. One quote from an HR manager of a global bank practising 'war for talent' strategies is worth reproducing here. She shares:

> Maybe one day, we will be operated (solely) by robots. Who knows? This is the topic whenever we are in so-called career discussions or development discussions. We always ask the people that question, "Why you? Why do we need you? What exactly are you offering?...What exactly is the value you're bringing? If you have this value, which is very easy to be replaced, so be it. You either try to invent yourself to have another set of values that is not so easy to be replaced,

or then unfortunately this is the path, whether you like it or not. (HR Manager, Banking & Finance TNC, Singapore, interviewed in 2016, reproduced from Brown et al. (2019))

Here, we see that the organisational trust once enjoyed by high-credentialed workers has eroded substantially, such that conversations of substitution by technology are now considered unproblematic. Of vital importance is that my co-authors and I found a single firm with a divergent talent model that we describe as 'wealth of talent' (Brown et al., 2019:13). In this firm, the broad proportion of the workforce is given the space to exercise professional discretion. Although we did not ask specific questions on technology programmes within the company, the high levels of discretion described to us by employees in the firm suggest a high level of possibility that they have the discretion to leverage digital technologies as they deem fit to augment their work, thereby the likelihood of preserving their value to the company.

Firms practising either 'war for talent' or 'wealth for talent' tend to be high value-added firms, and these may not be the only talent models in an economy. Indeed, the persistence of firms operating at a low skills equilibrium has been observed across a broad range of economies, including Singapore, South Korea, the UK, and the US (Bhaskaran & Chiang, 2020; Fleckenstein & Lee, 2019; Grugulis, 2013; Lyon, 2018). It is crucial to capture the corporate talent management model associated with such firms and understand how it shapes digital strategies and the possibilities for strengthening labour power in such firms through technological change.

Other conceptual frames

For an analytical understanding of the key dimensions for strengthening labour power, I draw on Adler (2004: 4-5), who highlights two essential components to skills that enhance labour power, namely the "mastery of the complexity of tasks" and the "mastery of the relations to coordinate activity across these tasks". A more comprehensive discussion of these concepts is in Chapter 2. Additionally, given the study's objective to contribute to future-of-work studies, I intend to connect the analysis directly to three prominent 'future-of-work' theories to assess downstream labour outcomes from technology use. The three theories are outlined below, and a more in-depth discussion is similarly provided in Chapter 2.

- *Future-of-work theory 1: Skills-biased technological change*
  Digital technologies create high-skill, high-discretion jobs and shed low-skill, low-discretion jobs (Autor, 2015; Goldin & Katz, 2008; Autor et al., 2020).

- *Future-of-work theory 2: Job polarisation*
  Digital technologies replace middle-level jobs relative to high-skill, high-discretion jobs and low-skill, low-discretion jobs (Goos et al., 2014; Caines et al., 2017). Middle-level jobs may also be

reconfigured and offshored using technologies to allow organisations to tap into labour in cheaper locations.

- *Future-of-work theory 3: Labour restratification*

  Digital technologies are used to change job content and/or job contexts of high-skill, high-discretion jobs (Brown et al., 2011; Brown, 2021).

Research design

The design of this research study is based on the twin goals of theory elaboration and method development (Fisher & Aguinis, 2017; Mackenzie & Knipe, 2006). In terms of theory elaboration, the study aims to extend from the original research (Brown et al., 2019) to elaborate on how corporate talent management, as a form of social relations of production in a firm, mediates organisational decisions on how digital technologies are being thought of, constructed and deployed in a firm that may prefigure changes to work processes that maintain or change an existing division of labour. In terms of method development, it seeks to establish the extent to which patterns of corporate talent management can be a leading indicator to anticipate changes to the division of labour at the aggregate or national level in the context of digital technological change.

The set of research questions (RQ) guiding this mixed-methods study is as follows:

RQ1: How does corporate talent management, as a form of social relations of production in a firm, mediate organisational decisions on how digital technologies are being thought of, constructed and deployed within a firm, and the subsequent impact on jobs and the division of labour within the firm?

- Are assumptions that shape corporate talent management embedded in how digital technologies are thought of and constructed in a firm?
- Are assumptions that shape corporate talent management also shape who is empowered to lead the digital strategy and who is excluded?

RQ2: To what extent do practices of corporate talent management at the firm level prefigure upcoming changes to the division of labour at the aggregate or national level with digital technological change?

- Can patterns of corporate talent management at the firm level be aggregated and used as a leading indicator to forecast changes to the division of labour at the national level due to digital technological change?

Singapore is the site of investigation for continuity with the original study (Brown et al., 2019). The industrial policy and state of industrial relations in the city-state make it useful for examining the study's

research questions on firm-level factors mediating digital programmes and workforce outcomes. Regarding industrial policy, the city-state is a leading digital innovation hub, hosting substantial technological initiatives as part of its industrial strategy to be a global city. This industrial policy takes place within a unique structure of industrial relations whereby a strong authoritarian seeks to balance capital and labour interests. Economic policies create a business-friendly corporate landscape, while social policies facilitate wealth redistribution outside the firm context through inclusive housing, education and pension schemes (Doner et al., 2005). Flexible labour market policies are in place, and there is low trade union penetration in the workplace. This combination of a business-friendly, technology-intensive setting and minimal union interference in a firm's social dynamics positions Singapore as an ideal case study. It helps us achieve analytical clarity to isolate firm-level decisions on the broader workforce. This task would be less feasible in countries such as Finland, Germany and South Korea, where institutions such as work councils directly influence firms' social relations. For instance, German semiconductor giant Infineon announced in 2020 its plan to make Singapore its global AI innovation hub, whereby AI solutions are tested out in Singapore before being rolled out in other parts of the company (Infineon, 2020). Indeed, Singapore's place in Infineon's global digital plan reflects the relatively unencumbered ways digital innovation can occur in the city-state. Such activities would have been challenging to execute at Infineon's HQ in Germany, given the need to work through the German Work Councils. Chapter 3 provides a comprehensive examination of the political economy of Singapore.

Mixed methods are used as the research design as it allows us to combine the intensity and richness in details of the qualitative approach to support theory elaboration with the generalising power of the quantitative approach for methods development (Lin, 1998). The quantitative component entails analysing the Business Skills and Performance Survey (BPSS). BPSS develops and establishes a system of workplace indicators relating to how firms organise demand for and use of skills, with the survey designed so that the indicators may be understood in isolation and in relation to each other (Tan et al., 2018). It is Singapore's only large establishment dataset, with 3,801 establishments surveyed in 2016. Crucial to the research questions is that BPSS includes talent indicators and questions on technological substitution and skills upgrading. A qualitative component follows up the quantitative analysis. Semi-structured interviews are conducted within 30 firms, comprising managers (n=35) and employees (n=48). Chapter 4 provides a comprehensive description of the methodological design of the study. **Table 1** summarises the research design of the study.

Table 1: Summary of research design

Research questions
RQ1: How does corporate talent management, as a form of social relations in a firm, mediate organisational decisions on how digital technologies are being thought of, constructed and deployed within a firm, and the subsequent impact on jobs and the division of labour within the firm? RQ2: To what extent do practices of corporate talent management at the firm level prefigure upcoming changes to the division of labour at the aggregate or national level with digital technological change?

Conceptual frameworks	
Corporate talent management	*Labour outcomes from digital programmes*
'Old' forms of corporate talent management: Education credentials are a talent marker. Those with high education credentials are entrusted with job roles designed to support them in exercising professional discretion. Those without high education credentials do not enjoy high trust, and their jobs are designed to control them (Braverman, 1974; Fox, 1974).	**Labour upgrading:** Use of digital technologies to create high-skill, high-discretion jobs and shed low-skill, low-discretion jobs (Autor, 2015). **Job polarisation:** Use of digital technologies to replace middle-level jobs relative to high-skill, high-discretion jobs and low-skill, low-discretion jobs (Goos et al., 2014).
'New' forms of corporate talent management: Organisation policies such as high-potential programmes demarcate who is or who is not a talent, with strategic roles assigned to those regarded as talent (Brown & Hesketh, 2004; Brown et al., 2019; Evett, 2009, 2013).	**Labour restratification:** Use of digital technologies to change job content and/or job contexts of high-skill, high-discretion jobs, leading to deskilling for some high-skilled workers (Brown, 2021).

Mixed method methodology	
Quantitative: Clustering analysis of establishments in Singapore using the Business Performance and Skills Survey (n=3,801).	**Qualitative:** Semi-structured interviews with 30 firms comprising interviews with managers (n=35) and employees (n=48).

The data in this PhD dissertation is drawn from my ongoing work as principal investigator of a corporate talent management study in Singapore from September 2020 to March 2022. The study sits within the Digital Futures of Work Research Programme (https://digitalfuturesofwork.com/) that ran from October 2019 to August 2023 and was jointly led by Cardiff University and the Institute for Adult Learning, with Professor Phillip Brown of Cardiff University as the Programme Director and me as the Deputy Director. The strand of study I led seeks explicitly to expand understanding of the range of corporate talent management approaches in Singapore and prospects for shifting Singapore's corporate landscape towards inclusive approaches. I worked with two research assistants to conduct the corporate talent management study. They assisted me in executing the quantitative and qualitative analyses under my direction. The first research assistant was a senior researcher who advised me on the appropriate method to undertake the quantitative analysis and executed the technique while I scoped the variables to be used and led the interpretation of the results. The second research assistant was a junior researcher whom I guided to co-conduct qualitative investigation in firms with me. This PhD dissertation reports on one strand of the inquiry, the talent-technology dimension, as analysed and interpreted by me.

Structure of the dissertation

Chapters 2-4 are context-setting chapters. Chapter 2 analyses the range of literature that this research study engages with, which informs the design of the inquiry. Chapter 3 outlines the capital-labour relationship in Singapore. It considers the 'future of work' issues emerging in the business-friendly city-state as it seeks to embrace digital innovation while sustaining social goals. Chapter 4 sets up the methodological approach taken in this study.

Chapters 5-8 are results chapters. Specifically, Chapter 5 presents topline results of the quantitative and qualitative investigations that uncovered four corporate talent management models in Singapore's corporate landscape, with evidence of contrasting technological outcomes to the workforce. These four talent models are 'war for talent', 'wealth for talent', 'stunted talent' and 'zero talent'. Chapter 6 compares 'war for talent' and 'wealth of talent' firms. Chapter 7 compares 'stunted talent' and 'zero talent' firms. Chapter 8 presents evidence of born-AI firms, showing how they, too, organise their talent models differently, offering a different trajectory of opportunities for their workforce.

Chapter 9 describes the results in response to the two Research Questions. Chapter 10 concludes the study with a summary of its findings, contributions, limitations, and areas for future research.

Summary

This chapter has identified a limitation in the academic literature on the 'fourth industrial revolution', dominated by technology-centric studies to account for the future of work. Drawing from studies of earlier periods of technological change, the study examines how current patterns of social relations of

production at the firm level may shape how technology is used to maintain or transform a division of labour. Corporate talent management is applied as a conceptual frame for studying social relations of production at the firm level.

Chapter 2 | Literature review

Key strands of literature review

As outlined in Chapter 1, this study seeks to advance an understanding of the future of work opportunities through the theoretical lens of the social relations of production at the firm level, using the conceptual framework of corporate talent management. In this chapter, I provide a literature review of the key theories, concepts and empirical evidence that underpin the study.

I begin by outlining the differences in theoretical paradigms of understanding the technical versus the social relations of production. I argue why the latter offers a sound theoretical framework to contribute to today's discussion of the future of work opportunities. I describe the strength of the social relations view of technical change: its ability to integrate considerations around the division of labour, technology, and management methods. I report too on some issues in the field, especially scholars' critique of the field's lack of conceptual and methodological diversity that is said to have led to a conceptual "impasse" (Sawchuk, 2006: 593) and "narrowing and dulling" (O'Doherty & Willmott, 2009: 936). Analysing the scholarly debates, I propose three interlinked gaps the field needs to close to allow it to make a more robust contribution to future-of-work studies. These are (1) broadening analytical attention beyond social relations at the point of production, (2) creating a systematic approach to capturing and interpreting variance in firms' labour and technology strategies, and (3) advancing methodological diversity.

I go on to review empirical studies that specifically discuss the impact of digital technologies on labour, highlighting their strengths as well as their weaknesses. I outline how early enthusiasm that digital technologies may allow for autonomous labour production has given way to growing scholarly attention that the direction of digital technological change is to standardise, fragment and make labour more precarious. I highlight the opportunity that the conceptual frame of corporate talent management offers towards a nuanced understanding of different pathways for labour outcomes from digital programmes. Finally, I outline how changes to labour power will be analysed in this study, drawing on current future-of-work studies.

Theoretical framing for understanding technical vs social relations of production

Adam Smith most famously describes the idea of a technical division of labour in his exposition of the labour process in pin manufacturing, in which he identifies 18 distinct operations that workers specialise in, from drawing out the wire to grinding and whitening the pin (Smith, 1937 [1776]). The technical relations of production are, therefore, primarily concerned with the different tasks to be performed

within a production process and are influenced strongly by the available materials and techniques of production (Glover & Kelly, 1987). Ferguson (1980 [1767]), who wrote during the same period and sketched out a similar labour process for pin manufacturing, however, unpacks the underlying motive for such a process:

> Every undertaker in manufacture finds, that the more he can subdivide the tasks of his workmen, and the more hands he can employ on separate articles, the more are his expences diminished, and his profits increased. *(Ferguson, 1980 [1767]: 181)*

As the quote by Ferguson (1980 [1767]) highlights, the technical division of labour is shaped directly by the capitalist's valorisation process. Valorisation refers to the process of labour being put to work, producing products creating surplus value that could be reinvested (Cleaver, 1992). In the academic tradition of social relations shaped by a Marxian understanding of the capitalist mode of production, it is the structure of power relationships between the capitalists and their managerial agents, on the one hand, and wage labour, on the other hand, that informs the ensuing technical relations of labour. In explaining the distinction between technological possibilities and outcomes, Suchting (1982) highlights that while new technologies expand the range of productive powers, the social relations of production under capitalism determine the eventual state of development of those productive powers. Tinel (2009) further explains that the technical division of labour is not ultimately shaped by the capitalist's command of specialised knowledge of how to run industrial production but rather by their rule of the labour process through their command over the means of production. Marx and Engels (1970 [1845]) make clear the upper hand that the capitalists enjoy:

> The class which has the means of material production at its disposal, has control at the same time over the means of mental production, so that thereby generally speaking, the ideas of those who lack the means of mental production are subject to it. *(Marx & Engels, 1970 [1845]: 64)*

While the capitalist has control of the means of material and mental production, it does not have complete control of labour power. Waged labour has leverage in terms of the indeterminacy of its labour-power, in that labour power is hired based on the potential that needs to be turned into realised labour. It is the transformation of labour's potentiality that is subject to managerial considerations, tensions and disputes to extract labour's exercise of discretionary effort (O'Doherty & Willmott, 2009; Smith, 2006). Managers require the exercise of labour power to create what Karl Marx has described as use-value, which is the usefulness of a commodity that is then turned into exchange-value through the capitalists' process of valorisation (Marx, 1990 [1867]). Consequently, as summarised by Sawchuk (2006: 600), the social relations of production are characterised by deep contradictions between

"conflict and consent, control and resistance, and bureaucracy and creativity" among those who own the means of production and those subject to them.

Technology deployment sits within this set of social relations in what MacKenzie and Wacjman (1999: 1) describe as the "social shaping of technology". Noble (1986) and Thomas (1994) highlight that decisions on new technologies are often made according to goals defined by powerful groups inside the organisation, such as management's assumptions of the best approach to bring a product to market or the ideological bias of high-status employees whose decisions may or may not coincide with what is the most efficient. Consequently, the state of pre-existing social relations of production shapes technological deployment considerably, making technology not a neutral object of job design. It is worth reproducing a quote from Fox (1974) on how changing managerial considerations of labour translates into a specific technology strategy:

> Situations have been frequent where the narrowing of task range has been followed by, or introduced expressly to accommodate, a simplification of tasks by machinery or new methods, thereby transferring discretion upwards to machine designers, coordinative managers, and a range of other specialists. *(Fox, 1974: 17)*

Technology, therefore, is not seen as exogenous in the academic tradition of social relations of production. Indeed, multiple studies of social relations of production in earlier periods of technological change have identified how changing patterns in social relations of production shape the labour impact of technological deployment (Biernacki, 1995; Braverman, 1974; Burawoy, 1979; Daly & Willis, 1989; Fernandez, 2001; Hanley, 2014; Noble, 1986; Sorensen, 1985; Vallas, 1993). These authors highlight how social relations mediate the use of technology in transforming an existing division of labour in ways that either degrade or upgrade labour power. Below, I outline a few critical studies:

- Braverman (1974), in a landmark study, outlines how the shift to Taylorist manufacturing techniques in the US at the turn of the 20th century took place in the context of shifting power relations between craftsmen and capital owners manifesting in the scientific reengineering of the manufacturing process that removed the discretion of craftsmen. Specifically, capital facilitated the implementation of scientific management (Taylorism) to seek greater control of the production process. This resulted in the deskilling and routinisation of tasks performed by blue-collar and lower-level white-collar workers. Technology was deployed to standardise labour so that employers would no longer be reliant on the intellectual and tacit skills of the workers, making them easier to control and replace. At the core of the labour process theory, as advanced by Braverman (1974), is the separation between conception and execution that is delivered through a reengineering of the manufacturing process (Burawoy, 1979).

- Hanley (2014) observes how shifting workplace relations shaped the direction of automation of white-collar work at General Electric in the middle of the 20th century as management sought to stall white-collar unionisation. The language of business growth was used to legitimise white-collar automation as strengthening managerial responsibilities in an attempt to deny white-collar workers the rewards of the productivity gains from the automation process and avoid their enlistment into the folds of unionisation. Managers were valorised at the expense of production and clerical workers, with the distinction between managerial and clerical roles reinforced to legitimate increasingly unequal rewards. Here, the development of new workplace technologies is advanced by corporate objectives to weaken organised labour and prevent its growth in the service sector.

- Noble (1986) contrasts how the social relations of computing technologies evolved skilled engineering trades in Germany but undermined skilled machining as an occupation in the US.

- Biernacki (1995) contrasts German and British wool textile mills to highlight how labour was understood differently in these national contexts, even though the industries had developed in the same period, used similar machines, and competed in similar markets. The German system sought to preserve labour power. It successfully pushed for conditions that built occupational capacity. In contrast, the British system undertook a market-driven 'production' approach that subjected labour to conditions of limited autonomy tied to delivering narrow outputs.

- Daly and Willis (1989) trace how the autonomy and discretion enjoyed by early radiologists in Australia came to be seen as undermining the traditional medical professional class. The ideological maintenance of a medical professional class in healthcare, facilitated by state licensing, led to the subsequent relegation of the radiographer to an allied health occupation.

Collectively, such studies demonstrate that technology is not destiny, and there are contrasting ways in which it can impact labour. Based on the studies listed above, the social shaping of technology led to the degradation of labour in some US manufacturing sites but not others (e.g. Braverman, 1974; Noble, 1986), effectively stalled the possible upgrade of specific labour categories in General Electric and the Australian healthcare industry (e.g. Daly & Willis, 1989; Hanley, 2014), and preserved labour power of technicians in Germany (Noble, 1986; Biernacki, 1995).

Extending the work of Avent-Holt and colleagues (Avent-Holt & Tomaskavic-Devey, 2010; Avent-Holt et al. et al., 2020), who argue that workplaces are sites generating a current state of social inequalities, I propose that workplaces anticipate the emergence of new forms of social inequalities or, conversely, contribute to strengthening social equity. The robust evidence of how pre-existing work contexts shape technological deployment should be leveraged for the field to make a decisive contribution to future-of-work studies as an alternative to the techno-centric studies of future work. In

the next section, I review scholarly discussions and tensions in the field to offer three ways in which the field of the social relations of production needs to be strengthened for the theoretical insights to inform future-of-work studies, namely, 1) broadening analytical tools to go beyond social relations at point of production; 2) creating space for the comparative discovery of variance in cases to capture the breadth of contradictions and struggle associated with capitalist-labour relations; and 3) to expand the diversity of research methods.

Three areas to strengthen the field of social relations of production to support future-of-work studies

As highlighted by various scholars (Jaros, 2005; Littler & Salaman, 1984; O'Doherty & Willmott, 2009; Tinker, 2002), current studies in the tradition of social relations of production are limited by the existing sets of analytical tools drawing from labour process analysis that gives focus to social relations at the point of production (e.g. classical works by Braverman, 1974; Burawoy, 1979 and recent works by Gandini, 2019). While capital-labour interactions at the point of production are essential to capture, they do not capture the whole story. Littler and Salaman (1984) have persuasively argued that a more useful theory of labour processes cannot be restricted to the specification of work activities at the point of production itself but must take into account control implications of decisions that may be taken elsewhere in the organisation. They cite capital strategies of offshoring to developing economies to outline how labour can be disciplined away from the point of production. However, the development of a core theory proposed by Thompson (1990) continues to make the point of production a core focus. There has since been a return to arguments for a broader conceptualisation of social relations of production as outlined by various authors such as Jaros (2005), O'Doherty & Willmott (2009) and Tinker (2002). I argue specifically for conceptual advancements *upstream* and *downstream* of the point of production.

By *upstream*, I refer to what Marx and Engels (1970 [1845]: 64) describe as the capitalist control of both the "means of production" and the "mental model" of production. Scholars like Littler and Salaman (1984) and Jaros (2005) argue that strategies of control and resistance at the production point respond to methods and techniques that have been laid out, narrowing the scope for the influence of labour power. Even in the classical work by Burawoy (1979), which focuses on relations at the point of production, this narrowing was implied given his observation that once Taylorite systems were installed, production was not possible without management's coordination and design functions. More recently, López et al. (2022) discuss how the prioritisation of speed and cost-efficiency in the fast-fashion industry is closing the options to use digital technologies to shift the industry to a "flexible specialisation" model that would have been more relational and labour-friendly. Instead, digital value chain restructuring in the fast-fashion industry seeks to break down the labour process into smaller, standardised tasks to be tracked and managed through digital devices and algorithms, leading to deskilling and standardisation. Although implementing Radio Frequency Identification (RFID)

technologies led to resistance in H&M's retail operations in Germany, the scope for change has considerably narrowed, given the networked pattern of the RFID technologies across other H&M stores. Further in this chapter, I will offer corporate talent management as a suitable form of capturing managerial-employee dynamics that also operate as a 'mental model' upon which firms construct their technological strategies, allowing us to go upstream to capture shifting dynamics prior to the point of production.

By *downstream*, I refer to the net effect of technological change on labour beyond the point of production. Howcroft and Taylor (2004) describe the need to capture the complexity and diversity of how work is being reconfigured. Technological change may lead to some jobs becoming obsolete and displaced while new ones are created, and yet others are transformed by incorporating elements of the technologies. In their words, the "totality of societal change may be greater than the sum of the constituent occupational parts" (Howcroft & Taylor, 2014: 2). The focus on the point of production during the period of technological deployment may have methodologically led to an inadequate capture of the net effect on workers, leading to what Sawchuk (2006: 593) describes as a "deskilling/upskilling impasse" – a debate that has lasted decades from Wood (1982), Littler and Salaman (1981) right through to Adler (2004), Aneesh (2001) and Sawchuk (2006), among others. Specifically, the debate critiques how most studies of social relations of production in the past decades observe the degradation of work, failing to account for the broader trends of upgradation observed in the expansion of professional and technical labour in the second half of the 20th century. Further in this chapter, I will outline how the design of corporate talent management as an *upstream* analytical framework mediating technological change supports the eventual *downstream* tracking of net labour outcomes, making it a useful, holistic framework to support future-of-work studies.

The second area for improvement in the field of social relations of production is to broaden the space for the comparative discovery of cases. The theorisation by Braverman (1974) of monopoly capitalism's logic to degrade work has been challenged by scholars in the field as being inconsistent with the underlying contradictions and struggle that underpin capitalist-labour relations (Adler, 2004; Sawchuk, 2006; Aneesh, 2001). The theoretical framing of the indeterminacy of labour power creates a need to capture the diversity of capital-labour relations in terms of resistance and accommodation and deliberate and purposeful cooperation between capital and labour. However, the lens of degradation remains influential. It has led to significantly more attention on theorising and empirically examining how institutions can support labour's struggle through collective bargaining, minimum wage and state intervention. Thus, comparative evidence of a variety of outcomes to technological use is typically provided through contrasting unionised versus non-unionised firms or between countries with different institutional arrangements, such as comparing the liberal economies of the US and the UK with the coordinated market economies of Germany and Scandinavian countries (Burgmann, 2013; Lloyd &

Payne, 2021). Researchers have signalled the need to identify firm-level, occupational-level, and industry-level contradictions manifesting in capital's need for workers' creative use of its labour power that acts as a bulwark against the pressure of valorisation (Adler, 2004; Sawchuk, 2006; Aneesh, 2001; Kern & Schumann, 1984; Mathews, 1994; Piore & Sabel, 1984; Streeck, 1989; Womack et al., 1990; Vidal, 2020). However, when such firms are found, they may be dismissed as isolated, ephemeral or exaggerated, for instance, criticisms of the illusion of labour power of workers co-opted into a system of self-exploitation (e.g. Appelbaum & Batt, 1994; Barker, 1999; Damarin, 2006; Vallas, 1999). Part of the challenge is that such cases are typically identified as stand-alone cases, making comparability at scale challenging (Choi et al., 2008; Jaros, 2005). I intend to address this weakness by using corporate talent management as a framework that is set up to discover variations in the social relations of production. Applying a corporate talent management framework to a large dataset of firms, such as Singapore's Business Performance and Skills Survey, will allow us to understand the distribution of corporate talent management models in an economy and analyse their correlation with technological strategies and workforce outcomes.

Interlinked with the above area, the third area for strengthening the field of the social relations of production to support future-of-work studies is the need to integrate methods. I join Choi et al. (2008) and Jaros (2005) in observing the dominance of case studies in the field, which creates a challenge to demonstrate generalisability. Even when Fernandez (2001) extends the traditional case study method into a longitudinal mixed-methods study of a single manufacturing plant to capture the downstream effects of technological change on labour, he notes the approach's limitations in terms of offering generalisability to the broader US economy. However, I also note that there has been considerably more use of quantitative techniques in recent works. These include the works by Littler and Innes (2004) and Choi et al. (2008), who use Australian longitudinal datasets of firms and individuals to capture growing social inequalities arising from corporate strategies, the work by Genz et al. (2018), who study patterns of German work councils' mediation of digital technologies across industries and firm types, the work by Souto-Otero et al. (2021) who show that high skills do not protect workers from the effects of technological change in Singapore firms, and the work by Alasoini and Tuomivaara (2022) who use Finnish national datasets to demonstrate patterns of skills upgrading. Such studies add insights to the field on the social shaping of technology but are also limited due to the inability of the quantitative technique to provide in-depth explanations. For instance, the findings by Souto-Otero et al. (2021) show that high value-add business strategies and management's positive perceptions of workforce competence are two statistically significant factors that shield workers from labour substitution but could not elaborate further if a relationship exists between these two factors. Similarly, in describing the patterns of skills-biased technological change in the Finnish economy, Alasoini and Toumivaara (2022) could, at best, hypothesise the underlying reasons for the phenomenon. The authors identify two social factors, namely the strength of the Finnish wage-setting institutions that have maintained high

wage compression and the dominance of the Finnish state as an employer with one-third of the workforce employed by the state. However, they could not rule out the nature of digital technologies as a determining factor either. Mixed methods can make a valuable contribution that allows the field to combine the intensity and richness in details of the qualitative approach with the generalising power of the quantitative approach (Lin, 1998). Chapter 4 will describe the mixed-method approach that will be undertaken in this study in greater detail.

There are a few concluding points to be made from the above literature review thus far. First, the field of social relations of production has much to offer to allow us to understand the drivers and patterns of digital change. Second, several weaknesses in the current literature need to be addressed if the field is to make a decisive contribution to future-of-work studies. They include new analytical concepts that allow the research investigation to go beyond the social relations at the point of production and analytical and methodological approaches that strengthen the capturing of variance in technological outcomes. Further in this chapter, I will outline how corporate talent management as a conceptual frame is rich enough to overcome these limitations. I now focus on the specific literature on the social relations of production that discusses the impact of digital technologies on labour power.

Empirical studies on digital technologies and the social relations of production
Here, I dedicate my attention to studies that examine the social relations of production around digital technological change. Following Brown et al. (2022) and Brynjolfsson and McAfee (2014), I take a broad view of digital technologies to include artificial intelligence (AI), platform technologies, Internet of Things (IoT), robotics, additive manufacturing, blockchain, and intelligent materials, among others. Digital technologies offer a new capacity to connect and integrate across a range of business activities, enabling product innovation – the creation of novel products and services, and process innovation – innovative ways of doing existing things, or a combination of both (Brown et al., 2022). Any attempt at classifying different forms of technologies is inherently challenging. However, for the purposes of this discussion, I select studies that only use the term digital or discuss a technology that has been widely accepted as a form of digital technology, thereby distinguishing the analysis from other technology types, such as personal computers and stand-alone tools or machines.

Interestingly, my review of empirical studies of the impact of digital change on labour has shown that early enthusiasm that digital technologies will allow for autonomous labour production has since shifted to growing evidence of the direction of technological change to standardise, fragment and make labour more precarious in what has been described as digital Taylorism (Brown et al., 2011; Altenreid, 2020). Specifically, the early works by autonomous Marxist scholars highlight the opportunity presented by digital technologies for autonomous labour production and the self-actualisation of labour power (Hardt & Negri, 2000; Burgmann, 2013). The basic argument is that given the character of digital labour

production that requires communication and sociability, technology and labour have become complementary rather than at odds with one another compared to earlier periods of technological innovation. Hardt and Negri (2000) describe the multitude of digital labour that operates through strategies of networked organisation and collective decision-making. Dyer-Witheford (1999: 65) describes them as the "wellspring of the skills, innovation, and cooperation on which capital depends" with difficulty to impose order on increasingly global systems of labour. Adler (2003) shows that standardisation procedures for software development mandated by the US government facilitated rather than inhibited labour cooperation. Individual coding evolved into a collaborative process whereby teams of software designers worked together and negotiated the standards to be applied and passed on to future developers. Andrews et al. (2005: 67) describe software production as a "craft rather than … technical-oriented" and therefore not at threat of deskilling and automation. As observed by Gandini (2019), where there was a critique, this has been mainly around the free digital labour produced by social media platform users that social media companies valorise (see, for example. Beverungen et al., 2015).

There has since been a perceptible shift to demonstrate growing precarity both within digital labour production and its application to industries outside of infocommunications. Works by authors like Altenreid (2020), Berg et al. (2018), Gandini (2019), Irani (2015) and Magaryan (2019) detail the decomposition of digital labour power through gig platforms such as Amazon Mechanical Turk, with the return of piece wage system, the disciplining of labour power through online ranking systems, and workers' isolation from one another such as the designing out of workplace learning from platform workflows. Altenreid (2020) describes the patterns as having elements of the old Taylorism but also some new ones. Specifically, Altenreid (2020: 152) highlights how highly standardised tasks allow for the "stunning" organisation of heterogenous workers in a "tight (if invisible) cooperation and division of labour between workers", as compared to the "subjective, spatial and organisational synchronicity a traditional Taylorist factory requires". Gandini (2019) similarly observes how labour platforms create invisible managerial figures sitting behind algorithmic management who remain hidden and inaccessible to workers.

However, broadly, the appearance of the labour independence of digital producers in earlier studies is consistent with underlying capital-labour dynamics. It is worth recalling Fox's description (1974) of the role of machine designers in facilitating a narrowing or simplification of tasks by machinery or new methods, working alongside managers and other specialists. Machine designers can be viewed as the handmaiden of the capitalists' strategy to control labour costs, as described in a landmark study by Brown et al. (2011). Drawing on interviews with senior corporate leaders of transnational corporations (TNCs), the authors flag the risks of a global shift to digital Taylorism, in which the knowledge of technicians, managers, and professionals is being translated into working knowledge through the

codifying, capturing, and digitalising of their work. This is the separation between conception and execution. Brown et al. (2011) situate the shift to digital Taylorism not in the technology itself but in changing capital-labour relations in which political economy contexts have legitimised the maximisation of shareholder interests, making possible the restructuring of global value chains for labour arbitrage. More recently, Brown (2021) argues that digital technologies are not attacking jobs from the bottom nor the middle of the labour market. Instead, they are being deployed right where heavy labour costs are. These are professional jobs that are being subjected to process innovation to standardise them and redistribute them through changing job content and job contexts.

The codification of knowledge work into digital tools is similarly described by Head (2014) through the development of highly complex software programs that large organisations increasingly rely on to strengthen managerial control against professional and technical labour. Core to such systems is their attempt to mimic human intelligence to perform cognitive tasks, whereby algorithms pre-determine the 'best practice' that would require practitioners to jump administrative hoops to override. Head (2014) describes how such systems are designed to trump human expertise, which reduces the autonomy of professional and technical workers in the process.

Of note is that the degradation of work is not inevitable due to the nature of digital technologies but a result of the capitalist's valorisation process. Head (2014) briefly highlights that such technologies can supplement rather than replace employee expertise through national institutions, such as the Scandinavian tradition of employee participation, and companies organised around alternative work cultures, such as the US' Lincoln Electric and the UK's John Lewis.

The case study by Kelkar (2018) provides a deeper understanding of alternative possibilities. He observes how edX, a massive open online course (MOOC) platform by Harvard and MIT, has a clear separation of labour in which software engineers build the platform while instructors deliver tech-enabled content. However, he highlights that this separation between conception and execution is not inevitable. He outlines how, in the early days of edX, the MOOC platform led to the creation of a category of professionals envisioned to have a unique combination of expertise – a subject-matter expert, a software expert, as well as a pedagogy expert – all rolled into one job role as a respectable 'edX Fellow' requiring a PhD. However, to achieve self-sustaining revenue and efficiency, edX management shifted to a platform business model in which software engineers would produce standardised software features that instructors at partnering institutions could use autonomously without assistance from edX. This meant three things. First, software engineers without pedagogical training are now the system's architects. Second, instructors could move their content online more easily, but there is limited space to shape the digital interface substantially. Finally, the rich role of the edX Fellow is now reduced to program management, with a PhD no longer a requirement. Discursive work is used

to secure the legitimacy of the platform business whereby the act of building software is "dull" and "boring" while the work of instructors is "interesting" (Kelkar, 2018: 2641). The end effect is to place the conception of educational technology in the hands of software engineers and computer scientists who lack any substantial background in pedagogy, while instructors and program managers take up the execution activities as 'takers' of the system.

As the scholarly work reviewed above shows, a distinctive feature of this period of digital innovation has been the attack on the discretion of professional workers, which is a challenge to policy assumptions of the promise of technology to create better jobs. Gill and Pratt (2008: 2) highlight that it is a "recent departure" for the capitalist system to "add well-paid and high-status workers into the group of precarious workers". Livingstone (2009, 2019) observes that professional occupations that are most commonly regarded as advantaged knowledge workers now appear to be experiencing degradation of their working conditions. While high-skilled workers are new targets, low- and mid-skilled jobs are also being remodelled through digital technologies that further reduce workers' autonomy. Earlier in the chapter, I refer to the study by López et al. (2022) on how digital technologies are used to prioritise speed and cost-efficiency rather than raise quality across the digital value chain, leading to further standardisation and deskilling of low-skilled workers in the fast-fashion industry. Other studies include the work degradation of low-skilled delivery workers organised through digital platforms, which not only lose their employee status but are being controlled by algorithms and a feedback system of management by customers (e.g. Altenreid, 2020; Gandini, 2019; Heiland, 2022).

However, consistent with the theoretical paradigm put forth in this study, it is essential to appreciate that technological outcomes are socially determined. Alasoini and Tuomovaara (2022) find evidence of skills upgrading in Finland in the last decade, with mid and lower-skilled service workers in Finland being exposed to digital technologies in everyday work. One of their hypotheses for the driver of skills upgrading is the Finnish wage-setting mechanisms that are said to be among the most rigid in the world. The quantitative study by Genz et al. (2018) of German work councils similarly shows that work councils have successfully fostered the use of digital technologies in physically demanding jobs. Studying the European steel industry, Stroud et al. (2020) observe worker resistance to digital gamification in German and Norwegian firms but acceptance in UK firms. The authors link the contrasting responses to the structuring of institutional arrangements for workers' actions. Lloyd and Payne (2019: 217) find that unions in Norway are in a position to be "pro-technology", seeing the embrace of technology as "fundamental" to the maintenance of the country's high-wage, high-welfare model. In fact, with robotics reducing the number of production workers, the union has been looking at the possibility of reshoring as labour costs become "less relevant and closeness to market becomes more important" (Lloyd and Payne, 2019: 217). However, the mechanisms for strengthening labour-power may be found not only in social institutions but also within capital-labour relationships. For instance,

in Singapore that is known for high levels of labour market flexibility, Souto-Otero et al. (2021) find that while high skills do not shield workers from labour displacement by technology, managerial perceptions of the workforce and business strategies do mitigate the substitution effects of digital innovation.

There are two concluding points from the above literature review of digital technologies and social relations of production. First, we are dealing with an issue of substantial scale as the evidence points to significant risks of digital technologies across the occupational structure affecting high-skilled, mid-skilled and low-skilled workers. This strengthens my earlier recommendation for integrating methods to capture breadth and depth in a single study. Second, we see that studies fall back on the role of institutions such as unions as the primary means to resist capital's valorisation activities. There is insufficient attention to contradictions that can exist within the capital-labour relationship to allow for other ways in which labour power can be enhanced. The findings by Souto-Otero et al. (2021) are instructive in signalling to us the factors within the capital-labour relationships that can strengthen labour power, namely business strategies and management's perception of workers. Head (2014) also describe alternative work cultures in companies such as Lincoln Electric in the US and John Lewis in the UK as a valuable counterbalance to strengthen labour power. Discovering the mechanisms by which labour power can be supported that is located within the contradictions of the capital-labour relationship is a challenging but necessary analytical activity given the scale of social inequality that might be unleashed as a consequence of the capitalists' Schumpeterian gale of creative destruction. I turn next to the analytical framework on corporate talent management that may point to new clues for the labour push-back.

Corporate talent management as a framework for social relations of production at the firm level
Here, I draw on the theoretical frameworks in Fox (1974) and a research study that I was part of, Brown et al. (2019), to describe a corporate talent management framework that will be used in the study. Corporate talent management is offered in this study as an upstream conceptual framework that captures existing managerial-employee dynamics. I suggest corporate talent management operates as a 'mental model' of production upon which firms construct their technological strategies, shaping downstream effects on labour power. I draw on the work by Fox (1974) and Brown et al. (2019) to outline a corporate talent management framework that will be used in this study. Although written in two different periods, both Fox (1974) and Brown et al. (2019) emphasise a plurality of ways for firms to structure their labour arrangements, consistent with the theoretical conceptualisation of the contradictions and tensions operating on capital-labour relations. Both authors also draw linkages to how corporate talent management mediates firms' decisions on technological deployment. The framework is, therefore, sufficiently rich to allow us to capture variance in a single study to demonstrate the social shaping of technology at the firm level.

Following Brown et al. (2019: 12), the study defines corporate talent management as the "institutional structuring of demand" of how companies organise labour. Corporate talent management reflects the positional competition within the firm regarding how the workforce is organised to deliver what needs to be done, along with the distribution of rewards. I make a distinction between *old* and *new* forms of corporate talent management. The work by Fox (1974) highlights old forms of corporate talent management, while the work by Brown et al. (2019) demonstrates new forms of corporate talent management.

Old forms of corporate talent management manifest in the trust, discretion and rewards organisations offer to workers with high levels of education and training. Fox (1974) develops a typology of organisational trust relations based on organisation structure, job design and employee relations. A defining feature is organisational discretion that relates to the extent a job requires the worker to make "necessary decisions, choices, preferences or judgement" (Fox, 1974: 57). A high discretion role gives considerable autonomy for the role occupant to exercise his or her wisdom, judgement and expertise. Crucially, the high discretion reflects the organisations' high trust in them because differences between managers and role occupants are worked through together based on assumptions of jointly shared purpose, setting up a pathway for cooperation. Fox (1974) argues that access to such roles has traditionally been associated with high levels of professional training. In contrast, low discretion roles are low trust, aimed at ensuring obedience and conformity through adherence to specific procedures and instructions that act as external controls. Such job roles typically do not require extensive education, with training aimed at securing compliance rather than exercising judgment. Those in low-discretion roles deduce that they do not have the confidence of their superiors and seek to safeguard their interests, setting up a pathway for contestation as managers seek to control workers further to achieve compliance. Fox (1974) observes that patterns of low trust tend to lead to the narrowing of task range as a strategy to discipline labour, with the technology used to secure control. Fox (1974) acknowledges two other organisational trust relations variants, as shown in **Figure 1**. Pattern 2 (low trust, high discretion) involves role occupants with high levels of education and training but whose professional autonomy is treated with caution by managers as possibly working against the firm's interest. Pattern 3 (high trust, low discretion) involves role occupants who do not have high levels of education and training but are trusted by managers for ideological reasons such as religious values.

Figure 1. Author's summary of the typology by Fox (1974)

Pattern 1	Pattern 2
High trust, high discretion *(co-operation)*	Low trust, high discretion *(atypical)*
High trust, low discretion *(atypical)*	Low trust, low discretion *(contestation)*
Pattern 3	**Pattern 4**

Fox (1974) believes that Patterns 2 and 3 are atypical. I argue that Pattern 2 is no longer atypical. Various authors have observed how the professional discretion of those with high levels of education and training is being encroached upon by organisational policies to limit their exercise of occupational discretion (Brown & Hesketh, 2004; Brown et al., 2011; Brown et al., 2019; Evetts, 2009, 2013; Livingstone, 2019). I describe this ongoing encroachment of the discretion of high-skilled workers as *new* forms of corporate talent management. Evett (2013: 786) describes the ongoing degradation of working conditions that knowledge workers face through "professionalism 'from above'" whereby "organisational objectives regulate and replace occupational control" through policies such as performance management and targets. Brown and Hesketh (2004) locate the weakening position of such high-credentialed labour in national policies of mass higher education, whereby the degree loses its quality as a badge of distinction. Organisations then use corporate talent management to stratify those they trust and reward from the rest. This is the 'war for talent' approach that is well-described in HR and management literature, in which 10-20% are seen as delivering the most value to the organisation who needs to be recruited, developed and rewarded differently from the rest (Michaels et al., 2001; Becker et al., 2009; McDonnell et al., 2017).

As outlined in various studies (Binder et al., 2016; Brown et al., 2019; Brown et al., 2021; Ho, 2009; Rivera, 2015; Sadik & Brown, 2019), high-potential talent is recruited through the convergence between HR strategies of leading employers and elite universities in the respective national contexts. Fresh graduates from these elite universities are courted and enticed with special incentives and development paths that set them apart. The system is set up based on a principle of scarcity, given that only 10-20% of an organisation enjoys such organisational privileges. Due to the structural scarcity of such individuals, companies seek to court such employees from leading competitors, increasing the labour market power of such individuals at the expense of those 'below the talent radar'. It is not that these elite talents fail to deliver value, but the mechanisms by which they do so may be linked to their selection as talent. For instance, Burkus and Osula (2011) argue that the Pygmalion effect could lead to a self-

fulfilling prophecy in which the mere designation of someone as high potential by those in authority can cause that person to become a high performer. Conversely, Moon et al. (2016) contend that implementing a forced ranking system to distinguish a group of high-potentials from others has detrimental effects on the latter's performance.

There is no let-up regarding education and training requirements in new forms of corporate talent management. Even for those 'below the talent radar', entry into jobs continues to require high credentials such as bachelor's and master's degrees, and all employees are assessed on their ability to stay up-to-date in their professional field, with learning agility as a key criterion in performance management (de Meuse et al., 2010). What has changed, however, is that the pattern of institutionalised trust and cooperation between managers and high-credentialed role occupants no longer holds. Organisational mechanisms such as targets and performance reviews are now placed on such workers, reducing their exercise of occupational discretion (Evetts, 2009, 2013). As shown by my research in Brown et al. (2019: 18), even those identified as talent feel constrained as they see themselves being embroiled in a complex process of "performing" rather than "performance". They are aware that they are constantly "judged and ranked in relation to others" by senior management. Therefore, 'war for talent' practices have the effect of disciplining professional labour where they are given space to exercise discretion in occupational areas due to their education and training but are subject to constraints at the organisational level.

My research at Brown et al. (2019) also provides initial evidence that narrow views of talent may prefigure corporate technology programmes of labour substitution or standardisation. The study quotes the view of an HR manager of a 'war for talent' firm on what was being asked of its high-skilled employees. Specifically, in career development discussions, the workforce is asked what value they bring to the company. Workers are asked to reinvent themselves so machines do not easily replace them. Here, we see that organisations' perception of values may prefigure how they set up their technology programmes regarding who should be retained. However, in the same study (Brown et al., 2019), my co-authors and I found evidence of a biotech firm in Singapore that rejects the narrow language of 'war for talent', seeing talent as plentiful and entrusting the broad proportion of its workforce with the discretion to carry out work activities as they judge fit. Conceptualised as having 'wealth of talent' practices by Brown et al. (2019), the broad proportion of the workforce possesses high-skilled credentials including PhD and Master, and enjoy high levels of professional autonomy. The culture of professional autonomy extends even to employees with weaker credentials. Due to the nature of the project, we did not ask about technological programmes within the company. However, the culture of empowerment in the company suggests a high likelihood that employees would be given the discretion to leverage digital technologies as they deem fit to augment their work, thereby preserving their labour power.

I draw on Brown et al. (2019) to describe two key dimensions shaping corporate talent management: the *framing of jobs* and the *classification of people*. The framing of jobs refers to control over 'conception' and 'execution' activities. Evidence of a strong framing of job roles is when companies adopt a centralised model of organisation control where 'permission to think' is restricted to people occupying strategically important positions in the organisation while the rest are entrusted with execution activities. A weak framing is when 'conception' and 'execution' activities reside in the same job role, allowing for 'permission to think' to be extended through the organisation. Old forms of talent management tend to suggest that conception and execution activities reside in a high-credentialed workforce. In contrast, new forms of talent management suggest that this relationship is no longer automatic. The c*lassification of people* relates to whether companies have an expansive or restricted view of the people who work for them and, hence, who is deserving of rewards and the firms' investment in developmental opportunities. A strong classification indicates a restricted view of talent to an elite group, categorised and treated very differently from other employees, creating a 'winner-takes-all' system. A weak classification of people indicates an expansive view that all or most employees are making important contributions to the company, manifesting in a distributed reward and development system. For example, 'war for talent' policies sharply categorise employees through stratified hiring policies and developmental pathways for those identified as talent, alongside the disproportionate share of monetary rewards these workers enjoy. In Chapter 3, I will outline how variables will be selected based on these two key dimensions that will allow us to capture the changing dimensions of corporate talent management.

Assessing changes to labour power

I argued earlier that the design of corporate talent management as an *upstream* analytical framework mediating technological change supports the eventual *downstream* tracking of net labour outcomes as a useful, holistic framework to support future-of-work studies. In this regard, we observe the skills dimensions of technological change as socially mediated rather than objective technical requirements. As highlighted by Grugulis (2007) and Warhurst et al. (2017), skills sit within the social relations within which skills development takes place, underpinned by relations of power and status that shape decisions on product markets and organisational strategies. Here, we can see how the analytical properties of the two dimensions of job framing and classification of people position us well to capture changes in labour-power. I draw on Adler (2004: 4-5), who highlights two essential components to skills that strengthen labour power, namely the "mastery of the complexity of tasks" and the "mastery of the relations to coordinate activity across these tasks"—the former overlaps with job framing, and the latter overlaps with the classification of people.

Job framing focuses on the unity or separation of conception and execution activities. This is a well-established paradigm in the social relations of production to understand the preservation of labour power. Its separation tends to lead to the transfer of discretion upwards to managerial authority, putting the worker in a position of weakness to exercise his or her labour power. It directly affects the autonomy a worker has over his or her craft. For Adler (2004), it places a structural constraint on labour's ability to master the complexity of tasks. For Aneesh (2001) and Bauwens (2012), it manifests in the loss of control over the worker's productive and creative capacity. Aneesh (2001) further describes aspects of practice connected with the unity of conception and execution activities, such as the space to develop a vision of the final product, an intuitive understanding or judgment of the tasks at hand, and latitude for improvisation. In this regard, the firm's valorisation strategies, such as product value-add strategies, are integral to understanding the nature of workforce discretion.

Classification of people relates to the unity or separation of the broad workforce. It relates to how some organisations may invest in some employees differently, even if all employees are broadly engaged in the same level of job complexity. These include the opportunities for some workers to participate in stretched opportunities such as global postings or the space to engage in corporate strategy development that prepares them for future opportunities. Other examples of divisive organisational policies may include patronage or apartheid systems. The effect on labour power is to weaken the opportunities for workers to master social relations and coordinate activities in the production process (Adler, 2004). Elsewhere, engaging with others in the production process has been described as relational expertise (Edwards, 2011) and boundary-crossing (Akkerman & Bakker, 2011).

The study, therefore, will use the above conceptualisations on changes to labour power based on job framing and classification of people to understand the patterns of labour upgrading or degrading within the production process. Given the changing relationships between high skills and workforce discretion, this allows us to avoid conflation with common skill categories such as education, training and wages. The changes to labour power will be assessed against three major future-of-work theories as part of constructing the pathway for the field on the social relations of production to contribute to future-of-work studies. The analytical focus is to assess the patterns of upgrading or degrading at the firm level. Below, I outline three major future-of-work theories, offering a reinterpretation of how changes in labour power will be assessed.

Future-of-work theory 1: Labour upgrading/skills-biased technological change (SBTC)
This theory relates to the use of technology to increase the skills content of jobs, leading to an increase in demand for high-skilled workers (Autor, 2015; Goldin & Katz, 2008; Autor et al., 2020). In this model, companies shed low-skilled jobs and create new jobs that require higher skills. SBTC studies typically consider the increase in wages of college graduates as evidence of SBTC. This approach is

deeply problematic given the range of studies suggesting the ongoing precarity of professional work. In particular, Brown et al. (2020) show that income inequalities have increased more within the category of the college-educated in the US than between those with and without a college education. Using our conceptualisation of changes to labour-power, I will take a different approach by analysing how firms use technology to create jobs requiring higher levels of unity of conception and execution activities and coordinating capacity across the production process.

Future-of-work theory 2: Job polarisation or 'hollowing out'
This theory relates to the strategy of using technology to replace middle-level skills relative to higher and lower skills (Goos et al., 2014; Caines et al., 2017). The basic assumption remains that companies will grow jobs that require higher skills. However, jobs that are shed are not low-skilled but rather those requiring middle-level skills, as digital technologies allow for routine cognitive work to be automated or offshored. Here, we should expect a sharper distinction between those entrusted with conception and coordinating activities versus those assigned with execution activities.

Future-of-work theory 3: Labour re-stratification
This theory relates to the strategy of using technology to change the job content and/or job contexts of high-skilled jobs to enjoy cost arbitrage (Brown, 2021). Technology is used to (a) change job content through separating conception and execution activities, with permission to think restricted to a smaller cadre of elite, and (b) change job contexts by introducing new labour arrangements such as agile working or distributed work that render some parts of the workforce significantly more precarious than others. Elsewhere, Brown et al. (2011) describe the ensuing outcomes of technological change as leading to stratified job roles as developers, demonstrators, and drones. Here, we should expect a category of high-skilled workers to pull away to focus more on conception and coordinating activities (developers), rendering the remaining high-skilled workers to experience degradation of work entrusted with execution activities (demonstrators). Meanwhile, lower-skilled workers have limited opportunities to see their work being upgraded (drone roles).

Summary
In this chapter, I have outlined the theoretical and conceptual frameworks guiding how the social relations of production are conceptualised in this study to make a decisive contribution to future-of-work studies. Specifically, I have outlined how corporate talent management can be used to analyse social relations of production at the firm level, particularly its character as a 'mental model' for how digital technology programmes are constructed to lead to changes to the division of labour in a firm. I describe how changes in labour power will be analysed, being understood as the capacity of labour to master the complexity of tasks and relations to coordinate activity across these tasks while considering

three future-of-work theories. In the next chapter, I describe the political economy of Singapore to explain why it offers crucial analytical value to the study's research questions, outlining also the 'future of work' issues emerging in the city-state.

Chapter 3 | The political economy of Singapore

Singapore in the 'fourth industrial revolution'

In this chapter, I contextualise the pro-business characteristic of the political economy of Singapore that lends crucial analytical value to the study's research questions of how a firm-level factor, corporate talent management, mediates the design of digital technology programmes and the potential ensuing effects on the division of labour. As noted in previous chapters, Singapore offers a business-friendly environment with a flexible labour market that makes the technological redesign of jobs and the redeployment and retrenchment of the workforce relatively unproblematic at the firm level. An analysis of firm-level factors would be challenging in countries such as Finland and Germany, where institutions intervene in the social relations of production within firms directly through in-firm work councils and institutions like minimum wage (Genz et al., 2018; Hanley, 2014). In contrast, Singapore is business-friendly, with minimal intervention in firms' direct activities. This characteristic of being business-friendly has made Singapore one of the key global hubs of digital innovation activities, thereby offering a highly dynamic environment for studying firm-level digital activities and anticipated impact on the division of labour.

I first outline the specific characteristics of the capital-labour relationship in Singapore that gives its unique quality of being pro-business yet offering high levels of human development, paying attention especially to the role of the Singapore state that give businesses flexibility in their activities while putting in place redistributive measures to share economic growth across the broad citizenry. I explain how this character of being simultaneously pro-business and pro-citizen leads to successive systemic crises, which have been resolved relatively unproblematically in previous phases of Singapore's economic development but pose significant challenges in the current period. I explain the policy discourse and expectations attached to digital innovation and how it has been upheld as a key strategy to sustain economic and social mobility by creating high-quality jobs. The contrasting perspectives and tensions between policy expectations and societal concerns provide the backdrop against which we will compare and contrast actual firm-level activities outlined in subsequent chapters.

The origins of Singapore's business-friendly regime (circa 1965 – 75)

The origins of the business-friendly regime in Singapore lie in the pattern of state formation of the newly independent Singapore state in 1965 (Doner et al., 2005; Sidel, 2012). As has been observed in the literature on social relations of production, the state typically plays a vital part in the maintenance and reproduction of capital (Jessop, 1977). When Singapore emerged from British rule in the 1960s, it was among the few newly independent countries that stood out for fully embracing its colonial past. It

abandoned initial attempts to undertake import-substitution industrialisation, seeking instead to reintegrate into the capitalist economy through export-oriented industrialisation. A common descriptor of the political economy of Singapore is as a developmental state in which the state uses its resources and influence to direct economic activities through public-private cooperation, balancing economic growth and social development (Doner et al., 2005; Johnson, 1982; Low, 2001; Sung, 2006). Indeed, coupling economic and social development has been a vital aspect of the Singapore developmental state that upgraded itself from a developing economy to an advanced economy status within a short post-independence history of 50 years.

Doner et al. (2005) argue against the conventional argument that the developmental states in Singapore, South Korea and Taiwan result from state autonomy from popular pressures. Instead, the authors indicate that the states' "impressive capacities actually emerge from the challenges of delivering social payments to restive popular sectors under conditions of extreme geopolitical insecurity and severe resource constraints" (Doner et al., 2005: 327). Indeed, the government that took power in newly independent Singapore comprised English-educated elites who faced a significant challenge to connect with the electorate that has been described in rather unsympathetic terms as a "largely Chinese-educated, economically discontented, and communist infiltrated electorate" (Lau, 2003: 9). Indeed, the British colonial policy required the introduction of democratic politics as a pre-requisite for independence, leading to Singapore emerging as one of the sites with the highest level of labour mobilisation in Southeast Asia (Doner et al., 2005). During the period leading up to independence, unemployment was high at 9-10% (Singapore Prime Minister's Office, 2015). Compounding the challenge was the announcement in 1968 by the British government of an early withdrawal of British troops whose activities were contributing to 20 per cent of the Singapore economy and whose presence had been a significant source of local jobs (Singapore Prime Minister's Office, 2015). With the initial plan to be integrated into the Malaysian economy abandoned, the political elite in Singapore saw little scope for a country of just 580km^2 to pull off an import-substitution strategy, changing tack to integrate into the capitalist economy through export-led industrialisation fully.

Distrust between the English-educated political elite and the Chinese-educated business elite led to policies favouring large transnational companies (TNC) as strategic partners to make export-led industrialisation successful. This makes state-sponsored capitalism in Singapore atypical, as developmental states typically nurture a local dependent business class, such as the chaebols in South Korea and home-grown SMEs in Taiwan. The newly-elected political elite in Singapore could easily marginalise the once powerful Chinese-educated business elite as the latter's fortunes were built on state licenses issued by the colonial government for growing particular produce such as pepper and tin (Rodan, 1993; Sidel, 2012; Trocki, 2006). Once withdrawn, the lifeline of their wealth was cut off. The activities of foreign TNCs received extensive state support for their ability to create large numbers of

jobs to ameliorate the economic discontent of the electorate. Under the government's Economic Expansion Incentives Act, the corporate tax rate was reduced from 40 per cent to 4 per cent on approved manufacturers' export profits for up to 15 years (van Elkan, 1995). Meanwhile, the relative fortunes of the local Chinese business community were allowed to decline, with the share of GDP contribution by locally-owned businesses declining from a high of 65% in 1962, just before independence, to 13% by 1980 (van Elkan, 1995). Until today, Singapore's local business community remains SME-dominated, supporting the value-chains of foreign TNCs or over-represented in the less profitable domestic sector (Bhaskaran & Chiang, 2020; Sadik et al., 2023a).

Indeed, job creation for local employment became the cornerstone of the Singapore state policy for decades to balance economic and social interests. Culturing the right foreign investors was a complex, long-drawn process entrusted to public servants at the Singapore Economic Development Board under the close watch of the political leadership (Lee, 2000). It is crucial to the political leadership that Singapore is seen as pro-business. In a geopolitical climate where labour mobilisation was generally high across the developing world, Singapore's political elite believed signs of ill-discipline of labour would lead to investors' pulling out and make the public policy of job creation untenable (Lee, 2000; Rigg, 1988). Government documents show that from 1963 to 1968, Singapore lost 35,000 to 45,000 manhours each year to strikes (Singapore Prime Minister's Office, 2015). Indeed, the disciplining of labour was widely held among the political elite as an economic as much as a political strategy, and this was achieved through a range of carrot-and-stick strategies (Lee, 2000). First, Singapore's vibrant labour unions were muzzled through laws that made organising labour and expressing labour discontent through activities such as strikes very complex. Specifically, the passage of the Employment Act and Industrial Relations Act in August 1968 "encouraged longer collective agreements, and prevented unions from striking on matters regarding promotion, recruitment, transfer, retrenchment and assignment of tasks" (Singapore Prime Minister's Office, 2015). This was a crucial bargaining chip for attracting foreign direct investment (FDI). The labour unions came to be encapsulated within a tripartite framework – of the state directly mediating relations between employer and employees. Second, access to social goods such as housing, education, and medical care is channelled through the compulsory national savings scheme, the Central Provident Fund (CPF), which requires citizens to participate in waged labour. Here, about 30% of wages are directly transferred from employers' payroll system into workers' CPF accounts that could be withdrawn to pay for housing, medical expenses and children's education, a regulation that continues to be in force today. Participation in waged labour thus becomes crucial for a citizen to access life's necessities in the city-state. These social payments became successful 'wealth-sharing mechanisms' that improved living standards substantially (Doner et al., 2005: 346). More crucial for our purpose is that although these social goods were delivered through wage employment, they existed outside of firm-level activities, allowing for the relative insulation of capital from broader social pressures. Finally, the Singapore state invests significantly in education and

training to prepare the workforce for economic life (Sung, 2006). Indeed, the developmental state of Singapore has been so successful at job creation that it meant citizens' social needs are well taken care of as long as they participate in waged labour (Doner et al., 2005).

Multiple systemic crises and their resolution (circa 1975 -2010)

An inevitable consequence of a system set up with the contrasting objectives of being pro-business while having broader social redistribution goals is the emergence of successive crises. Again and again, the developmental state had to reinvent the economy in new ways as wages grew, making the country less attractive to businesses. This put the continued sustainability of social payments to the population at risk. It creates systemic pressure on the state to direct new economic activities into higher-value-added areas to sustain social goals.

The newly independent Singapore state began with an export-oriented industrialisation strategy by attracting labour-intensive factories producing items such as matches, fish hooks and mosquito coils. By the mid-1970s, unemployment had fallen dramatically to about 3 per cent, but wages were rising. State policies were used to restructure the industrial base towards more capital- and skill-intensive manufacturing activities, such as semiconductors and pharmaceuticals, to generate more value-added from the same labour (Rigg, 1988; van Elkan, 1995). Tax holidays now applied to enterprises that were investing in manufacturing technologies. During this period, Singapore emerged as the world's leading producer of hard disk drives. This economic upgrade sustained the country's shared economic prosperity. However, by the mid-1980s, Singapore was losing its competitive advantage in terms of being a cost-effective manufacturing hub, leading to the country tail-spinning into its first deep recession in 1985. A range of strategies was applied, such as a regional initiative in which foreign TNCs would retain their skill-intensive headquarters in Singapore while shifting their labour-intensive manufacturing facilities to cities in Batam and Johor (Singapore Prime Minister's Office, 2015). Investments in public R&D were expanded to strengthen the knowledge base of Singapore's manufacturing sector that, now included wafer fabrication, clean energy, chemicals and biomedical sciences that emerged alongside important job-creating industries such as electronics and precision engineering (Singapore Prime Minister's Office, 2015).

However, a bolder move was needed as the upgrading into advanced manufacturing could no longer pull off quality job creation in the high numbers required. A decision was made to build a strong modern services sector while keeping manufacturing at 20-25 per cent of the economy, thereby running the country on two engines of growth (Singapore Prime Minister's Office, 2015). A financial sector promotion department was set up in 1997 and subsequently extended to other knowledge-intensive sectors, including accounting, law, advertising, consultancy and infocommunications, the foundations for making Singapore the global business hub it is today.

The question is the extent to which successive industry restructuring was managed equitably for labour. In countries such as Germany and Finland, federal regulations require extensive negotiations to ensure the equitable evolution of occupations. In Singapore, the removal of labour could proceed relatively unproblematic due to the Employment Act and Industrial Relations Act of 1968, which outlawed industrial strikes due to retrenchment and assignment of tasks, among others. The primary mechanism for redistributing opportunities was through state policies that successively groomed new categories of workers through the education sector to meet the new industry profile (Sakellariou, 2003). Thus, the shift to a capital and skills-intensive manufacturing sector was coupled with strengthening technical education by setting up vocational institutes and polytechnics (Chong, 2014). The subsequent shift to the services economy was coupled with the expansion of university education that grew progressively from fewer than 10 per cent of a birth cohort having access to undergraduate education prior to the 1990s to 20 per cent by 2000 and 25 per cent by 2010 (Singapore Ministry of Education, 2017). In this transition, existing workers often see their fortunes plummeting. For instance, workers with primary and secondary, who were the bulk of the factory workers drawing middle wages in the 1980s, were displaced in the shift to advanced manufacturing, being transited into the hospitality and cleaning sectors in low-wage jobs such as hotel chambermaids and janitors (Koh, 2007). However, new categories of workers were created among the younger population through higher education policies, facilitating intergenerational mobility such that the average Singapore family would not be seen as worse off. Indeed, the creation of the modern services sector catapulted the proportion of high-wage occupations in the economy in absolute and relative terms. Specifically, the proportion of professional, managerial and executive (PME) positions among resident workers grew by three times from 10.8 per cent of the total workforce in 1991 to 31.1 per cent of the workforce by 2011, thereby uplifting the socio-economic fortunes of a significant proportion of Singaporeans (Sadik et al., 2023a). In particular, the increase was powered by the sharp rise in the proportion of degree-wielding managers. This group expanded its representation in the managerial category from 21.4 per cent in 1991 to 61.7 per cent in 2011. Such a hefty increase in opportunities at the top end of the labour market over just 20 years showed that the developmental state was successful yet again in combining economic and educational upgrading to deliver socio-economic outcomes (Sadik et al., 2023a).

A more socially problematic lever employed by state policies to facilitate industry restructuring was the use of non-citizen workers. Local discourse describes two categories of such workers: ' foreign talent' employed in high-skilled work and 'foreign workers' employed in unskilled and semi-skilled work (Appold, 2005; Sadik et al., 2023a). For decades, 'foreign talent' existed in small numbers, mainly through the expatriate workforce of foreign TNCs. Foreign workers, however, started being allowed into the country in the 1970s to meet the high demand for labour in a fast-growing economy that has continuously operated on full employment after the initial chaotic post-independence years (van Elkan,

1995). It then became a strategy to discipline the workforce, as shown below in a speech delivered at a national day celebration by Mr Lee Kuan Yew, the founding Prime Minister of Singapore:

> As citizens [Singaporeans] can afford to pick and choose. Now, it is time to bring in work permit holders in the middle ranges of the skill and salary scales. Better quality foreign workers can put the spurs on the hinds of Singaporeans. Liberal immigration policies of skilled and disciplined workers for permanent residence with the view to later citizenship, will make Singaporeans sit up and try harder. (*Government of Singapore, 1980)*

Indeed, Singaporean workers were seen as 'fussy'. They were disciplined through the import of unskilled and semi-skilled foreign workers who earned lower wages than their Singaporean counterparts and were willing to put up with precarious work conditions. Capital benefitted from this arrangement. The beneficiaries were local businesses that could sustain their cost-efficient business models and their clients, foreign TNCs, who benefitted from lower subcontracting costs. The presence of these foreign workers, by and large, depressed the wages of less-educated workers previously earning middle wages. This meant their working conditions did not keep up with the broader patterns of work upgrading seen in the wider economy (Bhaskaran & Chiang, 2020). However, social aspirations were not affected in the broader scheme of things as the massive expansion of the services sector since 1995 created a significant number of high-wage jobs that the younger generation of workers would benefit from, as outlined earlier.

The more significant challenge, however, comes from the need to expand the 'foreign talent' workforce. The multi-segments of the services sector that needed to be created from finance, infocommunications, accounting and legal services required a more extended gestation period of skills development, leading to the expansion of the category of high-skilled foreign talent (Chia, 2011). The number of high-skilled 'foreign talent' was significantly smaller than the proportion of low and mid-skilled 'foreign workers' at just 13 per cent of the total foreign workforce in 2011 (Sadik et al., 2023a). However, high-skilled 'foreign talent' competed directly with locals in terms of access to desirable jobs, housing and public transport, unlike low-skilled foreign workers who were housed in dormitories and performing work that Singaporeans generally consider as "dirty, dangerous and demanding" (Debrah & Ofori, 2001: 281). Eating directly into the social payments that Singaporeans had been enjoying led to a strong push-back from citizens at the ballot box. The ruling party that had governed Singapore uninterrupted since 1965 suffered its worst electoral performance in 2011 (Tan, 2011; Tan, 2014). The developmental state's perpetual risk of systemic crises strikes again.

The digital economy as an opportunity (circa 2011 till present)

The aftermath of the 2009 global financial crisis and the strong push-back from citizens at the ballot box in 2011 necessitated a rethink of the industrial policy. The Prime Minister's Office outlines the direction of the next phase of economic upgrading:

> As Singapore recovered from the financial crisis after 2009, it became clear that we were now a maturing economy, and no longer a low-cost venue. Growth had slowed to about 4.5% annually in the 2000s. Since Singapore's labour force cannot keep growing indefinitely, continued economic growth would have to depend on raising productivity. In this phase, Singapore sought to elevate itself into a global city. *(Singapore Prime Minister's Office, 2015)*

According to government documents, being a 'global city' entails a greater concentration of economic hub activities, including regional head office functions, research, and advanced manufacturing (Singapore Prime Minister's Office, 2015; Singapore Economic Development Board, 2022). Singapore is well-placed to ride on Asia's dynamic growth in many ways. Foreign TNCs like GSK, Infineon, Accenture, and new digital heavyweights like Google, Twitter, and Facebook see Singapore as a strategic location for their Asian expansion. Likewise, a new breed of Asian TNCs like Huawei, Alibaba, Samsung and Hyundai see Singapore as a gateway for global expansion. The escalating geopolitical tensions between the United States and China enhance Singapore's appeal as a geo-strategic location for bolstering resilience in supply-chain operations. The co-location of the world's top businesses is expected to lead to spillover business expenditure in auxiliary activities. **Figures 2-5** indicate EDB's anticipated estimates of fixed direct investment, total business expenditure, value-add and job creation between 2013 and 2022.

Figure 2. Fixed asset investment commitments in Singapore (2013 – 2022)
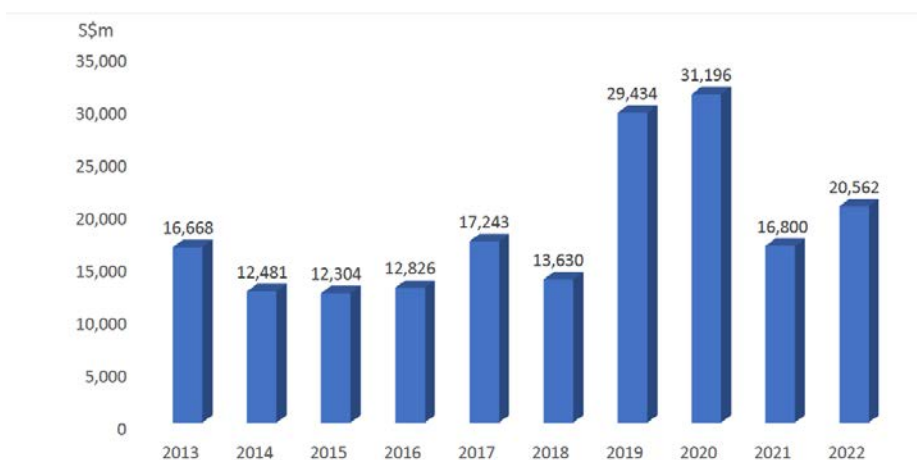
Source: Singapore Economic Development Board, 2023

Figure 3. Total business expenditure investment commitments in Singapore (2013 – 2022)

Figure 4. Value-add expected to be generated in Singapore (2013 – 2022)

Figure 5. Jobs expected to be created in Singapore (2013 – 2022)

Digital innovation is viewed as a key driver of economic upgrading, which is of significant interest to this study. **Figure 6** describes the breakdown of the job roles expected to be created by project type in 2022. A substantial 60 per cent of projected job growth in the economy is anticipated to be fuelled by activities centred on data, digitalisation, and automation.

Figure 6. Job roles expected to be created in Singapore in 2022 by project type

Innovation projects. Most are research scientist and engineer roles. An increasing number of projects are also seen in sustainability-related fields such as material researcher/engineers, carbon capture, utilisation and storage (CCUS) specialists, product designers

Advanced manufacturing projects. Job roles include process engineers and technicians, manufacturing data engineers, additive manufacturing engineers

Jobs: 17,113

Hub and business services projects including headquarters and centres of excellence. Job roles are driven by data, digitalisation, and automation expertise such as UI/UX designers, cybersecurity engineers, digital supply chain analysts

Source: Singapore Economic Development Board, 2023

Indeed, Singapore's quality of being business-friendly with minimal interference in firm-level activities makes it an ideal location for businesses to carry out their digital activities. For instance, German semiconductor giant Infineon announced in 2020 its plan to make Singapore its global AI innovation hub, whereby AI solutions are tested out in Singapore before being rolled out in other parts of the company (Infineon, 2020). Singapore's place in Infineon's global digital plan reflects the relatively unencumbered way digital innovation can take place in Singapore, given its flexible labour market and low trade unionism within the workplace, which would have been challenging to pull off at Infineon's headquarters in Germany. This was the case for Hyundai as well. Its headquarters in South Korea hosts one of the country's largest unions, with a culture of protracted disputes between management and labour union representatives that have made carrying out shopfloor changes difficult (The Korean Economic Daily, 2023). It is, therefore, no surprise that in 2020, Hyundai announced a significant investment of S$400 million in an innovation centre in Singapore as part of its strategy to be a global leader in smart mobility (ChannelNewsAsia, 2020).

In addition to being attractive to big firms, for the first time, government policies sought to attract technology start-ups, seeing this strategy as vital to anchor potential big businesses in Singapore early. Like the early strategy of attracting FDI, an incentive scheme was designed to get start-ups worldwide to set up their headquarters in Singapore to root them early before they get big. All startups receive attractive tax breaks for the first three years of their operation, with their tax rate reduced to 0% for the

first S$100,000 of income, while the rate for corporate taxes is capped at 17 per cent (Bottega & Indolino, 2017). Furthermore, numerous tax deductions are available that promote R&D and productivity improvements by startups, thus further reducing the effective tax rate. Singapore also has no tax on capital gains, so start-up investors enjoy the full gains when an entity is sold. The Singapore government has also set up an equity fund to fund Singapore-based startups with strong IP and global potential in deep technology areas that typically take more extended incubation periods to create innovative processes (Government of Singapore, 2023a). Additionally, Singapore has made it easy for ultra-high net worth individuals and family offices to set up in the city-state that offers access to funds to promising start-ups. This support ecosystem makes Singapore attractive to regional start-up founders, including India, Vietnam and Indonesia. By 2022, Singapore emerged as the leading startup ecosystem in Asia-Pacific, with 12 unicorns and more than 3,800 tech-enabled startups (The Business Times, 2022).

The final piece involves addressing the vulnerabilities in the SME sector, offering a tailored set of incentives to SME businesses to encourage digitalisation, thereby amplifying their productivity and facilitating internationalisation. The SME sector is crucial to upgrade, making up 99% of companies and employing two-thirds of the workforce. In contrast to advanced economies like Germany and Finland, where SMEs typically account for around 6 per cent of the Gross Domestic Product (GDP), Singapore's SMEs have contributed less than half to the overall GDP in the last decade (Sadik et al., 2023b). An enterprise development grant has been set up to offset 5 per cent of the transformation costs of Singapore's SMEs. The SMEs Go Digital programme was also launched to guide SMEs to adopt advanced digital solutions to grow their business. It includes a scheme for SMEs to hire chief technology officers as a service (CTO-as-a-service) to bridge the capability cap (Infocomm and Media Development Authority of Singapore, 2023).

Going 'global' in the Singapore context, therefore, means embracing digital innovation as a crucial strategy for economic upgrading. The approach is to fire on all cylinders by deliberately cultivating business and digital transformation activities across all firm types – traditional and emerging big businesses, as well as SMEs. The political elite expects the strategies to create better jobs to sustain Singapore's socio-economic development and meet Singaporeans' aspirations. However, there are clear signs of strains that I will outline in-depth in the next section.

'Job quality' challenge for the Singapore developmental state

In this current phase of socio-economic upgrading through a 'global city' strategy with a heavy focus on digitalisation, there is growing evidence that the Singapore developmental state is struggling to facilitate simultaneous economic and social upgrading, as the very jobs seen to facilitate upgrading are either difficult to access or at a higher risk of being displaced. Here, I articulate four significant

challenges for job creation in Singapore's ongoing transition to the digital economy, namely, 1) the problematic access to top jobs; 2) the multi-dimensional challenge of growing professional jobs; 3) the aspiration challenge of non-graduates, and 4) the SME job upgrading challenge.

The problematic access to top jobs

The first challenge is the problematic access to top jobs. As policymakers solidify efforts to bolster business and job opportunities through an industrial policy aimed at evolving the city-state into a global city driven by a digital economy, a notable challenge is surfacing — the Singaporean system is encountering difficulties in fostering the development of corporate leaders and top specialist talent. EDB, the organisation that played a crucial role in Singapore's remarkable job creation and local job access over the past five decades, is now expressing concerns about a skills mismatch. Ironically, this concern is raised when Singapore's investments in higher education are at their peak, with the city-state also home to two of Asia's leading universities. For instance, the EDB noted in 2017 that the creation of 2,000 digital economy jobs in Singapore over the next four years might not entirely go to Singaporeans, as more efforts were needed for Singaporeans to gain the skills to take up these jobs (The Straits Times, 2017). In 2019, the managing director of EDB, Chng Kai Fong, publicly discussed the chasm. He said:

> We are working hard to bring the best jobs to Singapore, whether it is an engineering centre from Stripe and Indeed.com, to regional HQs of MNCs running global product lines out of Singapore…We should be seeing more Singapore corporate leaders. But the numbers have been few…The jobs and HQs are here. Our education system is rigorous. Our people are internationally exposed. *(Chng, 2019)*

For the first time therefore, the developmental state of Singapore is failing to connect economic upgrading and job creation with local employment. As my colleagues and I have outlined in Brown et al. (2019), the reason for this is structural. Access to elite jobs typically follows a recruitment pattern of being recruited from elite universities. These selected talents are provided with a differentiated pathway from the rest of the workforce early in their career as part of the grooming to leadership positions, with stretch opportunities and socialisation with senior leaders (Binder et al., 2016; Brown et al., 2021; Ho, 2009; Rivera, 2015; Sadik & Brown, 2019). The identification of elite talent is signalled by national systems of talent hierarchy rather than international league tables of university ranking (Sadik & Brown, 2019). Singapore's schooling system is highly tiered at the primary, secondary and junior college levels, in only as much as to allow the political elite to cream the crop, who are then sent to top universities worldwide through state scholarships and form the pipeline of talent for top senior civil service positions leading to ministerial positions (Ye, 2015). Indeed, all prime ministers in Singapore, including the candidates-in-waiting to take over from the current prime minister, have been

educated at top foreign universities in the US and the UK as part of state scholarships. Upon graduating, they build an extensive career in the civil service before running for political office. Given the decisions in the early years of the developmental state to prioritise the foreign business sector at the expense of the local business class, there is little need for an educational pathway to groom the business elite. Without the need to groom the political or corporate elite, local universities in Singapore are mainly undifferentiated towards mass provision of higher education. The net effect is the lack of structures of opportunity for Singaporeans to take on top corporate leadership roles, even though many are deemed highly competent (Brown et al., 2019).

The issue of Singaporeans' poor access to top jobs has emerged as a source of public anxiety. It boiled over in 2020 due to the recession triggered by the COVID-19 pandemic. During this period, the city-state experienced its sharpest contraction in employment over the last two decades. Specifically, the number of retrenchments per 1000 employees more than doubled from 5.1 per cent in 2019 to 12.8 per centin 2020 (Singapore Ministry of Manpower, 2021). The government found itself questioned over the country's dependence on 'foreign talent' for top positions, especially in the lucrative banking and info-communications sectors that enjoyed a boom during the pandemic. In the banking sector alone, government statistics indicated that the total number of senior positions in the financial services sector grew from 3,900 in 2014 to 5,900 in 2019. However, most positions (56 per cent) were held by non-locals (Monetary Authority of Singapore, 2020). There was also a concentration of 'foreign talent' coming from countries like India that are seen as inexplicable, given that Singapore's education system has typically been regarded as significantly more reputable than India's educational institutions. As my co-author and I explained (Sadik & Brown, 2019), India has a highly stratified university sector with a clear demarcation of elite institutions, namely the Indian Institutes of Technology (IITs) and the Indian Institutes of Management (IIMs) whose graduates are courted and incentivised by large TNCs to join them as part of elite campus recruitment schemes. These individuals receive preferential development, including stretch postings, which allow them to develop a portfolio of experience for top corporate jobs. There is little recognition in the policies of the Singapore government that the mismatch in talent flow results from positional competition within firms through corporate talent management. The policy assumption continues to be that locals lack the skills that can be plugged through education and training programmes. Expensive public-funded training programmes are being put in place to get Singaporeans to be hired by big companies. However, with Singapore now part of the global circuit for the placement of strategic leaders, it is even more demanding for local talent to distinguish themselves.

The multi-dimensional challenge of growing and retaining professional jobs in Singapore
The second challenge is growing the proportion of professional jobs. While these jobs do not carry the same prestige as the elite jobs outlined in the preceding section, they remain crucial as they signify the baseline expectations of highly educated Singaporeans. By 2019, degree-holders formed about 37.6 per

cent of the resident workforce, up from 27.7 per cent in the preceding decade (Sadik et al., 2023a). The proportion of degree holders in the local workforce is expected to grow, with public university places increased to 50% per birth cohort in 2020 (Singapore Ministry of Education, 2017). There is, therefore, pressure to generate sufficient professional jobs that qualified locals can access.

Unfortunately, despite a significant surge in managerial and professional positions for locals between 1991 and 2011, a similar trend has not been observed in the last decade (**Tables 2 & 3**). **Table 2** shows that job creation between 2001 and 2011 was powered by the growth of managerial and professional jobs. However, the sharpest growth since 2011 was in the associate professionals and technicians (APT) category, which has never been associated with degree qualifications. **Table 3** shows that the proportion of degree holders flowing into APT increased the fastest between 2011 and 2019.

Table 2. Rate of increase of selected occupations for resident workforce in Singapore (1991 – 2019)

Occupations	1991	2001	2011	2019	Ratio (2001/1991)	Ratio (2001/2011)	Ratio (2011/2019)
Managers	4.8%	9.2%	13.9%	12.6%	1.92	**1.51**	0.91
Professionals	6.0%	12.4%	17.2%	20.9%	**2.07**	1.39	1.22
Associate Professionals and Technicians	12.0%	17.8%	17.6%	21.9%	1.48	0.99	**1.24**

Source: Sadik et al. (2023a)

Table 3. Rate of increase of degree qualification among selected occupations in Singapore for resident workforce (1991 – 2019)

Occupations	1991	2001	2011	2019	Ratio (2001/1991)	Ratio (2001/2011)	Ratio (2011/2019)
Managers with degrees	21.4%	36.5%	61.7%	71.0%	**1.71**	**1.69**	1.15
Professionals with degrees	62.8%	68.9%	79.5%	80.6%	1.10	1.15	1.01
Associate Professionals and Technicians with degrees	12.6%	19.9%	33.0%	40.0%	1.58	1.66	**1.21**

Source: Sadik et al. (2023a)

It was not just the local workforce that saw a sharp increase in the APT category. Similarly, between 2011 and 2019, the foreign workforce associated with mid-skilled occupations, namely the 'S Pass', similarly enjoyed the sharpest increase across the three main foreign work pass categories (**Table 4**).

Table 4. Proportion of the foreign workforce by employment pass type (2011-2019)

Type of Employment Pass	2011	2019	% change
Employment Pass (Associated with managerial and professional occupations)	13%	14%	+1%
S Pass (Associated with associate professionals, technicians and clerical occupations)	10%	14%	+4%
Work Pass (All other occupations)	76%	70%	-6%

Source: Sadik et al. (2023a)

The trends suggest that Singapore's transition into a 'global city' phase coincides with a deceleration in quality job creation, particularly in professional roles that the local population considers 'good' jobs. Such jobs have become relatively scarce compared to earlier periods. Indeed, using job postings data, Chia et al. (2023) show that degree and skills requirements rose in tandem between 2012-2017 in Singapore, with the skills requirements changing the fastest among professionals.

The challenge of growing professional jobs is expected to be more acute. Singapore is located in a region with lower-cost economies, such as India, Vietnam, Malaysia, and the Philippines, where higher education policies have created a highly qualified workforce. Some of the professional jobs in Singapore may be performed remotely by these workers. The potential challenge of remote work has been significant enough to prompt the Singapore Ministry of Manpower to require companies to report on the feasibility of remote work for certain jobs. The results are shown in **Figure 7**, which shows a substantial risk for professional and managerial jobs to be done remotely compared to other types of occupations. Given that professional work has traditionally served as a pathway for social mobility in Singapore, it raises questions about the capacity of the Singapore developmental state to generate an increasing number of high-skilled jobs consistently.

Figure 7. Distribution of Singapore job vacancies that can be done remotely by occupational categories
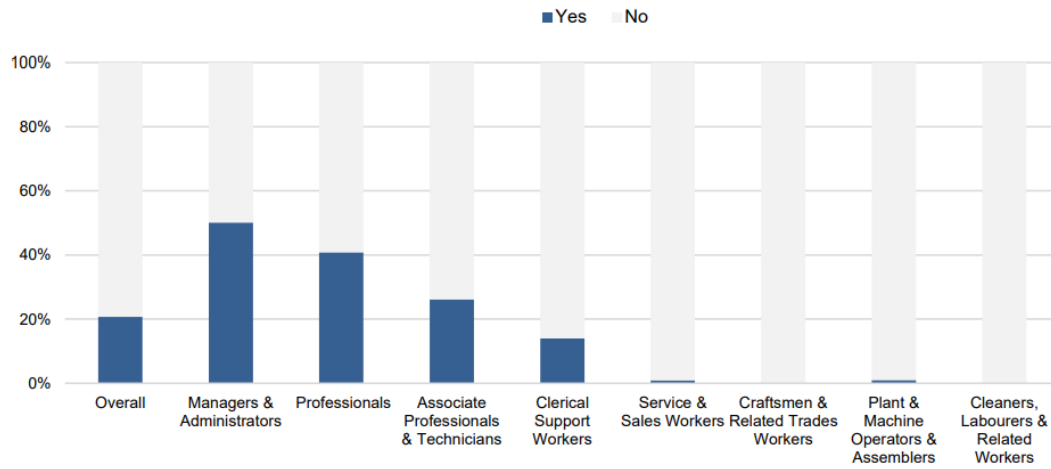
The aspiration challenge

The third challenge is meeting the aspirations of non-degree holders. Educational upgrading policies have typically been used as a complementary strategy to economic upgrading to resolve previous systemic crises of the Singapore developmental state, with outstanding outcomes. Between 1991 and 2011, educational upgrading was the main driver of occupational upgrading, with a massive change in the profile of managers with degree qualifications, from 21.4 per cent in 1991 to about 71.0 per cent by 2019 ((Sadik et al., 2023a). This has raised expectations within the broader workforce regarding access to university education to achieve social mobility. The Singapore government launched SkillsFuture as an educational reform to moderate credential competition. SkillsFuture aims to offer alternative pathways to provide Singaporeans with the "opportunities to develop their fullest potential throughout life, regardless of their starting points" (Government of Singapore, 2023b). The focus of the reform is to shift away from a frontloading model of educational opportunities towards providing the workforce with more opportunities across their working lives instead, such as access to short courses, career conversion programmes and workplace learning (Tan, 2017). It is a new approach towards social mobility in Singapore that runs contrary to the credential-based upgrading strategy used to resolve previous crises. A senior politician described SkillsFuture as Singapore's "most important economic and social strategy in the long term" (The Straits Times, 2019). The vision is to support the empowerment of individuals regardless of their starting qualifications, with lifelong education provisions to allow them to rise to the top of their fields and respond nimbly to industry and job disruptions across their working lives.

Unfortunately, the SkillsFuture movement has not yet led to the equitable distribution of opportunities between degree and non-degree holders, as hoped for by the Singapore government. As shown in **Table**

3, graduate fortunes are declining in Singapore, with more flowing into associate professional and technical job roles. This process has led to the bumping down of opportunities for non-degree holders. It is creating a conundrum for policymakers in the higher education sector. Specifically, degree qualifications no longer confer the same set of opportunities for labour market success enjoyed by degree holders in previous generations. However, the degree qualification remains a vital screening mechanism, without which non-degree holders do not even stand a chance (Chia et al., 2023).

The job upgrading challenge

The final challenge is jobs in the SME sector. The increasing weakness of the TNC sector to power quality job creation in the numbers required to sustain social aspirations would not be so problematic if the SME sector can transform itself to upgrade jobs given that it employs 70% of the workforce in Singapore at present (Sadik et al., 2023b). As noted earlier in the chapter, Singapore's post-independent strategy of preferential cultivation of TNCs led to a significant weakening of local enterprises. Using 2012 PIAAC data to compare Singapore SMEs with those in OECD countries, Freebody et al. (2017) found the following:

- Wage difference between SMEs and non-SME jobs in Singapore was much greater than the OECD average;
- SME jobs in Singapore had substantially lower skills use than non-SMEs compared to OECD countries and
- SME jobs in Singapore offered lower job autonomy than non-SMEs compared to OECD countries.

From a job upgrading perspective, there is plenty of scope for Singapore SMEs to redesign their jobs and close the gap with the non-SME sector. However, the SMEs' share of the GDP stagnated between 2012 and 2022 (**Figure 8**). This suggests a sustained structural weakness of the SME sector to narrow the wage difference with the non-SME sector. A study I led on the business transformation of Singapore SMEs in 2021 found that digital activities were driving a substantial portion of SMEs' transformation. While such activities increase skill requirements to some extent, they do not necessarily enhance job autonomy and discretion that will strengthen SMEs as choice employers vis-à-vis the non-SME sector (Sadik et al., 2023b).

Figure 8. Share of nominal value added by enterprise type in percentage
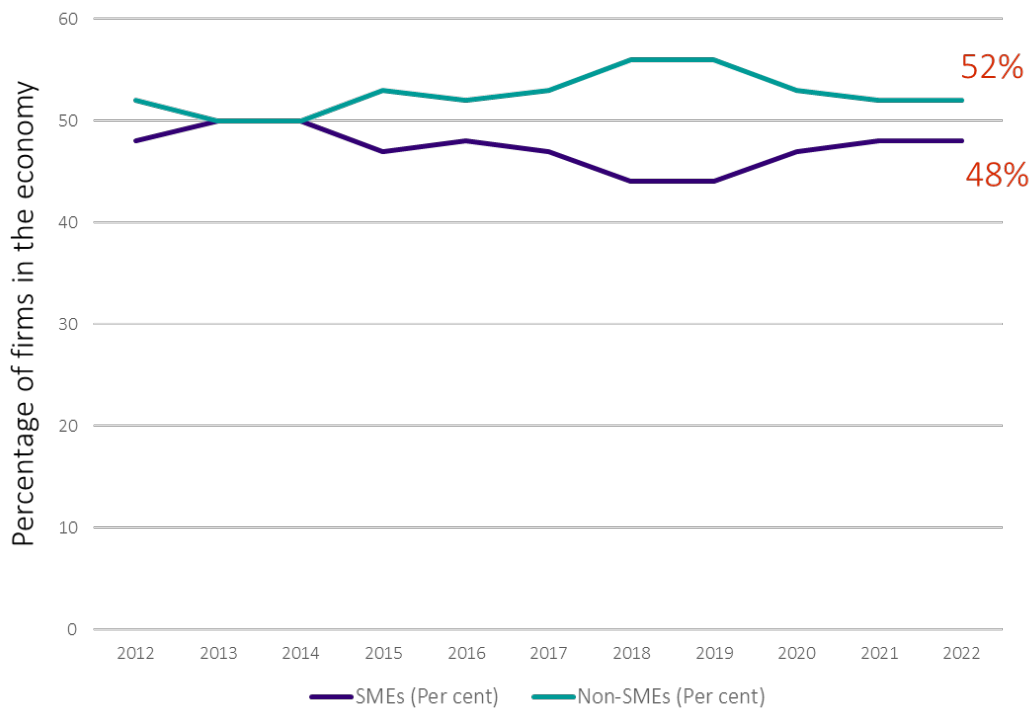
Source: Sadik et al., 2023b

Labour pushes back again

Reviewing the above trends, the current period of being a 'global city' (2011 to present) is tied to weakening opportunities for sustaining the occupational upgrading of Singaporeans. In the 2020 Singapore general election conducted at the height of the COVID-19 pandemic, the ruling party extended their 2011 poor performance, losing an unprecedented number of seats to the opposition. This was observed to be unusual as the Singaporean electorate historically tended to be risk-averse during times of crisis (Er, 2021). What was especially detrimental was that the cabinet minister-cum-labour chief was voted out of parliament in a stunning defeat at the hands of a relatively unknown opposition team in an electoral ward made up of young families. Singapore politicians have since recognised the underlying decline in national optimism. It is worth reproducing here an extract from a speech of a senior politician, Mr Tharman Shanmugaratnam:

> There has been a downdraft in optimism, and that together with growing insecurities at work, are the fundamental challenges we have to address. We have to not just treat this as a trajectory that's given, but ultimately, to alter the trajectory and recreate the sense of society that the future will be better…We must avoid the stagnation of the middle that is plaguing many societies. The stagnation of the broad middle class, both blue collar and white collar (workers), and we

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must ensure that we preserve and rebuild the spirit of solidarity. Everyone must advance together. (Human Resources Online, 2 November 2022)

He assesses that blue-collar and ordinary white-collar workers are at risk in the ongoing digitalisation process. He adds:

> We're already seeing the risk of blue-collar workers and ordinary white-collar workers stagnating in their pay earlier in life, compared to professional workers, is very high. We have to find ways in which we provide conveniently and in a relevant way, equal opportunities to quality work for every segment of the workforce. (Human Resources Online, 2022)

Here, we see the assumption of skills-biased technological change (SBTC) dominating the policy, thinking that the most at risk are non-professional workers who stand to lose vis-à-vis professional workers. To redress these inequalities, lifelong learning through the SkillsFuture movement would provide non-professional workers with the skills to reinvent themselves through what Mr Tharman Shanmugaratnam described as 'constant upskilling and reskilling, and regular injects of learning through life' (Human Resources Online, 2022). Here again, we see educational reform being peddled as a solution to support social dislocations as part of the structural changes to the economy and ongoing digital activities of industries and firms. However, there is a qualitative difference compared to educational reforms in earlier periods. The upskilling described here is no longer linked to credential-based upgrading, which was common in previous phases of Singapore's development. Instead, it is about cushioning the less skilled, so they do not fall too far behind those with high skills. In other words, high-skill jobs are thought to remain protected in Singapore even though some temporary adjustments can be expected as the industry restructures in Singapore's transition to a 'global city' strategy. Once the 'global city' strategy fully matures alongside the new educational reforms under SkillsFuture, social progress will be able to be sustained. It is this expectation of skills-biased technological change that we will examine in the subsequent empirical chapters, whether digitalisation activities in firms in Singapore in 2021 in a more mature phase of the 'global strategy' would lead to the shedding of low-skilled jobs and the creation of high skilled jobs, and the extent to which this is shaped by corporate talent management.

Summary

In conclusion, this chapter describes the character of Singapore's developmental state, which seeks to strike a delicate balance between being pro-business and pro-citizen, leading to recurring systemic crises. In each crisis, the solution was to upgrade the economy to generate higher-skilled jobs. Quality job creation is matched by policies of educational upgrading, creating new categories of workers who benefit en masse, thereby sustaining a sense of social progress in Singapore. The most recent systemic

crisis between 2011 and 2012 led to another process of economic upgrading through the 'global city' strategy driven strongly by digitalisation. This strategy puts Singapore on the global circuit as the location of choice for the world's top businesses, with a significant push towards digital activities. However, there is an emerging mismatch in terms of quality job creation. Firstly, top jobs being created are not as easily accessible to locals compared to previous periods. Second, the creation of managerial and professional jobs has slowed considerably in the last decade compared to previous periods, and are at greater risk of being offshored. Meanwhile, jobs at the lower end of the labour market that are dominated by SMEs have not been upgraded sufficiently. There is a sense that these are temporary aberrations that are inevitable as the Singapore economy restructures into a global city. Digital activities, therefore, continue to be encouraged by the political elite and enjoy insulation from the broader societal pressures as the government uses the educational lever to manage difficult workforce transitions in a race between education and technology (Goldin & Katz, 2008). This character of the Singapore developmental state renders it a highly valuable political economy context for examining the interplay between corporate talent management, digital programmes and the potential impact on the division of labour. In the next section, I will describe the methodology for the study.

Chapter 4 | Methodology

Theory elaboration and method development

The study has the twin goals of theory elaboration and method development. In terms of theory elaboration, it aims to extend from the original study (Brown et al., 2019). Specifically, it seeks to elaborate on how corporate talent management, as a form of social relations of production in a firm, mediates organisational decisions on how technology is being thought of, constructed and deployed to maintain or change an existing division of labour. In terms of method development, it seeks to establish the extent to which corporate talent management can be a leading indicator of upcoming changes to the division of labour at the aggregate or national level.

By theory elaboration, I follow Fisher and Aguinis (2017: 438) in defining it as a "process of conceptualising and executing empirical research using pre-existing conceptual ideas or a preliminary model as a basis for developing new theoretical insights". As observed by Lee et al. (1999: 164), theory elaboration is distinct from theory generation, which "occurs when the inquiry's design produces formal and testable research propositions," and from theory testing, which "occurs when formal hypotheses or a formal theory determines the study's design". While there are interdependencies between theory generation, theory elaboration and theory testing, Van Maanen et al. (2007: 1146) describe theory elaboration as the balance between "the logic of discovery" that is the focus of theory generation and the "logic of validation" that is the focus of theory testing. Theory elaboration aims to expand the contours of a theory and, therefore, nurture "a logic of discovery" to set it on the path for greater accuracy through the "logic of validation". Fisher and Aguinis (2017: 452) suggest that theory elaboration is germane in cases where the explanation provided by a theory is "controversial, ambiguous, or inadequate". In this study, I seek to build up on the vital groundwork laid in the original study (Brown et al., 2019) on the influence of corporate talent management on technology strategies that impact labour. The theory is *controversial* as corporate talent management is rarely linked to technological decisions on labour use in the academic literature on the future of work in the 'fourth industrial revolution' in any substantial manner to date. The theory is also *ambiguous* and *inadequate*, as the relationship between corporate talent management and technological decisions has not been specified adequately. By employing a strategy of theoretical elaboration, we can enrich and extend the corporate talent management theory framework to examine its relationship with technology deployment.

By method development, I follow Mackenzie and Knipe (2006: 6) in defining it as advancing "systematic modes, procedures or tools used for collection and analysis of data", in this case, to forecast

the future of work. As observed in Chapter 1, many studies that seek to anticipate the future of work in the 'fourth industrial revolution' are drawn up based on technological possibilities. Insufficient attention has been spent on using firm-level processes to anticipate the future of work, even though it has been acknowledged that the impact of technology on work can be observed more easily at the firm level. For instance, Moniz et al. (2009: 16) observe that "company level data provides a good entrance to the issue of changes in work". The theory put forth in the original study by Brown et al. (2019) delves into the nuanced ways in which corporate talent management influences firms' technology choices, subsequently reshaping the division of labour within organisations. This, in effect, posits corporate talent management as a leading indicator to anticipate the future of work, which is novel.

Theory elaboration and method development are thus complementary in this research study as we seek to understand the relationship between corporate talent management and the future of work opportunities at both the firm and national levels.

Singapore remains the site of investigation for continuity with the original study I was part of (Brown et al., 2019), consistent with the goal of theory elaboration. In the comparative study conducted in China, India, and Singapore, 20 transnational corporations (TNC) and six small and medium-sized enterprises (SMEs) and start-ups in Singapore were interviewed about their corporate talent management strategies. The study found the dominance of narrow corporate talent management approaches in which talent was typically 10-20 per cent of the workforce. The dominance of narrow corporate talent management approaches in TNCs was anticipated, but it was surprising that SMEs and start-ups had the same approach across the three Asian countries. Given their small size and nimbleness, we had expected these SMEs and start-ups to operate with a broader view of talent. Consistent with our expectation, none of the respondents indicated that they would increase the number of high-skilled employees in Singapore. On the contrary, the respondents highlighted discussions of using technology to substitute high-skilled jobs. Of interest is also that the study found one SME in Singapore that operated with an expansive talent model, but there was limited discussion on its technology strategy. This study, therefore, seeks to uncover more evidence of the relationship linking corporate talent management, technology strategies and changes to the division of labour. As discussed in Chapters 1 and 3, Singapore is important analytically because of its business-friendly environment in which the state has established clear structures to insulate the firm's labour decisions. This helps us achieve analytical clarity on the impact of firm-level technology programmes on the broader workforce, which would be less possible in countries such as Finland and Germany, where institutions intervene in the social relations of firms directly through in-firm unionisation and related institutions.

Mixed methods as the research design

Given the research goals, mixed methods are selected to capture variance in how digital technology programmes may be designed according to different approaches in corporate talent management, with different patterns of changes to labour power. Mixed methods research is typically defined as research that involves collecting, analysing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon (Leech & Onwuegbuzie, 2009; Tashakkori & Creswell, 2007).

Here, given the contentious views in scholarly debates, I would like to specify the study's position on mixed methods research. Four contrasting positions on mixed methods research can be discerned. The first position rejects mixed methods research in its entirety with the view that the ontological and epistemological underpinnings of qualitative and quantitative methodologies exist in two separate paradigms such that mixing them makes a study invalid (Gage, 1989; Howe, 1988). In this line of argument, quantitative approaches are said to be drawn from an understanding of an independent reality or positivism. In contrast, qualitative approaches are drawn from an understanding of reality that is knowable only through the social construction of meanings or interpretivism. The ontological and epistemological differences are insurmountable, so mixed methods research is untenable. This has been dubbed the 'paradigm wars in the social sciences' that many scholars have criticised as unhelpful (Maxwell, 2011; Song et al., 2010). A second position that emerged is that of pragmatism, which states that no method is perfect, and therefore, the researcher needs to go with "what works" (Howe, 2004: 53-54). The researcher, therefore, has the flexibility to draw from the toolboxes of qualitative and quantitative research (Maxcy, 2003; Teddlie & Tashakkori, 2012). This view has been criticised as eclecticism and lacking rigour (Denzin, 2012; Morse & Niehaus, 2009). A third position is mixed methods as a 'third paradigm' that needs to develop its own tools and approaches to blur the methodological boundaries between quantitative and qualitative methods. Strategies include deconstructing validity as an operative term (Guba & Lincoln, 2005) and developing emergent methods (Hesse-Biber & Leavy, 2008).

Explicit or implicit in the first three positions is a recognition that a qualitative/quantitative divide exists, which the fourth position rejects firmly. Scholars advancing the fourth position include Bergman (2008: 14), who describes qualitative and quantitative approaches as "heterogeneous families of methods" that cannot be characterised as distinctly as commonly assumed. Lin (1998) highlights that qualitative research has always had positivist and interpretivist traditions. Babone (2016) notes that although quantitative research is typically associated with positivist approaches, it was equally possible to design a quantitative study based on an interpretivist approach. Bazeley (2018: 334) likewise agrees, extending further that the "meaning of everything, including numbers, is theory-based and all research is

interpretive". Hacking (1999) shows how particular phenomena, such as mental illness and child abuse, can be usefully seen as both natural and social constructs.

The study identifies most closely with the fourth position – that it is for the researcher to establish a study's ontological and epistemological position, which can be applied equally to both quantitative and qualitative methods. Decisions on the ontology and epistemology of a study are usually drawn from researchers' understanding of their reality as it shapes their practice, including the decisions they make to scope the research problem and the methods and type of data to be collected (Bergmann, 2008). The fourth position in mixed methods research suggests that it is equally essential that a study's ontological and epistemological aspects be considered in relation to the nature of the research problem. In this regard, the study of corporate talent management, as a form of social relations of production, is best approached from a lens of interpretivism – of a social world of meaning on how decisions are made to organise the workforce determined by social processes. Drawing on the fourth position, there is no tension in applying interpretivist approaches to quantitative and qualitative methods in a single study. In fact, scholars such as Babone (2016) have outlined certain tenets for interpretive quantitative studies, such as analysing data from multiple perspectives and integrating measurement and modelling into a more holistic process of discovery.

An interpretivist approach across the quantitative and qualitative investigation unites the research design. This allows us to advance the goals of theory elaboration and method development concurrently. Specifically, mixed methods allow us to combine the generalising power of the quantitative model that gives a sense of the scope of the phenomenon with the intensity and richness in details that the qualitative model offers (Lin, 1998). Following the typology developed by Leech and Onwuegbuzie (2009), the study adopts a fully mixed sequential equal status design. This means that the qualitative and quantitative research are mixed across the stages of the research process, occurring sequentially but with both elements given approximately equal weight. In the words of Turner et al. (2017: 244), both the quantitative and qualitative methods "stand more or less on equal footing". In terms of sequencing, Cronholm and Hjalmarsson (2011) advise that the researcher should commence with a quantitative approach when there is a good pre-knowledge of the phenomenon. Given that the broad contours of the theory have been described by Brown et al. (2019), it will be useful for this study to begin with a quantitative investigation. The results then inform the design of the qualitative investigation. Qualitative and quantitative findings are then triangulated, leading to an integrated set of results.

Setting up the quantitative investigation
The quantitative investigation draws on a national-level dataset, the Business Performance and Skills Survey (BPSS). The BPSS, completed between January and December 2016, is a large national face-to-face employer survey of 3,801 commercial establishments with ten or more workers in Singapore.

The BPSS develops and establishes a system of workplace indicators for diagnostic, policy and practical purposes. Indicators include (i) workforce composition metrics such as the proportion of degree holders and professionals; (ii) the establishment's productive system that included market conditions, value add strategies and technology strategy; and (iii) management's perception of workers' performance and talent indicators. BPSS researchers explained that the survey was designed so that indicators may be understood in isolation and in relation to each other (Tan et al., 2018). This is useful for our purposes. The survey respondents were either the business owner or a senior manager of the establishment with a minimum of 1 year's tenure. Establishments were selected for sampling from a registry of live companies managed by Singapore's regulatory body, the Accounting and Corporate Regulatory Authority (ACRA). The protocol for data collection entailed the interviewer approaching the business entity at the address listed in the sampling frame and checking that the entity was eligible and willing to participate. If the establishment was non-eligible or refused to participate, the interviewer checked the eligibility of the nearest neighbouring commercial establishment before inviting them to participate as a replacement firm. The BPSS team are my colleagues at the Institute for Adult Learning, and they share that the design of the BPSS survey took inspiration from the UK's Employer Skills Survey and the European Skills and Jobs Survey, hence having a high level of fidelity with constructs that are well-established in international studies of jobs and skills.

There are four areas in BPSS of interest to us, namely, 1) variables on talent to capture the existing construct on the classification of people; 2) variables on skills demand and discretionary effort; 3) questions on the impact on labour with the introduction of technology in work processes; and 4) contextual variables such as productive system and workforce composition that will add depth to our investigation.

A significant weakness in using the BPSS data is that it was collected in 2016, before the COVID-19 pandemic. It would be reasonable to expect that the business environment has evolved and that the patterns observed in the dataset might be less relevant or valid. Additionally, there are variables of interest to this research study that BPSS did not capture. For instance, BPSS surveyed employers on the extent of workforce reduction from technological change but not if they had increased workers. For questions on technology, there is no specification of the technologies used, for example, mechanisation versus digital technologies. However, I take the view that the BPSS survey remains useful and will take us way ahead than if we have not used the survey given the wide range of variables of interest to us. This reflects a judgment that a researcher must make in the face of imperfect data. To mitigate the weakness of the dataset, the study will leverage the qualitative investigation to assess the stability of the patterns of corporate talent management and how they shape digital strategies. **Table 5** summarises the key variables in BPSS of interest to the study.

Table 5. Key variables in BPSS of interest to the study

Concept	Construct	Variables
Corporate talent management	Talent	• % of workforce adding significant value to the company • % of workforce with high potential • % of workforce for future promotion • % of workforce that is difficult to replace within 3 months if they resigned
	Skills demand	• % of jobs with university degree required • % of jobs with at least 3 years of industry experience • % of jobs with induction training of more than a week • % of jobs with frequent learning or development activities
	Discretionary effort	• % of workforce going beyond the call of duty • % of workforce taking up duties of others without being asked • % of workforce putting in more hours than expected • % of workforce making helpful suggestions
Technology	Technology use	• Extent of being an early adopter of technology • Significant changes in tech-related work processes
	Workforce reduction	• Extent of reduction in number of workers
	Increase in skills	• Change in skills & training needs of new recruits (low, mid & high levels)
Other workplace context indicators	Demographics	• Sector, domicile, size
	Business strategy	• Always customise products and services • Competing for premium quality vs price competition • Frequently take many risks • Job design and technology focus more on maximising workflow efficiency than workers' skills
	Workforce engagement	• % of workforce attrition (including by occupations) • % of senior appointments were internal promotions • Opportunities for non-PMEs to form their own teams • Sharing of business info with non-PME workers
	Rewards	• % of workforce that receive company-level bonuses • % of workforce that receives individual performance-related pay • % of workforce that receives share options for employees • % of workforce with opportunity for international assignments
	Business performance	• Change in profitability • Change in sales/revenue • Change in market share

Clustering is the selected methodology for analysis of the BPSS data, given the objective of the study to identify the patterns of corporate talent management across the Singapore economy and its relationship to technology strategies and labour outcomes. Clustering is a process of grouping variables into groups or clusters so that objects within a cluster are similar but dissimilar to objects in other clusters. In terms of its utility, clustering has been described variously as an "explorative data analysis technique used for investigating the underlying structure in the data" (Govender & Sivakumar, 2020), "the art of finding groups in data" (Kauffman & Rousseeuw, 1990: 1), and a method with "the ability to rearrange the data thereby helping researchers to be more aware of pattern recognition and discovery" (Fonseca, 2013: 403). As Everitt et al. (2011) observe, classifying a set of objects is not like a scientific theory and is best assessed in terms of its usefulness rather than whether it is 'true' or 'false'. An inspiration for applying the method to firms is the study by Holm and Lorenz (2015), which uses the clustering technique to map out the key patterns of work organisations in Europe using the European Working Conditions Survey.

Decisions on the dimensions to cluster the data were made in relation to how to validate and elaborate on the two constructs of corporate talent management in the original study by Brown et al. (2019), namely the classification of people and the framing of jobs. Three key constructs have been selected from the BPSS study, namely talent, skills demand and discretionary effort that are outlined below:

Talent construct: The talent construct in the BPSS matches closely to the construct of the classification of people in the original study by Brown et al. (2019), or what I describe as new forms of corporate talent management tied to organisational policy on who is valued and rewarded. Here, the focus is understanding senior managers' assessment of who is valued in the company and for what reasons. Questions were asked on (a) talent as performance (% of workforce considered as adding significant value to the establishment); (b) talent as potential (% of workforce considered as showing promise to take on more significant responsibility in the future); (c) talent as promotability (% of workforce who are candidates for future promotion); and (d) talent as hard to replace (% of workforce considered as being hard to replace within three months if they resigned). Combined, they provide adequate measures of the different dimensions in which people may be classified in the company, including current performance, future performance, and business continuity. Of interest is that initial sensing of the BPSS data shows that while respondents took a generous view of the performance of their workforce at 40-60% on average, the proportion regarded as high potential, promotable and difficult to replace shrunk significantly to around 20-30% of the workforce. In **Figure 9**, the chart shows that while there is a somewhat uniform distribution in terms of establishments' response to the current performance of their staff, the distribution is skewed to the right for the proportion considered as high-potential talent. This possibly suggests a forced distribution, with most establishments in Singapore keeping their talent pool

at around 10-20 per cent of their workforce. This is consistent with the finding in the study by Brown et al. (2019) of the dominance of a narrow view of talent in Singapore.

Figure 9. Distribution of establishments' response to different 'talent' categories
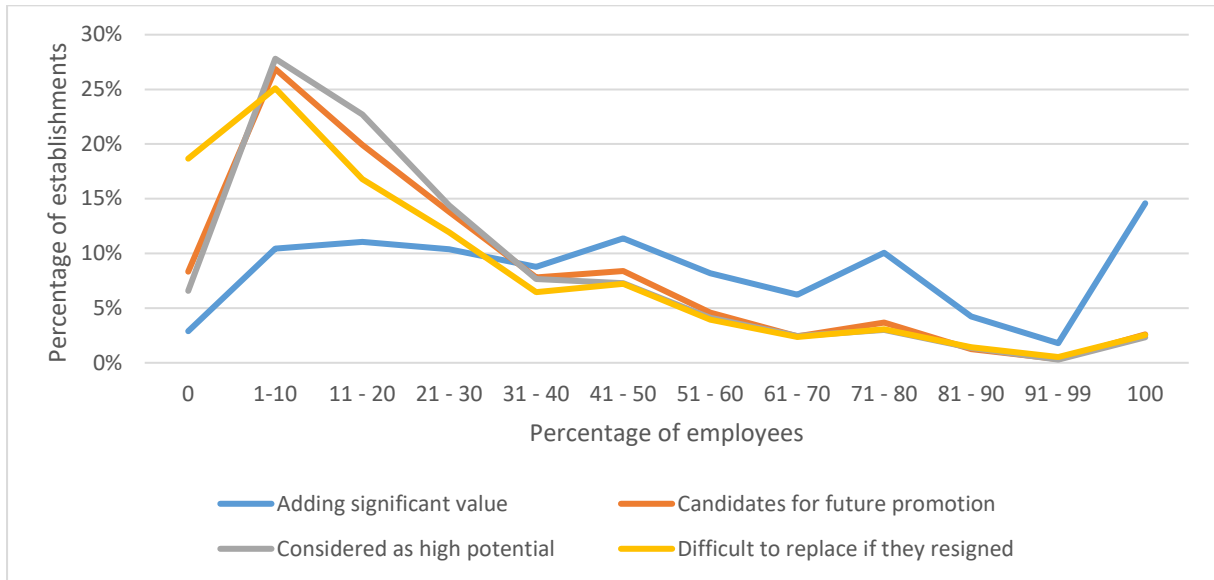
Skills demand: BPSS researchers define the skills demand construct as "reflect[ing] the complexity of the jobs available in establishments by offering a broad overview of the technical and cognitive skills they require" (Tan et al., 2021: 16). What is being measured is the skills and training required of a job, rather than that possessed by employees who may not have the skills and training, or who may have exceeded the requirements. The variables are (a) initial training (% of jobs with university degree required); (b) induction training (% of jobs with induction training of more than a week); (c) industry experience (% of jobs with at least 3 years of industry experience); and (d) additional professional development (% of jobs with frequent learning or development activities). Specifically, the higher the skill levels required for the job, the more likely it is that it is harder to separate conception and execution activities, suggesting a weak framing of jobs. This has been the assumption of classical studies such as Fox (1974) that highlight employees with higher levels of professional training will likely be given more discretion to perform their tasks. However, the popularity of corporate talent management practices based on a narrow view of talent ('war for talent') has been observed to occur at a time of mass higher education as a way of distinguishing between elite and non-elite talent in corporations' reputational games to be seen as being able to attract the best of the best (Binder et al., 2016; Brown et al., 2021; Brown & Hesketh, 2004; Ho, 2009; Rivera, 2015; Sadik & Brown, 2019). The changing theoretical understanding of skills demand makes it an essential and useful construct for clustering.

Discretionary effort: Discretionary effort has been described as "the voluntary effort that employees contribute to the organisation above and beyond what is required to keep the job and remain functional" (Lloyd, 2008: 22). It has been conceptualised as a behavioural measurement of employee engagement that both employees and employers could report. When reported by senior managers of their workforce, it is often interpreted as an observable assessment of the workers' performance (Macey & Schneider, 2008; Barrick et al., 2015). Discretionary effort thus could co-relate to the BPSS variable of talent as performance (defined as % of workforce adding significant value to the establishment). However, performance appraisal is often biased (Bellé et al., 2017). An alternative understanding is that the construct of discretionary effort may represent management's perceptions of the workforce that underline the social relations within a firm. Given our goal to map the patterns of corporate talent management as a measure of social relations, discretionary effort is thus an important construct to add to the clustering. The related variables in the BPSS survey were related to management's views of how employees exerted voluntary effort, namely (a) % of workforce going beyond the call of duty, (b) % of the workforce taking up duties of others without being asked, (c) % of workforce putting in more hours than expected; and (d) % of workforce making helpful suggestions.

As listed in **Table 6**, 12 variables were used for clustering**.** Agglomerative hierarchical clustering using Ward Linkage was used to classify groups of establishments based on these variables. Ward's method has generally been favoured as a method of clustering based on empirical studies of hierarchical clustering methods (Everitt et al., 2011). Before clustering, dimensions were standardised to have a mean of zero and a standard deviation of one.

Table 6. BPSS variables for agglomerative hierarchical clustering using Ward Linkage

Concept	Construct	Variables
Talent management (immediate relevance)	Talent	• % of workforce adding significant value to the company • % of workforce with high potential • % of workforce for future promotion • % of workforce that is difficult to replace within 3 months if they resigned
Talent management (potential relevance)	Skills demand	• % of jobs with university degree required • % of jobs with at least 3 years of industry experience • % of jobs with induction training of more than a week • % of jobs with frequent learning or development activities
	Discretionary effort	• % of workforce going beyond the call of duty • % of workforce taking up duties of others without being asked • % of workforce putting in more hours than expected • % of workforce making helpful suggestions

The clustering analysis produced a dendrogram with various cluster options that are illustrated in Chapter 5. The same chapter provides a rationale for determining the cut-off at four clusters (Clusters 1 – 4). These four clusters are then used to understand the clusters' co-relations with aspects such as the general demographics, business strategy, technology use and financial performance. As a mixed-method study, the quantitative findings of each cluster is subjected to further investigation in the qualitative study. Therefore, the actual naming of each cluster will only be undertaken at the end of the integrated analysis. The full set of quantitative findings are reported in Chapter 5.

Designing the qualitative investigation

The qualitative investigation builds on the quantitative investigation to examine how corporate talent management and technology strategies are connected, across 30 firms. In sampling these 30 firms, a two-pronged strategy was employed. The first strategy involved selecting firms from each of the four clusters identified in the BPSS quantitative analysis (Clusters 1 – 4). A total of 15 firms were chosen through this method.

The second strategy involved sampling the remaining 15 firms from the researchers' contacts. There are several reasons why this study opts to include firms beyond those identified through the BPSS clustering technique. On the one hand, it is impossible for the qualitative interviews to be used to test the internal validity of the typology directly. This is because this study only has access to the firms' names, not the actual BPSS respondents. There is thus no way of validating the findings from the BPSS survey as the response for the qualitative interviews may come from a different senior manager of the firm. In addition, it has been five years since the BPSS survey. Therefore, testing the internal validity of the four major clusters is not possible, given that the business context of firms may have evolved. On the other hand, there is greater merit in testing the utility of the four major clusters across a broader section of the corporate sector. If the BPSS clusters were accurate, we should expect to see evidence of such companies in the wider corporate population. Therefore, the sampling for the qualitative interviews includes both BPSS and non-BPSS firms.

In each of the 30 firms sampled in the qualitative investigations, interviews were planned with one senior manager and two employees. The interviews with employees are critical to corroborate the responses of senior managers with experience on the ground, thereby giving us greater confidence in the interpretation of the data.

It is important to note that qualitative data collection occurred during the COVID-19 pandemic, which constrained our access to firms. The research team could only contact companies that had a website or whose senior managers were on LinkedIn. Government-regulated safe distancing measures did not

allow us to visit firms directly. Calling up firms was also tricky as work-from-home measures meant that general telephone enquiries were often suspended. The data collection method was mainly conducted via Zoom to abide by government regulations. However, when the government allowed workplace interaction, respondents were allowed to be interviewed via Zoom or face-to-face. Most still prefer a Zoom interview, usually for convenience or because of cautious company policy that restricts workplace interactions. In total, 77% of respondents were interviewed via Zoom.

BPSS firms (n=15) were recruited first by identifying a senior manager through the corporate website or LinkedIn and sending an email invitation to them to participate in the study. These were usually the Chief Executive Officers (CEO) or the Human Resource (HR) managers. Upon their acceptance of the invitation, a set of guiding questions was provided, and an interview was set up either via Zoom or in person based on their preference. At the end of the interview, they were requested to nominate two employees for the career journey interviews.

Non-BPSS firms (n=15) were recruited using the researchers' professional and personal contacts. A process was put in place to assist with sampling the 15 non-BPSS companies using approximate measures to assess their relevance to the four clusters. The process included informal discussions with those who know the practices of the firms, a review of the websites and media articles on the firms, and an analysis of workforce profiles through LinkedIn and Glassdoor reviews. The purpose of the assessment process was not to establish the firms' corporate talent management model before data collection but rather to be purposeful in ensuring that the non-BPSS sample capture a wide variety of corporate talent management models as much as possible. Upon identification of suitable firms, a request for interviews was sent to senior managers that followed the same process as BPSS establishments.

The acceptance rate for interviews by senior managers was significantly higher for non-BPSS firms (1:2) than for BPSS firms (1:7). This is understandable as direct contacts would have more trust in the researchers and, therefore, be more supportive of the study. Employee interviews, on the other hand, had a different logic. Firms that took a more generous view of their workforce were three times more likely to nominate employees for career journey interviews than firms that took a restricted view of their workforce, regardless of whether they were recruited through the researchers' contacts or otherwise. We took advantage of the openness of firms operating with a generous view of their workforce by asking for more employees for interviews to allow us a deeper understanding of the firm's social relations. The openness of the senior managers of such firms was striking to the extent that a few of those nominated ex-employees or employees who were serving their notice. In keeping with the objectives of the qualitative investigation to capture emerging trends, we allowed the senior managers

to nominate employees who did not reside in Singapore. This allowed us to have a pulse on changing workplace practices, such as the use of remote labour as part of firms' digital strategy.

All employees interviewed were contacted separately via email or phone once the senior managers provided the contact. A series of steps was taken to secure their consent and ensure they felt safe sharing their experience. Specifically, the study was explained to them, including their right to withdraw participation. In addition, it was highlighted to the employees that the interviews were confidential, and their managers would not be informed of their responses in any way. Our assessment of the employee interviews was that despite being nominated by their managers, the employees' responses were frank and candid, with elements of criticality that showed their trust in the research process.

A data collection instrument based on semi-structured interviews was used for interviews with senior managers and employees. Semi-structured interviews provide a balance between the strictly worded questions used in surveys or questionnaires and the lack of set questions used in unstructured interviews (Bryman & Bell, 2011). A semi-structured interview instrument was used based on "conversations with a purpose" (Burgess, 1984:102). The focused discussion gives flexibility to the researchers to ensure that core areas are discussed, yet allowing the researchers space to pursue new lines of inquiry as a result of the respondents' answers (Bryman & Bell, 2011).

The themes in the data collection instrument for senior managers were drawn up based on the research questions, literature review and initial quantitative analysis. This allows the study to probe aspects not covered in the original study by Brown et al. (2019) but which the quantitative analysis signalled as important. For instance, the quantitative analysis found that companies with a generous view of talent had the highest attrition rate, which was an unexpected finding that required unpacking. The qualitative investigation also encompassed additional facets such as the business model, learning modalities, managerial strategies, and technology strategy.

The themes in the data collection instrument for employees were drawn up based on the areas related to their sense of control over the unity of conception and execution activities in their role, as well as their ability to coordinate activities across the production process. These include, for instance, the extent to which employees felt they could exercise discretion in their work, their sense of being valued by the company, and their involvement in technology activities.

All the respondents except one allowed us to record the interviews. Audio recordings were sent for transcribing. The transcript was then sent to the respondents for their review. Generally, respondents did not have many corrections to their transcripts. One senior manager respondent did not allow us to

record the interview due to the firm's organisational policy. The respondent consented to notes being taken. A set was prepared and sent to the respondent for review. **Table 7** summarises the data collected.

Table 7. Summary of qualitative respondents

	BPSS (15 firms)			Non-BPSS (15 firms)		
	No. of firms	**Managers**	**Employees**	**No. of firms**	**Managers**	**Employees**
^Cluster 1	4	4	5	15	18	35
^Cluster 2	3	3	4			
^Cluster 3	4	6	2			
^Cluster 4	4	4	2			
Total	**15**	**17**	**13**	**15**	**18**	**34**
Via Zoom	-	**14**	**10**	-	**13**	**26**
Via phone call	-	-	-	-	-	**1**
Face-to-face	-	**3**	**3**	-	**5**	**7**
Total no. of firms:				30		
Total no. of interviews (managers & employees):				82		
Total no. of manager interviews only:				35		
Total no. of employee interviews only:				47		
Proportion of total interviews via Zoom:				77%		

^ Refers to the four clusters derived from the BPSS cluster analysis in the quantitative component of the study. The qualitative study samples were taken from each of the four BPSS clusters (n=15) and researchers' own contacts (non-BPSS, n=15). Clusters 1-4 are not named yet as they are subjected to further interrogation in the qualitative component of the study to develop the final archetypes.

In terms of analysis, every company is treated as a case. Each case is first analysed in relation to the senior manager's response, followed by triangulation with the employees' responses where available. Each case is then compared with other cases through a process of constant comparison, which leads to an assessment of which set of companies is more like one another and dissimilar to the rest. The outcome of the qualitative investigation is akin to a manual clustering of all 30 firms into four archetypes with a description of their broad practices that include corporate talent management and product and technology strategy. The following section outlines how the study's quantitative and qualitative findings are integrated.

Designing the integration of findings

Although data integration is said to be at the heart of mixed methods research, it has been highlighted that the substantial integration of findings in mixed methods research is seldom achieved (Fielding, 2012; Woolley, 2009).

The most common strategy for integrating findings is triangulation, sometimes described as convergent triangulation (Turner et al., 2017). Proponents of convergent triangulation have stressed that greater validation for a theory is produced when it has been subject to multiple tests using different methods that yield consistent results (Denzin, 1970; McGrath, 1995; Molina-Azorin, 2007; Torrance, 2012). Tashakkori and Teddlie (2003: 40), therefore, highlight the quality of consistency in terms of "consistency of multiple conclusions with each other, consistency of interpretations across people, and distinctiveness of the interpretations from other plausible ones'' as an important quality of assessing data integration in mixed methods research.

However, a criticism of convergent triangulation is the threats to validity inherent in the methods when combined (Fielding, 2012). In other words, to consider findings valid only if they are consistent across two methods is to undermine the validity of the separate methods. Specifically, a major finding in one method that is not supported in another will be excluded from the final set of findings using the convergent triangulation process. Fielding (2012), therefore, suggests taking a more balanced approach by considering the range of ways in which findings in one method might co-relate with findings in another. He recommends analytical strategies that include synthesising findings across two methods if they are equivalent and commensurate or launching conceptual investigations when there are contradictory findings, as an empirical resolution is unlikely to be effective due to the nature of the methods used. Kelle and Erzberger (2004) describe a similar approach to data integration by analysing three alternatives at the level of results: whether the qualitative and quantitative results converge, complement or contradict. Finding the term 'integration' unsatisfactory, Mason (2006: 9) suggests the term "meshing or linking" as more appropriate by using "dialogic explanations that allow the distinctiveness of different methods and approaches to be held in creative tension".

Turner et al. (2017) reframe this issue by proposing that the choice of data integration method is primarily influenced by the theoretical and methodological objectives of the mixed-method research rather than the specific type of data integration. They suggest that convergent triangulation is appropriate, for instance, if the research objectives are theory testing and advancing precision in measurement. On the other hand, holistic triangulation is appropriate if the objective is to advance theory development through authenticity. Considering that theory elaboration is the primary objective of this research, the study will utilise the process of holistic triangulation. This approach permits the exploration of distinct perspectives or angles that one or more individual methods can offer, enriching

the theoretical development. When there is qualitative and quantitative data convergence, the study will employ triangulation to elaborate on the underlying mechanisms, drawing upon the interpretive approach. In cases of divergence, a constant comparison of hypotheses and alternative explanations is applied. This approach enables the development of the most plausible explanation when disparities arise. A layered approach to data integration is adopted, commencing with an analysis of corporate talent management patterns, progressing to an exploration of the broader context within firms, and culminating with an assessment of the digital strategy's potential impact on the division of labour. This data integration strategy facilitates a systematic approach to triangulate the findings holistically. **Table 8** summarises the approach taken.

Table 8. Layers in data integration strategy

Data integration strategy	Layers
Holistic triangulation	Layer 1 – Patterns of corporate talent management
	Layer 2 – Wider context of firms
	Layer 3 – Firms' digital strategy and potential impact on the division of labour

Ethical considerations

Ethical approval was sought from Cardiff University's School of Social Sciences Research Ethics Committee as part of the Digital Futures of Work research programme, which is a joint project between Cardiff University and the Institute for Adult Learning. The letter of approval was received on 25 August 2020. The design of this corporate talent management study required access to the Business Performance and Skills Survey (BPSS) that was administered by the Institute for Adult Learning. In accordance with the procedures at the Institute for Adult Learning, additional ethical approval was secured from its ethics committee to allow the researchers to access the data that would identify the companies that participated in the BPSS survey. This was officially granted on 29 January 2021. The key ethical issues are outlined below.

The first ethical challenge was access to BPSS respondents for a separate study distinct from the original survey. Fortunately, the BPSS survey had a question asking companies to opt in to be contacted for follow-up interviews. Only these companies were approached. The new project was explained to them, and new consent was secured for their participation.

The second ethical challenge is securing informed consent from respondents with two different profiles: managers and employees. Managers are considered part of the occupational elite, holding positions of

authority and having the capacity to provide informed consent effectively. Informed consent for managers was secured first by email, where companies were told about the project, the questions being asked, the right to withdraw at any time, and the confidential nature of the interview with only anonymised data presented in the final findings. At the start of the interview, these aspects were reinforced. Specific consent was requested for the use of an audio-recorder, or Zoom recording function to record the interview. For employees, as their managers nominated them, this adds an additional layer of ethical consideration to the study. Special attention was given to ensure that they comprehended their right to decline participation in the interview, to withdraw their data from the research process at any stage, and to assure them that what is shared in the interview is fully confidential. An additional step was taken: they provided their informed consent in writing by filling out a form (**Appendix C**). Generally, both managerial and employee respondents exhibited a high level of trust in the confidentiality of the research process. Only one manager declined the use of the Zoom/audio recording due to organisational policies, but allowed for notes to be taken. The notes were circulated to the respondent after the interview for his review.

The third ethical challenge concerns the researcher's role and position in the interview process, given the interpretivist underpinnings of the study. Corlett and Mavin (2018: 386) highlight the idea of "positional reflexivity", whereby the researcher is aware and understands how her "biography, place and positioning of self and other shape the research process" (Corlett and Mavin, 2018: 386). As observed by Hassan et al. (2018: 404), no researcher could sufficiently claim himself or herself neutral "because there is no neutrality". Still, the researcher must have explicit recognition of the need to minimise his or her projection of values to respondents as part of the knowledge production process. The most important aspect in this study is my values on corporate talent management, that the basic approach should be of inclusion rather than exclusion which stands in sharp contrast to the dominant approach in Singapore. Positional reflexivity, in this case, requires me to allow spaces for respondents to share their views freely with no overt judgment from me. This is a challenge, as I found myself more enthusiastic towards respondents who espouse a view of corporate talent management similar to mine. A strategy I used was to constantly remind myself to maintain neutrality even when respondents espoused a view of corporate talent management that was dissimilar to mine. As the data is jointly collected with other researchers, I similarly guided them in reflection exercises at the end of each interview and during our weekly meetings.

The fourth ethical challenge revolves around the need for care to ensure the anonymity of the respondents when reporting the data. Some of the firms are leading-edge firms that are easily recognisable by their profile. A key strategy employed includes describing the firms in general rather than specific terms, for example, using the term European rather than German or Norwegian, describing the industry in generic terms without mentioning the products, and reporting employment size in general

terms. For instance, firms may be described as having more than 50,000 employees rather than their actual number. A more significant challenge is reporting the comments by employees to ensure their anonymity, given that their employer had nominated them. While the data analysis involves comparing perspectives of managers and employees within each firm, it is not ethical to report employee views directly in relation to employer views as it may lead to the identification of the employee. The reporting approach in this dissertation, therefore, focuses on presenting employees' views separately from managers' views. Employees' views are reported in the aggregate for each firm archetype based on the cluster results. This approach reduces the risk of the potential identification of employees. Although the presentation of employee data in the aggregate lessens the overall impact of the analysis, it is a necessary step to protect the anonymity of employee respondents.

Summary

This chapter describes the methodology underpinning the research investigation. The study has been designed to pursue the dual objectives of theory elaboration and method development. Its overarching aim is to analyse the interplay between corporate talent management patterns, decisions regarding digital strategies, and the potential impact on the division of labour. A mixed methods research design is employed to combine the generalising power of the quantitative approach with the intensity and richness in details of the qualitative approach (Lin, 1998). The quantitative investigation entails using the BPSS survey to develop clusters of corporate talent management and initial co-relation with labour outcomes from technology use. A qualitative investigation followed to interrogate and elaborate further on the quantitative results. A strategy of holistic data integration is used to make sense and interpret the qualitative and quantitative findings.

The results are presented in subsequent chapters. Chapter 5 presents an overview of the integrated results from the quantitative and qualitative investigations. Chapters 6-8 discuss the various patterns of corporate talent management observed and the relationship with firms' digital strategy.

Chapter 5 | Integrated results from quantitative and qualitative investigations

Presentation of mixed method results

The key integrated results of this mixed method study are presented in this chapter, with in-depth findings reported in Chapters 6-8. Data integration is at the heart of mixed-method research. Therefore, the results presented in this chapter are organised to demonstrate the techniques used for data integration in this study. Specifically, holistic triangulation is the key strategy for integrating the quantitative and qualitative results. Holistic triangulation allows for identifying areas in which the qualitative and quantitative results converge and diverge, signposting the interpretive activities for developing best-case explanations of the phenomenon being investigated (Turner et al., 2017). The data-analytic technique of constant comparison is used whereby each interpretation and finding are compared with existing findings as they emerge from the data analysis. By way of providing a structure to the integrated analysis, three key layers are used as part of the process of holistic triangulation as follows:

- Layer 1: Patterns of corporate talent management
- Layer 2: The wider context of firms
- Layer 3: Digital strategy and the potential changes to the division of labour

Therefore, the key quantitative and qualitative results are presented in this chapter based on the three layers outlined above. Results from the quantitative analysis using the Business Performance and Skills Survey (BPSS) are first presented. Due to the constant comparison method, qualitative results are analysed with the quantitative results iteratively rather than sequentially. For instance, when an emerging qualitative finding diverges from the quantitative finding, various alternative explanations are explored in relation to both types of data, leading to the most plausible findings. This iterative process leads to the progressive synthesising of qualitative and quantitative findings. The findings from the qualitative analysis are, therefore, integrated with the quantitative analysis and presented in a consolidated manner in the second half of this chapter.

Quantitative results from BPSS analysis

Patterns of corporate talent management (Layer 1): As explained in Chapter 4, agglomerative hierarchical clustering using Ward Linkage is used to classify groups of establishments based on 12 variables drawn from three key constructs in the BPSS. These constructs are talent, skills demand and discretionary effort. Before clustering, dimensions are standardised to have a mean of zero and a standard deviation of one.

Figure 10 provides the dendrogram that emerged from the cluster analysis. The Y-axis of the dendrogram measures dissimilarity between establishments, calculated using Ward's linkage method. It adopts a continuous dissimilarity measure L2, which is the Euclidean distance applied to the establishments observed and ruling their clustering. The baseline at 0 signifies establishments being most similar to themselves. As dissimilarity increases, more heterogeneous establishments are grouped together. On the X-axis, the groups resulting from clustering are labelled G1-to G10 (Pai, 2021).

Figure 10. Dendrogram from BPSS cluster analysis using Ward Linkage
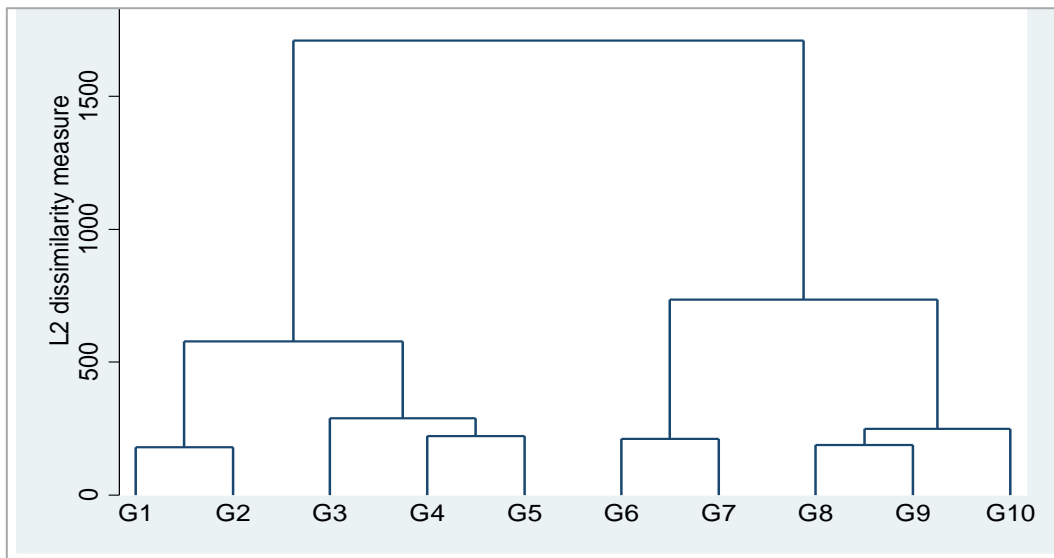
I drew on the guidance by Everitt et al. (2011) that a classification of a set of objects is best assessed in terms of its usefulness rather than whether it is 'true' or 'false'. Finding the right balance of clusters is crucial: too many may lack simplicity, while too few may blur meaningful distinctions between clusters. Upon reviewing the initial results, I decided to limit the analysis to 4 clusters (Clusters 1-4) as it offered the most distinct depiction of the differences between each cluster. **Figure 11** illustrates the cut-off at four clusters.

Figure 11. Cutting-off at four clusters for the BPSS analysis
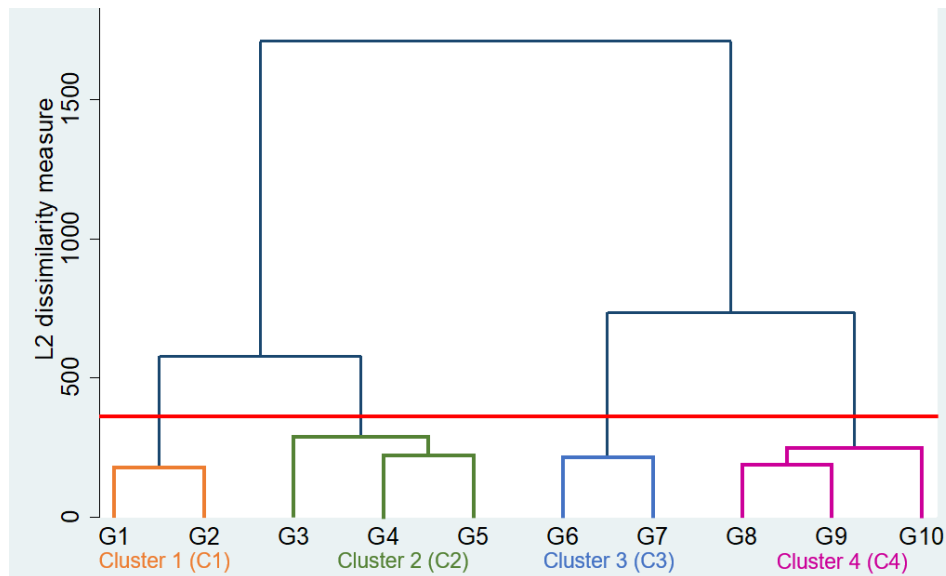
In **Figure 12**, the results of the 12 variables utilised for clustering are presented according to Clusters 1- 4. Cluster 1 establishments report above-average responses for all variables. Cluster 4 establishments report below-average responses for all variables. Clusters 2 and 4 show mixed results.

Figure 12. Cluster results based on variables used for clustering

Table 9 presents more detailed cluster results by variables. The overall sample mean and average values within each cluster are presented for each of the 12 variables.

Table 9. Results of average values of dimensions used for clustering by cluster

Constructs	Variables	Sample mean		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Skills demand	% of jobs requiring degree	3.97	21-30%	35-45%	21-30%	15-25%	5-15%
	% of jobs requiring induction training of more than a week	4.78	25-35%	41-50%	41-50%	5-15%	11-20%
	% of jobs requiring frequent learning	4.75	25-35%	45-55%	31-40%	15-25%	11-20%
	% of jobs requiring industry experience	5.39	31-40%	45-55%	35-45%	25-35%	21-30%
Discretionary effort	% of staff going beyond the call of duty	3.43	15-25%	26-50%	10-20%	26-50%	5-15%
	% of staff taking up duties of others	3.30	15-25%	26-50%	10-20%	26-50%	1-9%
	% of staff putting in more hours	3.44	15-25%	26-50%	10-25%	26-50%	1-9%
	% of staff making helpful suggestions	3.40	15-25%	26-50%	10-25%	26-50%	5-15%
Talent	% of staff adding significant value	6.45	45-55%	65-75%	51-60%	31-40%	21-30%
	% of staff for future promotion	3.98	21-30%	41-50%	15-25%	5-15%	5-15%
	% of staff with high potential	3.90	21-30%	41-50%	15-25%	5-15%	5-15%
	% of staff difficult to replace	3.67	15-25%	41-50%	11-20%	1-10%	5-15%

Source: BPSS

Table 10 draws on the cluster results presented in **Table 9** to describe the overall patterns of corporate talent management for Clusters 1-4.

Table 10. Description of patterns of corporate talent management for Clusters 1 - 4

Cluster	Constructs	Results	Overall patterns of corporate talent management by cluster
Cluster 1 (25%)	Skills demand	Above average	Cluster 1 firms form the third largest cluster at 25% of the dataset. Cluster 1 firms report above-average levels for all three constructs. Firms in this cluster appear to be the closest fit to the 'wealth of talent' in the original study by Brown et al. (2019). Cluster 1 firms have the highest skills demand. It also reports above-average levels of discretionary effort. It also has the
	Discretionary effort	Above average	

Cluster	Constructs	Results	Overall patterns of corporate talent management by cluster
	Talent	Above average	highest proportion of workers valued as talent in terms of current performance (i.e. 65-75% of the workforce seen as adding significant value) and future performance (i.e. 41-50% seen as high potential or for future promotion). There is early evidence that non-graduate labour may enjoy good opportunities, too, given that 41-50% is seen as having high potential or for a future promotion that is more than the average proportion of jobs requiring a degree in the firms (i.e. 35-45% are jobs requiring a degree). It suggests that these firms may practise neither old nor new forms of corporate talent management. This is an important area for investigation in the qualitative component of this study.
Cluster 2 (30%)	Skills demand	Above average	Cluster 2 firms form the largest cluster at 30% of the dataset. Cluster 2 firms appear to be the closest fit to the 'war for talent' in the original study by Brown et al. (2019). Cluster 1 firms report above-average levels of skills demand. Consistent with high skills demand, most workers are valued for their current performance (i.e. 51-60% of the workforce is seen as adding significant value). However, workers are not valued for future contributions, with the proportion identified as high potential or promotable shrinking to just 15-25% of the workforce. Firms in this cluster also report below-average levels of discretionary effort, which is unusual as it contradicts their generous view of their workforce's current performance. Combined, the findings suggest that Cluster 2 firms have a restricted view of their workforce. The sharp distinction between current and future contributions in Cluster 2 firms suggests the 'war for talent' behaviour of these firms, consistent with the findings in the original study by Brown et al. (2019) that saw the definition of corporate talent as going beyond performance to focus on potential as a response to the need to maintain exclusivity of a small cadre of workers in a period of mass higher education (Binder et al., 2016; Brown & Hesketh, 2004). Cluster 2 firms, therefore, relate more closely to new forms of corporate talent management that seek to stratify high-skilled labour.
	Discretionary effort	Below average	
	Talent	Above average for talent indicator associated with performance, but below average levels for all others	
Cluster 3 (18%)	Skills demand	Below average	Cluster 3 firms form the smallest cluster (18%) in the dataset. Based on the cluster analysis that first split based on the discretionary effort results, Cluster 3 firms are observed to be more like Cluster 1 firms. Both clusters report the same levels of discretionary effort. This is unusual as Cluster 3 firms did not report having higher skills demand, which typically suggests that
	Discretionary effort	Above average	

Cluster	Constructs	Results	Overall patterns of corporate talent management by cluster
	Talent	Below average	jobs are designed narrowly in these firms. Unexpectedly, management's observation of higher levels of discretionary effort does not translate into a high assessment of their workforce's current performance or future potential. No conclusion can be made if Cluster 3 firms follow old or new forms of corporate talent management.
Cluster 4 (27%)	Skills demand	Below average	Cluster 4 firms form the second largest cluster at 27% of the dataset. Cluster 4 firms have the most restricted view of their workforce in the BPSS dataset. They set up jobs that require below-average skills demand and report the lowest levels of discretionary effort and the lowest proportion of talent both in terms of current performance and future potential. The proportion of jobs requiring a degree and those regarded for future promotion and high potential matches closely at 15% of the workforce. There is thus early evidence that Cluster 4 firms relate most closely to old forms of corporate talent management that privilege graduate labour.
	Discretionary effort	Below average	
	Talent	Below average	

Of significant interest is that the dendrogram in **Figure 10** is first split by the set of variables linked to discretionary effort, followed by skills demand. This suggests that establishments in Singapore are more different from one another depending on senior managers' observation of the extent of the voluntary effort that the workforce puts in. This is an unexpected finding as a reasonable expectation is that firms were more likely to differ based on skills demand. Previously, a study by BPSS researchers of the same dataset found a positive and significant relationship between discretionary effort and skills demand (Tan et al., 2018). The researchers suggest skills demand to be an explanatory reason for the co-relation with discretionary effort, explaining that "it is highly likely that employees' technical and cognitive competencies are important prerequisites for them to know what should be done and how it should be done to execute their job roles efficiently and effectively and for encouraging their exertion of discretionary effort above and beyond the baseline requirements" (Tan et al. 2018: 10). This is a standard interpretation based on old patterns of corporate talent management in which high levels of employee engagement co-relates with graduate qualifications. Our cluster findings instead suggest that there is far greater variation in firms' corporate talent management practices.

Another observation from the cluster analysis is that corporate talent management patterns cannot be observed as a continuum from high to low. Overall, there is a close overlap between the cluster results and the four talent models put forth by Fox (1974 – see **Figure 1 in Chapter 2**). The exception is that what he observed to be atypical – low trust, high discretion workplaces – is now the dominant talent model in Singapore. The contrasting behaviour of Cluster 2 and 3 firms especially requires deeper investigation. Cluster 2 firms set up jobs that require high skills demand, and managers take the view

that a significant proportion of their workforce is adding significant value (average of 51-60 per cent, see **Table 9**). However, they do not have a generous view of the workforce's future value to the company (an average of 15-25 per cent are high potential or promotable; see **Table 9**). On the other hand, Cluster 3 firms take a generous view of their workers' engagement despite jobs requiring lower than average skills demand, and workers not seen as contributing significantly to the company both in terms of current performance and future potential.

The wider context of firms (Layer 2): This section reports on the statistical results from the co-relation tests of each cluster to the firms' wider contexts. A correlation analysis is performed between the four clusters and aspects such as business strategy and financial performance. For ordinal variables, one-way analysis of variance (ANOVA) with the Bonferroni multi-comparison test is first performed. When an ANOVA result shows significant differences in the means of the variables by clusters, the Bonferroni test is applied to determine which means among the clusters are significantly different. For categorical variables, logistic regression is used instead of one-way ANOVA. **Table 11** provides the findings of the distribution of firm characteristics by cluster.

Table 11. Distribution of firm characteristics across Clusters 1 - 4

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Cluster distribution	25.0	30.5	18.0	26.5
Demographics				
SME	24.1(***)	30.6	17.4	27.9***
Multinational corporation	33.0***	29.5(***)	18.6(***)	19.0(***)
Industry				
Infocomm	40.5***	27.7(***)	19.6(*)	12.3 (***)
Financial services	39.0**	24.2 (**)	21.1	15.8(***)
Professional, scientific, technical	37.3***	31.6(***)	15.9(***)	15.2(***)
Education	32.4*	33.3	18.9	15.3(*)
Real estate, admin & support	28.5*	33.0	11.1(**)	27.4
Wholesale & retail trade	23.4(**)	27.0	19.0	30.6**
Manufacturing	18.6 (***)	27.9	18.0	35.4***
Construction	15.1(***)	35.1***	23.2***	26.6***
Accommodation, food & beverage	14.2 (***)	38.0***	16.3*	31.5***
Workforce profile				
% of professionals, managers and executives (PMEs)	25-35% +++	15-25%	21-30%	11 - 20%
% of knowledge workers	41 - 50% +++	21 - 30%	21 - 30%	15-25%
Business strategy				
Frequently take many risks *(strongly agree [4 or 5 out of 1-5])*	25.8***	32.9	14.7(***)	26.6

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Design jobs for efficiency *(strongly agree [4 or 5 out of 1-5])*	26.3*	29.5	16.7 (*)	27.5
Always customise products and services *(strongly agree [4 or 5 out of 1-5])*	28.1***	29.0 (***)	16.8 (***)	26.1 (***)
Substantial customisation, compared to others *(strongly agree [4 or 5 out of 1-5])*	27.7***	30.2 (**)	17.0(***)	25.2(***)
Compete for premium quality products and services *(strongly agree [4 or 5 out of 1-5])*	28.6***	29.4 (***)	17.5(***)	24.5(***)
Relies on developing unique products and services *(strongly agree [4 or 5 out of 1-5])*	28.6 ***	29.9(***)	16.1(***)	25.4(**)
Work practices				
Work autonomy *(Score of 1-5 with 5 being the highest)*	3.4 +++	2.9	3.1	3.1
Opportunity for non-managerial staff to create teams *(1-Never, 2-Sometimes, 3-Often)*	1.9 +++	1.8	1.8	1.8
Employee development				
% of senior staff who are internal promotions	41-50% +++	21-30%	15-25%	11-20%
% of all staff who are learning on the job	60-80% +++	51-75%	51-75%	50-65%
% of staff with career planning	10-30% +++	10-20%	10% or less	less than 10%
% of staff with opportunity for international assignments	25-35% +++	15-20%	11-20%	5-15%
Staff rewards				
% staff earning less than $1900	11 - 20% +++	21 - 30%	15-25%(-)	21 - 30%
% staff earning more than $6000	11 - 20% +++	5-12%	5-15%	1 - 10%
% staff receiving performance bonus	51 - 60% +++	41 - 50%	41 - 50%	31 - 40%
% staff receiving company bonus	65-75% +++	71-80%	61-70%(-)	65-75%(-)
Attrition				
% of PMEs	3-8% +++	1-5%	1-5%	1-5%
% of technicians and associate professionals	6-10% +++	6-10% (-)	3-8%	6-10% (-)
% of other staff	6-10% +++	6-10% (-)	3-8%	6-10% (-)
Financial performance				
Increase in profitability	34.7 ***	29.0 (***)	18.0(***)	18.3(***)

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Increase in revenue	32.7 ***	29.4(***)	18.5(***)	19.3(***)
Increase in market share	33.7***	31.5(***)	18.2(***)	16.7(***)

Legend:

With Type 1 as reference:

- ***, **, *: The logistic regression identifies the Type/s that is statistically '**more likely**' related to that particular variable with significance level at $p<.001$, $p<.01$, $p<.05$, respectively

- (***), (**), (*): The logistic regression identifies the Type/s that is statistically '**less likely**' related to that particular variable with significance level at $p<.001$, $p<.01$, $p<.05$, respectively.

- +++, ++, +: The one way ANOVA with Bonferroni test identifies which Type mean is statistically different from other Types, with significance level at $p<.001$, $p<.01$, $p<.05$, respectively. The (-) is to show that particular result is not statistically different from the reference (Type1), while others without (-) are statistically different from Type 1.

From the results in **Table 11**, it is immediately evident that only the wider context of Cluster 1 firms can be well-described. A higher proportion of their workforce tends to be professional workers who perform knowledge work. The business strategy of Cluster 1 firms is characterised by high levels of innovation activities seen in terms of reliance on developing unique products and services and substantial customer customisation. Workers in Cluster 1 firms enjoy the highest levels of autonomy. They also receive the best rewards and development, including reporting the highest proportion of senior staff who are internally promoted. There are also more opportunities for non-managerial staff to create a team. Cluster 1 firms also report the best business performance in terms of increased profits, revenue and market share over the last 12 months. An unusual finding is that despite the good treatment of workers, Cluster 1 firms also report the highest level of attrition among PMEs. This is an important area to investigate in the qualitative investigation. There are not enough statistically significant findings to describe the other three clusters well. The only other key statistically significant finding is that Cluster 4 firms are most likely to be SMEs.

However, a closer look at the sectoral results in **Table 11** points to an important area for deeper investigation on the qualitative component of the study. Cluster 1 firms are statistically more likely to be found in the following industries: infocommunications, financial services, professional services, education, and real estate, most of which are associated with high skills. Cluster 4 firms are statistically more likely to be in wholesale and retail trade, manufacturing, construction, and accommodation, food and beverage industries, which tend to be associated with low skills. Cluster 2 firms are statistically more likely to be in construction, and accommodation, food and beverage industries, while the only clear trend for Cluster 3 firms is that they are more likely to be in the construction industry. Even so, the sectoral distribution results in **Figure 13** suggest that all four cluster types are present in all sectors. This finding makes it crucial to study unconventional firms in each cluster, for instance, professional

services firms in Cluster 4, and F&B firms in Cluster 1. Such an approach will help us deepen firm-level practices shaping corporate talent management strategies in such firms. The sampling strategy in the qualitative analysis will incorporate this approach.

Figure 13. Distribution of industry sectors across Clusters 1 - 4

Legend:

With Type 1 as reference:

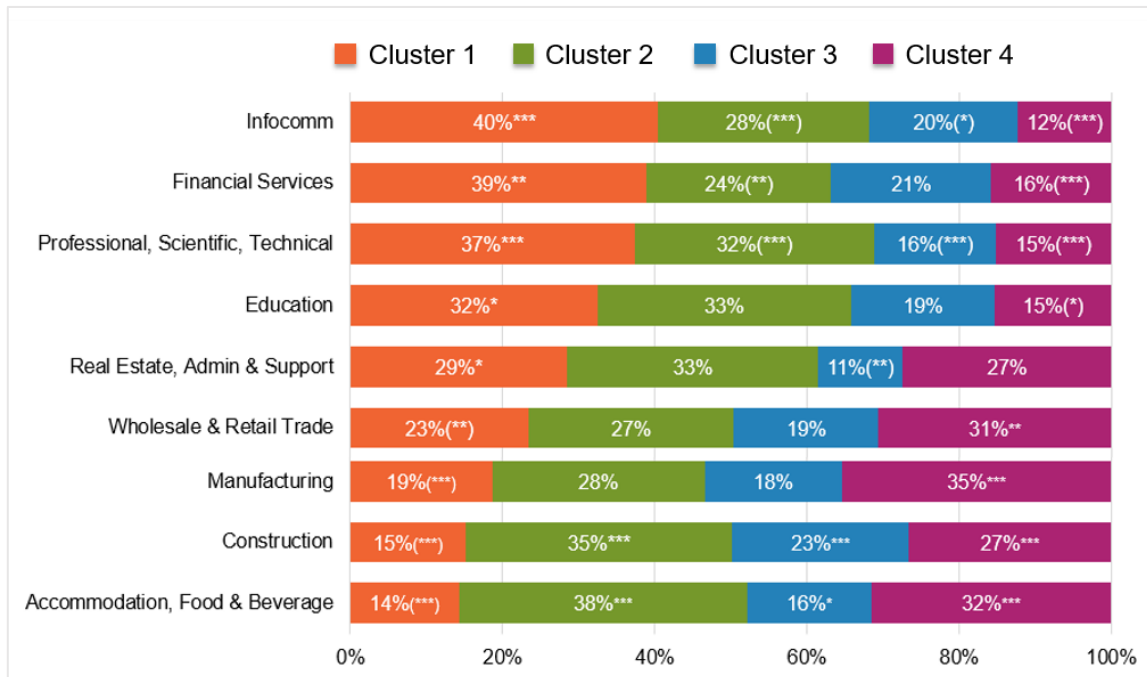- ***, **, *: The logistic regression identifies the Type/s that is statistically '**more likely**' related to that particular variable with significance level at p<.001, p<.01, p<.05, respectively

- (***), (**), (*): The logistic regression identifies the Type/s that is statistically '**less likely**' related to that particular variable with significance level at p<.001, p<.01, p<.05, respectively.

Technology strategy of firms (Layer 3): The co-relation analysis of the technology strategy of the four patterns of corporate talent management yields more meaningful insights. **Table 12** reports the distribution of firms' technology strategy by cluster.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Cluster distribution	25.0	30.5	18.0	26.5
Technological innovation				
Early adopter of technology	28.0 ***	28.9(***)	16.7(***)	26.5(*)
Changes in work processes due to technology	33.1 ***	30.4 (***)	18.2 (***)	18.3(***)
Reduction in workers due to technology	27.7(***)	33.6***	16.6	22.1***
Increase in training for new PME staff due to changes in technology	38.6***	33.6	14.5(**)	13.3(***)
Increase in training for new technicians and associated professionals due to changes in technology	37.9*	31.4	15.2(*)	15.5(*)
Increase in training for other new staff due to changes in technology	37.1	31.0	16.3	15.6

Legend:

With Type 1 as reference:

- ***, **, *: The logistic regression identifies the Type/s that is statistically '**more likely**' related to that particular variable with significance level at $p<.001$, $p<.01$, $p<.05$, respectively

- (***), (**), (*): The logistic regression identifies the Type/s that is statistically '**less likely**' related to that particular variable with significance level at $p<.001$, $p<.01$, $p<.05$, respectively.

As reported in **Table 12**, Cluster 1 firms are most likely to be early adopters of technology and the most likely to have introduced changes in work processes due to technology. Of vital importance to our research question is that Cluster 1 firms are unlikely to reduce workers due to technology. Instead, they are more likely to increase training for new recruits at the top and middle levels of skills. This suggests that Cluster 1 firms employ a skills-biased technological change (SBTC) strategy, with no evidence of 'hollowing out'.

Consistent with the study's hypothesis that a narrow view of the workforce is likely to lead to employment changes when technology is introduced, Cluster 2 and Cluster 4 firms, indeed, are more likely to reduce workers due to technological innovation. As the BPSS variable on workforce reduction did not ask which part of the workforce is reduced (i.e. high, middle or low level of skills), it is not possible to understand if workforce reduction led to changes to the structure of employment. In addition, no statistically significant findings can be reported for Cluster 2 firms in terms of whether it increases training for its new staff at all levels. For Cluster 4 firms, it is statistically significant that they are unlikely to increase in skills demand for new PME and mid-tier workers. In contrast, no statistically significant findings exist for an increase in skills demand for low-skilled workers. There is, therefore, some evidence that Cluster 2 and 4 firms may not engage in SBTC. For Cluster 3 firms, there are no statistically significant results if they are more likely to reduce the workforce compared to the other

clusters. Like firms in Clusters 4, however, they are unlikely to upgrade jobs. It is a curious phenomenon that Clusters 3 and 4 firms with below-average skills demand do not upgrade skills when they employ technology.

Overall, SBTC is observed only for Cluster 1. Given that only 25 per cent of firms were in Cluster 1, it can be concluded that SBTC is not likely to be the dominant technology approach of firms in Singapore, contrary to policy expectations. The findings on Cluster 2 and 4 firms suggest that firms that take a restrictive view of their workforce are more likely to reduce their workforce, which is consistent with the study's hypothesis. Of interest is that Cluster 2 and Cluster 4 firms have very different skill demand profiles. It suggests that for Cluster 2, high skills do not protect workers from being substituted by technology. For Cluster 4, which is more likely to comprise SMEs, it suggests that the policy assumption of skills upgrading in the SME sector with technological change is misguided. Overall, the observations sit well with the findings from a logistic regression analysis performed on the BPSS data by Souto-Otero et al. (2021). The authors similarly find that high skills do not protect workers from technological replacement, while management perceptions of workforce competence and business strategy shelter workers from displacement.

On the whole, the quantitative investigation successfully captures variations in patterns of corporate talent management in the economy. The biggest contribution of the quantitative analysis is to provide early evidence of the correlation between corporate talent management and technology. The BPSS variables are not comprehensive enough to capture changes to the division of labour within an establishment. We now turn to the qualitative study to help us understand further the relationship structuring corporate talent management, digital strategy and the division of labour at the firm level.

Qualitative results and integrated findings
As described in Chapter 4, it is impossible to verify the internal validity of the quantitative study as it has been five years since the BPSS survey with considerable changes to the business context, as well as the fact that the senior managers who responded to the BPSS survey are unknown to the research team. The qualitative study is therefore designed to establish the external validity of the BPSS analysis and describe the patterns of corporate talent management and digital strategies impacting the workforce at the firm level. For maximum representation, two key sources for sampling firms are used, namely from the BPSS survey and from the researchers' contacts, as discussed in Chapter 4.

The first set of firms for qualitative interviews is drawn from the BPSS cluster results (4 per cluster; n=16). Purposive sampling is used to ensure a good mix of industries and firm types in each of the four clusters. For instance, the BPSS analysis shows that Cluster 1 firms are more likely to be in the infocomm and professional services sector, which is consistent with the industries' association with

high skills demand, including degree credentials. However, an F&B firm is listed as a Cluster 1 firm, which is unusual given that the F&B industry is not typically associated with high demand for degree credentials. Efforts were made to secure the company for interview to understand the similarities and differences between their practices and those from knowledge-intensive sectors. Similarly, although SMEs largely dominate Cluster 4, non-SMEs in Cluster 4 were sought out for interviews for a contrasting perspective. Additionally, technology start-ups are found in Cluster 1 and 2 firms consistent with the policy strategy of the Singapore government. Steps were taken to seek them out for interview. As for the second set of firms (n=14) secured from outside the BPSS sample, the firms are shortlisted using the researchers' contacts and initial desktop research to capture as much variance as possible in corporate talent management practices. For each of the 30 firms, we seek to interview both the managers and employees. However, only 18 out of 30 firms provided employees for interviews. This response rate is comparable to the original study by Brown et al. (2019). The respondents' demographics have been described in detail in Chapter 4.

In terms of analysis, each firm is analysed as a case, combining the interviews with the senior manager and the employees where possible. Each case is then compared with other cases through a process of constant comparison leading to an assessment of which set of companies is more like one another and dissimilar to the rest. As highlighted earlier in the chapter, triangulation between the qualitative and quantitative data took place iteratively rather than sequentially. Special attention was placed on points of convergence and divergence with the quantitative data. Points of convergence facilitate a comprehensive description of the phenomenon under investigation, drawing from both quantitative and qualitative data. Points of divergence require a deep dive into both the quantitative and qualitative data to derive a best-case understanding of the phenomenon being investigated. The process of triangulation is structured based on the three layers outlined earlier.

Overall, there is a significant convergence between the quantitative and qualitative findings, with the qualitative findings offering rich evidence of the wider business context of firms' corporate talent management strategies that are intimately connected to the business strategy. Combined, corporate talent management and the wider business strategy inform the design of digital innovation programmes. There is, therefore, a strong correlation between corporate talent management, digital programmes and the likely ensuing effects on the division of labour at the firm level, which holds significant potential for understanding social relations of production at the aggregate level to inform the future of work opportunities in support of the study's research questions. The results for each layer of the integrated analysis are provided below.

Patterns of corporate talent management (Layer 1): Drawing from the definition in the original study, corporate talent management refers to "the institutional structuring of demand in terms of how

companies organise the people to work for them" (Brown et al., 2019: 12). The four archetypes found in the BPSS clusters converge well with the findings of the qualitative component of the study. Integrating the qualitative and quantitative findings, two main characteristics are identified that structure how firms in Singapore organise the people to work for them, namely occupational and organisational discretion. For the first characteristic, firms may organise jobs to be designed as a complex or narrow collection of tasks. Complex jobs demand occupational discretion that includes expert knowledge, risk assessment, and discretionary decision-making. This relates very well to the first dimension of labour power proposed by Adler (2004: 4) of "mastery of the complexity of tasks". The second characteristic relates to *organisational discretion*. This relates to how work organisations are set up in terms of hierarchy and managerial control – whether workers are trusted within the organisation to exercise their skills to perform their jobs or if they are monitored through organisational policy, targets, performance indicators or other related tools of organisational control or conformity. The characteristic of organisational discretion relates well with the second dimension of labour power proposed by Adler (2004: 5) of "mastery of the relations to coordinate activity across tasks".

Mapping out the interaction between occupational and organisational discretion, four patterns of corporate talent management in Singapore can be observed that correlate well with the original four BPSS clusters. **Figure 14** outlines four patterns of corporate talent management in Singapore based on the integrated findings. The number of firms that fit each archetype based on the qualitative study is also specified.

Figure 14. Patterns of corporate talent management in Singapore

		Organisational discretion	
		High trust	**Low trust**
Occupational discretion	**Complex jobs**	**Wealth of talent** High occupational discretion, high organisational discretion **Quantitative: 25%** **Qualitative: 8 firms** **(3 BPSS, 5 non-BPSS)**	**War for talent** High occupational discretion, low organisational discretion **Quantitative: 30%** **Qualitative: 10 firms** **(5 BPSS, 5 non-BPSS)**
	Narrow jobs	**Constrained talent** Low occupational discretion, high organisational discretion **Quantitative: 18%** **Qualitative: 8 firms** **(4 BPSS, 4 non-BPSS)**	**Zero-talent** Low occupational discretion, low organisational discretion **Quantitative: 27%** **Qualitative: 4 firms** **(4 BPSS, 0 non-BPSS)**

An explanation of the four archetypes in **Figure 14** is as follows:

- 'Wealth of talent' firms generate complex jobs and provide the space for their workforce to exercise their discretion. Therefore, the social division of labour overlaps with the technical division of labour, giving rise to a high-trust, high-discretion workplace. Of interest is that 'wealth of talent' firms largely employ graduate labour but extend the exercise of occupational and organisational discretion to their non-graduate labour. Unlike 'war for talent' firms, they do not go for elitist credentials, preferring to take a chance on candidates with less sterling credentials. In this regard, the finding of 'wealth of talent' firms is a significant departure from the typology of Fox (1974) of 'high-trust, high-discretion' workplaces that he theorised is due to the high levels of occupational training. Instead, this study finds that the extension of professional and organisational discretion to non-graduate labour is due to the firm's business strategy, which will be explained in the next section. The unusual finding of above-average attrition in 'wealth of talent' firms is due to the opportunities given to the broad workforce to undertake cutting-edge work that allow them to build their portfolio considerably, strengthening their attractiveness to prospective employers. Even though 'wealth of talent' firms take in those with less than sterling credentials, the design of the business activities gives space for the broad workforce to build up their portfolio. This enhances their employability, such that they are then poached by competitors. The openness of 'wealth of talent' firms is such that they provided us access to workers who left the company or were in the process of serving their notice period. This allows us to confirm that pull factors, rather than push factors, are the primary reason for their departure.

- 'War for talent' firms generate complex jobs that require high occupational discretion, similar to 'wealth of talent' firms. That workers participate in complex tasks explains the quantitative finding for why a significant proportion of the workforce is seen as adding significant value to the firm. However, despite the high skills of their workforce, only a small proportion of their workforce is trusted, reflecting high levels of managerial control within the organisation that intervenes with workers' ability to coordinate activities across tasks. This can be reflected in policies designating certain jobs as strategic vs non-strategic and certain segments as talent vs non-talent. Here, the social division of labour undermines the technical division of labour, consistent with the observation of the degradation of professional work described by many scholars (Brown & Hesketh, 2003; Brown et al., 2011; Brown et al., 2019; Evetts, 2009, 2013; Livingstone, 2019).

- 'Constrained talent' and 'zero-talent' firms do not generate complex jobs and, therefore, do not require high levels of occupational discretion. However, workers in 'constrained talent' firms are given the organisational discretion to coordinate activities with others to deliver their work. Here,

the social division of labour compensates for the technical division of labour. In contrast, workers in 'zero-talent' firms have narrowly designed jobs and are closely monitored. The social division of labour is thus reinforced by the technical division of labour, but it works in the opposite direction of 'wealth of talent' firms. Of interest is that although most jobs in 'constrained talent' and 'zero-talent' firms do not require degree-level training, the qualitative interviews conducted with senior managers indicate that the people flowing into their companies are increasingly degree holders, consistent with the increase in workers with degree qualifications across the Singapore economy as outlined in Chapter 3.

Overall, the study's findings show that both old and new forms of corporate talent management exist in the Singapore economy. However, new forms of corporate talent management manifesting in 'war for talent' practices are the dominant approach, corroborating the original study's findings by Brown et al. (2019). The dimensions of occupational and organisational discretion in Figure 12 also closely mirror the findings of Evetts (2009, 2013), who outline differences between (1) occupational professionalism and (2) organisational professionalism. Evetts (2013: 786) highlights the rise of organisational professionalism, which she calls "professionalism 'from above'" in which "organisational objectives regulate and replace occupational control". She suggests that occupational professionalism and organisational professionalism are distinct ideal types, but our study highlights the interdependency of the two dimensions in a workplace. In other words, occupational and organisational professionalism, which tended to reinforce one another previously, are increasingly diverging in today's circumstances, manifesting particularly in the dominance of the 'war for talent' workplace.

Wider contexts of firms (Layer 2): A key finding is that while statistical analysis shows that 'wealth of talent' firms are predominantly located in high skills sectors like infocomm, finance and professional services, both quantitative and qualitative investigations reveal that sectoral differences do not determine the talent models chosen. For example, professional services firms (an industry associated with high skills), as well as F&B and retail firms (industries associated with low skills), are found in all four clusters. A better predictor of the type of corporate talent management is business strategies that directly structure how the workforce is organised, developed and rewarded. **Table 13** briefly describes the business contexts of each firm type that demonstrate the valorisation strategies pursued, with in-depth empirical data provided in Chapters 6-8.

Table 13. Wider business contexts of each firm type

Type	Description
'Wealth of talent'	'Wealth of talent' firms have a distinct business model of always innovating, as seen in their efforts to innovate and develop unique products and services for clients. This finding is statistically significant in the BPSS cluster analysis and further supported by qualitative findings. Their product strategy tends to fit the 'collaborative customisation' strategy in the typology by Gilmore and Pine (1997), requiring high levels of creativity and constant collaboration with clients to create products that uniquely meet their needs. This means that a broad segment of the workforce needs to be entrusted to exercise judgment and initiative to develop such products. Jobs are designed to be expansive, requiring high professional discretion and significant collaboration across functional teams to meet clients' needs. The professional and organisational discretion are extended to non-graduate labour as part of the firms' innovative processes. Because of the focus on collaboration, 'wealth of talent' firms deliberately set themselves up to avoid stratification, with senior managers rejecting the idea of a single-hero performer and taking active steps to maintain a fair rewards system to allow ideas to surface from the ground. For instance, in one firm, the HR manager ensures that colleagues working on mature projects with declining revenue potential are fairly compensated compared to those working on new high-growth projects with increasing revenue potential. The HR manager sees this as vital to sustaining workers' motivation and earning their trust that they will be compensated fairly across product innovation cycles that are bound to have high and low points. Additionally, due to the innovation process that is seen as unpredictable, the firms are open to non-traditional talent, including non-graduate talent and mid-career switchers. Here, it can be observed that there is deliberate and purposeful cooperation between managers and workers as part of the firms' valorisation strategy, keeping to the pattern of contradictions that scholars have theorised will exist within the capital-labour relationship (e.g. Adler, 2004; Sawchuk, 2006).

Type	Description
'War for talent'	'War for talent' firms operate through a dual business strategy of innovation leading to efficiency, in which a group of workers are entrusted to innovate and develop future products while the rest of the workforce pushes out the products and services of today. Talent is identified to take on strategic/innovation roles, which typically tend to be 10-20 per cent of the workforce who are developed and rewarded differently from the rest. These workers tend to be hired based on specific credentials that include elite university qualifications or experience with brand-name competitors as part of a strategy to keep up with the competition. The product strategy of 'war for talent' firms tends to fit the strategy of 'adaptive customisation' in the typology by Gilmore and Pine (1997), in which one standard but customisable product is designed. Such a product strategy still requires high levels of creative labour at the onset but has limited scope for sustained creativity across the product's lifecycle. In this regard, labour's creative potential is valued in a small group of workers but not the rest of the workforce as part of the firm's valorisation strategy. However, the qualitative findings show that even those identified as talented feel constrained, as the space to exercise their creativity and independent judgement is subject to significant managerial control of the innovation agenda.
'Constrained talent'	'Constrained talent' firms have high managerial control but seek to differentiate themselves in the market by strengthening customer-centricity to make up for their standardised products and services. This business model explains the organisational discretion they offer to their workforce. Their product strategy tends to fit the strategy of 'cosmetic customisation' as described in the typology by Gilmore and Pine (1997). Here, the valorisation strategy of controlling costs significantly limits the space available for labour to exercise their creative potential despite the organisational discretion provided to them.
'Zero-talent'	'Zero-talent' firms tend to be driven by price competition strategies with high managerial control. Products are standardised, with limited space for discretion. Here, the valorisation strategy has minimal use for labour's creative potential.

Digital strategy of firms (Layer 3): The qualitative investigation shows significant use of digital technologies across all firm types but harnessed for very different purposes. **Table 14** briefly summarises the patterns observed in the digital strategy of firms of each type. A deeper examination is provided in Chapters 6-8. Overall, there is no support that technology is an external stimulus exerting uniform influence across all firm contexts. Instead, technology is employed as a tool to advance business strategy, and can be used in contrasting ways with contrasting effects on labour.

Table 14. Design of digital programmes based on firm type

Archetypes	Description
'Wealth of talent'	**Use of digital technologies to augment labour across the firm, maintaining the division of labour and enabling job upgrading of mid-level workers** As the BPSS cluster analysis shows, 'wealth of talent' firms tend to be an early adopter of technology, with technology impacting their work processes. It was statistically less likely to reduce workers and more likely to raise skills requirements for new PME and TAP recruits. The qualitative analysis describes how the talent model shapes technological outcomes. Specifically, the focus on customer-centricity through collaborative working means that workers are allowed to experiment with digital technologies and decide how those tools will value-add to the customer experience. This often means that workers would have developed complementary skills, alongside delivering technology-enabled solutions, that reduce their risks of being substituted by technology. The inclusive approaches of such firms create the capacity for technologically upgrading the jobs of even mid-skilled workers such as learning support technicians. *Likely outcome: Skills-biased technological change via increase in skills requirements of both high- and mid-skilled workers; there is no evidence of 'hollowing out' of the middle of the workforce.*

Archetypes	Description
'War for talent'	**Use of technology to restructure work processes in ways that strengthen managerial control, leading to restratification of professional work** Findings from the qualitative analysis show that 'war for talent' firms are typically well-resourced, with many firms who are leading players in digital experimentation. In fact, job roles related to AI and other digital technologies have emerged as a talent designation, forming a crucial part of the 10-20 per cent of talent recruited or groomed specifically to drive the product innovation agenda. The design of the technology strategy, such that the broad workforce is not involved in the digital programmes at the onset, means a narrowing of task range for professional workers 'below the talent radar'. This put them at risk of being substituted by technology or that their work processes become standardised. Currently, these workers continue to perform an important function within the firms that rely on their professional expertise. However, the direction of firms' digital programmes suggests an ongoing process of the transfer of professional discretion upwards to managers and machine designers. There is, therefore, a greater likelihood of reducing the professional workforce. The jobs of middle workers (technicians, sales, etc) are sustained. These workers will increasingly receive instructions through a digital platform, without seeing an increase in their engagement in complex tasks nor higher discretion to coordinate activities. *Likely outcome: labour restratification / labour substitution of professional workforce; continued demand for technicians/associate professionals/sales (no 'hollowing-out' of the middle of the workforce)*
'Constrained talent'	**Use of technology to source for cheaper professional labour in less developed economies, continued demand for low-skilled job roles** The product strategy of 'constrained talent' means that they continue to compete based on standardised products and services with some level of cosmetic customisation. Firms seek to use digital technologies to make their operations more cost-efficient. However, the deployment of digital technologies forces them to increase the demand for expensive professional labour. There is a structural challenge for them to hire graduate labour in Singapore who do not appreciate workplaces that fail to provide them with an environment of high occupational discretion. Consequently, there is evidence that these firms have started experimenting with hiring remote professional labour from cheaper locations such as the Philippines and Indonesia. These are executive roles in IT, sales and customer

Archetypes	Description
	service. These firms do not seek to upgrade non-executive job roles that will continue to be based in Singapore.
	Likely outcome: There is evidence of an increase in skills demand through the use of remote professional workers who may be engaged in high-skilled tasks but lack the discretion to coordinate activities across the tasks being based outside of the market they serve. 'Hollowing out' through digital offshoring may instead take place at the top half of the labour market (professional and associate professional positions). Low-skilled job roles are not upgraded, although their work processes are increasingly controlled through digital tools.
Zero-talent	**Use of technology to remove low-skilled job roles; no upgrading of jobs** Such firms typically avoid using technology, seeing it as additional costs rather than a means to shift away from their price competition strategies. When digital strategies are pursued, they are designed to automate manual job roles, leading to labour substitution but with no upgrading of remaining jobs to maintain low labour costs. *Likely outcome: No evidence of SBTC nor 'hollowing out' of the middle; labour substitution of non-professional work but no upgrading of remaining roles*

Summary

This chapter provides topline findings of the quantitative and qualitative findings of the mixed method study using a layered analysis. The BPSS cluster analysis results are first reported, with the qualitative investigation extending the findings further. The integrated analysis led to the development of four archetypes of corporate talent management in Singapore, which are distinguished by two key characteristics, namely occupational and organisational discretion. Occupational discretion relates to the complexity of jobs for the broad proportion of the workforce – whether the collection of tasks is broadly or narrowly defined, leading to the need to exercise professional judgement, risk assessment and discretion associated with high levels of professional training and industry experience. Organisational discretion relates to coordinating activities across tasks – whether managerial control empowers or monitors the performance of the broad proportion of the workforce. Four patterns of corporate talent management have been identified: ' wealth of talent', 'war for talent', 'constrained talent' and 'zero-talent'. Brief descriptions of the business contexts of each archetype are provided to explain how the patterns of corporate talent management may have emerged. Brief evidence is also provided of how the patterns of corporate talent management co-relate with the digital strategies of the firm, and the possible assessment that can be made on potential changes to the division of labour within

Chapter 6 | 'War for talent' vs 'wealth of talent' firms

Comparing 'war for talent' and 'wealth of talent' firms

'War for talent' and 'wealth for talent' firms in Singapore are striking in how similar yet dissimilar they are. Both compare well in terms of hiring above-average levels of professional labour relative to the two other two firm types ('constrained talent' and 'zero-talent'). This makes them prized employers in Singapore's increasingly congested labour marketplace with high levels of job competition among graduates and non-graduates, as described in Chapter 3. Where 'war for talent' and 'wealth of talent' firms diverge is in terms of how professional labour is organised within the firm. 'War for talent' firms seek to stratify the workforce through high-potential talent management that identifies a cadre of talent, usually set at 10-20 per cent, who are recruited, developed and rewarded differently from the rest. This is a central organisation policy that has been conceptualised as a new form of corporate talent management in Chapter 2. In contrast, the practices of 'wealth of talent' firms seek to work against stratification to maximise the discretion of professional labour through ample space to exercise professional and organisational discretion. They deliberately set themselves up to minimise workforce stratification so as to create a safe environment for the exercise of job autonomy and collaboration throughout the workforce. By the inclusive values that underpin their organisational policies, the opportunity to exercise discretion extends even to non-graduate labour.

As supported by both the quantitative and qualitative investigations, this difference in corporate talent management in 'war for talent' and 'wealth of talent' firms lies in their distinct valorisation process. 'Wealth of talent' firms are perpetual value-creators, seeking to create value through always developing new products and services. They are in the business of constantly collaborating with their customers as a value proposition in a strategy that means deliberately seeking out customers and partners who wish to work with them to develop unique solutions. This requires the empowerment of the broad workforce, which includes managerial attention to the motivation of the average worker to exercise his or her labour potential. The valorisation strategy of 'wealth of talent' firms fits the pattern of 'collaborative customisation' (Gilmore & Pine, 1997) and 'bottom-up innovation' (Gaynor, 2013), which requires organisational freedom to support risk-taking. In contrast, the valorisation strategy of 'war for talent' has a stratified approach. A select group of talent is involved in top-down innovation that, once produced, leverages the rest of the workforce to push out the product. This fits the 'adaptive customisation' strategy described by Gilmore and Pine (1997: 12), whereby firms frontload the ways customers can modify products and services to suit their needs, seeking to minimise subsequent interaction as a key strategy for cost-optimisation. As I will outline below, this twin strategy is plagued by a significant number of internal contradictions, specifically a weakness in leveraging professional

judgment to connect with what customers value. What is of concern is that this model of labour stratification puts professional workforce who are 'below the talent radar' at risk of being subjected to automation and/or standardisation using digital technologies as part of cost optimisation, being seen as less valued than those demarcated as 'talent'.

In this chapter, I exclude technology start-ups, outlining only qualitative evidence from TNCs and SMEs. The reason for excluding start-ups from this chapter's discussion is deliberate. There may be views that born AI start-ups that are digital-first may not be directly comparable to other firm types. Their practices are therefore dealt with separately in Chapter 8, which will show that it is similarly the valorisation strategy driving the 'war for talent' and 'wealth of talent' practices that lead to divergent labour outcomes, independent of firm type. A total of 8 TNCs and SMEs are selected for comparability purposes for discussion in this Chapter, with their profiles outlined in **Table 15**. In the next section, 'war for talent' practices are first discussed, followed by 'wealth of talent' practices. Managerial interviews are discussed in relation to their firms. Employee interviews are discussed in an aggregated manner without specific reference to their firm for ethical reasons, as explained in Chapter 4.

Table 15. Demographics of selected firms for comparative analysis

Four 'war for talent' firms	Four 'wealth of talent' firms
Manager interviews	
WFT-01 (TNC) is a global European equipment manufacturer in the construction industry with more than 50,000 workers in more than 100 locations worldwide. One senior HR manager and two training managers were interviewed.	*WOT-01* (TNC) is a global European manufacturer supporting the agricultural industry with over 10,000 workforce in more than 60 locations worldwide. The hub director was interviewed.
WFT-02 (TNC) is a global professional consulting company with over 100,000 employees worldwide. The HR director was interviewed in the original Talent project (Brown et al., 2019) but has since left the company. Her replacement was interviewed in this follow-up project.	*WOT-02* (TNC) is a medium-sized European SME that supports IT in the manufacturing sector. It has a workforce of close to 200 globally. The managing director was interviewed.
WFT-03 is a large Singaporean retail enterprise with more than 1,000 employees worldwide. The HR director was interviewed.	*WOT-03* is a large Singaporean enterprise that operates in F&B and retail. It has more than 1,000 employees globally. The HR director was interviewed.

Four 'war for talent' firms	Four 'wealth of talent' firms
WFT-04 is a small local enterprise in the travel industry with operations only in Singapore. The HR director was interviewed.	*WOT-04* is a small local enterprise in corporate training with operations only in Singapore. The HR manager and a senior consultant were interviewed.
Work journey interviews	
Two 'war for talent' firms provided employees for work journey interviews (total n=6). All of these employees are on high-potential programmes. Their job roles range from sales to engineering and customer service.	Three 'wealth of talent' firms provided employees for work journey interviews (total n=9). As these firms do not have high-potential programmes, there appears to be no key criterion for firms' selection other than employees' personal interest to participate in the research project. Their job roles include business analysis, data engineering, IT consultancy, and UX/UI design.
Summary	
Total corporate interviews: 6 **Total employee interviews: 6**	**Total corporate interviews: 5** **Total employee interviews: 9**

'War for talent' firms

Talent restratification as a business strategy

The corporate talent management programmes in 'war for talent' firms are strategic initiatives driven at the highest leadership level, and intertwined with new corporate priorities. In *WFT-01*, the introduction of a corporate talent management programme in the late 2000s came at a time of corporate thinking that with technologies being easily emulated by Chinese competitors, the company needs to differentiate itself through service offerings. This is a highly unusual view for a company that is internationally known for its engineering prowess. By service offerings, the regional HR manager describes it as the "ease" with which clients do business with the company that requires leaders who can bring teams together – in other words, managerial capabilities. Significant investments are put in place to build such a cadre of talent.

The European HQ drives the managerial talent programme as a highly competitive programme run on a global scale to groom future leaders for the company. In a company with more than 50,000 workers across more than 150 locations, only 50 people are accepted globally each year. Drawn from across global sites, these high-potential talents are identified by their country managers as future talent and put through a high-pressure assessment process. Once selected, they are exposed to rich opportunities for

development, including an overseas stint and mentoring by senior leaders, where they are constantly assessed to ensure their continuous fit to the needs of a highly exclusive programme. The Singapore office drives the engineering talent programme for entry-level engineers who receive all-rounded training to be trained as engineering talent. In Singapore, only a small group of about 10% of the workforce is enrolled in either the managerial or engineering talent development programmes.

Similar practices of talent stratification are conducted in *WFT-02* that are also tied to corporate priorities. Specifically, the APAC HR director describes three talent categories. The first talent category is the highest distinction referring to individuals being groomed to build new strategic capabilities for the firm that are ahead of the market. The second talent category applies to those seen as having distinctive achievements, while the third category refers to anyone promoted in the previous year. The APAC HR director shared that no more than 15 to 20% of the workforce will be in the top two talent tags. She explains the close connection between the top talent category in her company and corporate priorities:

> Roles [in the top talent category] are very deliberate. [We] are looking at a 12, 18, 24-month window on how we invest in talent where we put strategic investments in growing capabilities that may be ahead of the curve… We kind of think of ourselves as being in post-digital…In many ways, whatever our clients need, we need to have them first at a more mature capability [level] so that we can help our clients achieve their digital transformation. So for us [it] is always building ahead of the curve, what perhaps people today may not be seeing as that volume or that demand…[This corresponds with] knowing where we invest in that talent in a specific way that will allow us to grow a sizable capability and scale it fast. *(APAC HR director, WFT-02)*

Ironically, when the previous APAC HR director for *WFT-02* was interviewed in 2016, she had said that the corporate priority was to 'blow up' performance appraisal, as the process was seen as too time-consuming, expensive and not adding value to the employees' journey (Brown et al., 2019). In effect, this review of the appraisal process has led to corporate talent management becoming more exclusive and being tied to senior-level discussions, with the link from the corporate talent management programme to the strategic priorities of the company being made more deliberate.

WFT-03 similarly introduced a corporate talent management programme very recently as part of a massive 5-year corporate transformation programme that came about due to significant pressures from born-digital retail players that were taking the Asian retail scene by storm. The strategy of *WFT-03* is to go on a significant headhunting exercise through a 'buy' strategy of getting top talent with experience in digital retail, including platformisation, customer analytics and digital marketing. These are typically

foreign talent with digital retail experience who sit on its senior management team. Ironically, after a strategy of buying talent to mount an aggressive digital strategy, it has come to realise that its traditional forte of warehousing and physical stores are, in fact, its strengths because, when combined with new digital capabilities, they far exceed the capacity of any born-digital retail players. This admission by *WFT-03* supports the observations of Noble (1986) and Thomas (1994) that decisions on new technologies are often made according to goals and assumptions defined by powerful groups inside the organisation that may not coincide with what is the most efficient. Despite a good reflection of the error of the firm's past strategies, the HR director in *WFT-03* still feels the need to bring in experienced hires for roles deemed strategic to the company, such as customer analytics. Complementing the 'war for talent' for experienced hires at the level of senior management, a high-potential talent management programme is put in place that comprises no more than 5% of the company's global workforce. The senior leadership is closely involved in the high-potential programme. As the HR director explains:

> [The talent programme] involves the leadership team in coaching or even the selection. The leadership team conducts interview with these people. So they are also have buy-in. They are also equally vested in the success of this bunch of people that we have chosen. (HR Director, *WFT-03*)

The fourth 'war for talent' firm, *WFT-04*, likewise has been feeling the pressure from the disruption by technology that cuts at their role as a middleman in the travel industry. Strategies to secure new profit streams are similarly accompanied by the introduction of a corporate talent management programme that has a different flavour in an industry that typically does not require graduate labour as part of the job requirements. To overcome the challenge of the disinterest of Singapore graduates, the company has started headhunting polytechnic students to offer them sponsorships followed by further sponsorship in university studies. As management associates, these talents have an accelerated career track with rotation across several job roles before landing plum roles in the much-coveted marketing and product development departments. The HR director emphasises that the company's operational needs are most dependent on experienced hires who typically only have diploma qualifications. However, the flow of young graduates is seen as vital to inject "fresh ideas" into the company and keep up with changing consumer needs.

Again and again, across the four firms, we see that corporate talent management is designed to complement a business strategy to beat the competition by building capacity in a select few to conceptualise product or service innovation, which the rest of the workforce would then roll out. *WFT-01* and *WFT-02* are brand-name firms with deep pockets that engage in 'war for talent' practices to hire graduates from top elite universities worldwide and bid for experienced hires from brand-name competitors. However, as *WFT-04* shows, it is possible to apply 'war for talent' strategies even when a

firm cannot access the elite group by carving out an alternative pool that is nurtured through the principle of scarcity. The underpinning idea is to select the 'best of the best' based on what is possible. To qualify, handpicked employees must go through a strict vetting process and subsequently be given developmental opportunities unavailable to the rest of the workforce. They are then subjected to continuous scrutiny by senior leaders to justify that they are indeed deserving to be in the small, privileged group entrusted to take their firms forward.

Views from employees

Despite the sophisticated design of corporate talent management strategies and their intention to support the empowerment of an elite group to drive change, the outcome of stratification is to limit the discretion of professionals across the firm, even for those regarded as talent. Consistent with the findings of Brown et al. (2019), while the talents that are interviewed value the recognition they receive from the organisation, the process of talent prediction means that corporate talent management programmes are built in the image of senior leaders that give those identified as talent minimal space to manoeuvre.

Indeed, despite 15 years of industry experience and his involvement in global programmes to develop new ideas to take the organisation forward, a high-potential talent feels constrained by the overall direction set by senior leaders. He has been thinking hard about the possible opportunities with digital technologies, seeing them as an enabler for "convenience, transparency and connectivity" in the industry. In fact, he has an idea of building an app that facilitates building a new relationship with users that the firm currently lacks. However, he does not think that such an app will sit easily with "corporates" who are likely to fear the level of accountability that comes with transparency. He shares:

> This is my own personal sharing because I have been in this line for quite long and I also wanted to see how can we make some changes…[description of app redacted to maintain anonymity of the business context]…I very much want to see this app but I am not so sure whether [the firm] will want this app as it is more like monitoring them. *(WFT-Employee 01)*

What we see, in fact, is how the process of corporate talent management has socialised high potential talent into the ways of thinking of senior management that makes proposing alternatives risky, even when these professionals assess that an alternative strategy is crucial to deliver better value. They lack the organisational freedom to take risks and exercise their professional judgment. This socialisation to align with the views of a corporate leader is an unintended consequence of the corporate talent management process, as talents are fully aware that they are constantly being judged and assessed to justify their continued participation in the programme. In other words, the 'war for talent' approach suppresses the exercise of professional judgement, as those designated as talent consider the views and

ideas they should put forward as part of impression management in a high-stakes game (Goffman, 1956). As described by another talent:

> A lot of things come from the management, like, say your budget, how much you spend, and there are certain goals in a company that is top-down. We have to conform to making those goals happen. And that results in us trying to think in certain processes. Like, in order to get this goal, I need to do this, this, this, this, this. *(WFT-Employee 02)*

Consistent across the employee interviews in these two firms, despite being on high-potential programmes that are supposed to provide them with stretch opportunities, these talents clearly feel that they are not in a position to influence corporate decisions. One talent describes how disempowered he feels:

> The struggle…, I would say, is really the lack of empowerment... It's like there are certain things that you want to do, but it seems like you do not have the authority to do. *(WFT-Employee 03)*

He adds that he has limited opportunity to shape the future products and services of the company. He shares:

> In my scope so far, we have multi-layers, I would say. We are really at that layer whereby we only do the operation, the frontline. So those products which are being launched by R&D, it's really high up, it's really beyond us. They have an R&D team looking at that. *(WFT-Employee 03)*

High-potential programmes, as a new form of corporate talent management, therefore underpin a particular character of the social relations of production by identifying a small group that managers choose to trust to build future products and services, but in the process, undermines the exercise of discretion by these workers. While these talents maintain their professional discretion to carry out complex tasks, they are denied the organisational discretion to coordinate activities across tasks and harness digital tools to augment their practice as they deem fit. Regardless, these talents retain significant power as part of the organisational structure that brings them directly into the execution, if not conception, of digital corporate goals. What is problematic is to think about the fate and fortunes of those not regarded as talent, whose position I will now analyse.

Future trajectory for labour

Indeed, the turn to the 'Internet of Things' (IoT) is anticipated to lead to significant changes in the overall work processes, but interestingly, managers do not expect their work process to evolve significantly. When asked about the development of IoT-fitted equipment, a managerial talent does not anticipate significant changes to her job scope. She shares:

> For me, it will specifically not [change]. I just have to be a lot more aware of what's going on with the changes to the product – that there's something else to think about in terms of the [projects]. It's extra stuff that we just have to be aware of. *(WFT-Employee 04)*

The above quote reflects the centrality of managerial power to get things done in a corporate setting, including achieving financial goals, client management and project management that will continue to drive their role in the labour process. By virtue of their abundance in a professional setting, technical skills appear to have less strategic value in a system set up based on the scarcity principle. A training manager in a *WFT-01* firm describes how technical skills will change with the development of an IoT platform:

> We actually have sensors around this machine [that] will give feedback before the machine even [has] a breakdown. So it's kind of like a big data analysis where we have predictive maintenance. And also, it has these diagnostic tools available. Which means, let's say I encounter Error A. They will have like certain steps to be [taken] – our guys don't even need to troubleshoot. The [platform] will tell him what to do, what steps to be taken, in order to resolve this problem, in terms of probability. *(Training manager, WFT-01)*

He anticipates that it is "highly possible" that fewer technical talents are required. What is clear is that physical work is still required:

> You can do automation through digitalisation but getting your hands dirty, it's still the same…. You still need physical work. You cannot say digitalisation will do away with everything. Physical work must still be there. *(Training manager, WFT-01)*

In effect, we are seeing ongoing changes to the labour process involving project managers, data engineers, field engineers and field technicians. Specifically, it can be anticipated that it is the work of field engineers (as opposed to field technicians) that will go through the most significant transformation in terms of deskilling through digital technologies. This suggests an ongoing transfer upwards of the professional discretion of engineers to the coordinating powers of an IoT platform, controlled by machine designers to make judgments on technical possibilities. Technicians will continue to play an

essential role as the front to customers. However, they will increasingly receive digital guidance and monitoring through the platform in a labour process guided by algorithmic management.

In *WFT-02*, a similar transformation is taking place. The current lack of organisational discretion among professionals 'below the talent radar' is being transformed through the digital process to attack their exercise of professional discretion. While its talent pool is receiving the personalised attention of senior management, the rest of the workforce is currently being put through a process of workforce re-engineering of what its APAC HR director calls 'specialisation at scale'. It is worth quoting her at length:

> Three years ago, we introduced a [workforce] analytic solution that is run globally across [>100,000 staff]…That analytics is what we call specialisation at scale. What it essentially does is it actually reverse engineers, based on all the experiences and jobs that we put our people on, what their core skills and specialisations are…Traditionally, how we used to do it was to define the competency framework…you spend all this time with consultants trying to define this [framework]. By the time you've identified everyone and mapped them to something, you need to start this whole process again. It's far more dynamic now, right, because we put people on jobs, and…we can reverse engineer all the skills and the specialisations. The algorithm is a bit of a black box for us…[but] it's consistent across [the workforce]…unlike LinkedIn, where you decide what…avatar you want, and you start building this avatar. [In this platform], it is really based on your experiences. So people can update their experiences, and it auto-generates a profile of where your skills are and how deep your skills might be on the basis of the experiences that are either defined and automatically pulled into the system, or updated by you. And so, with that algorithm, it allows us to match against demand and supply…So we track our demands, we track our supply, we know where people have skills, and we know in the future we need these skills…So more and more we're able to use a more data led approach to match and say, "Okay, [Respondent] has these skills and we need skills in this other area, [and] she has strong adjacency to this new set of skills. We also know when she's going to roll off a project…Which means that if you had these skills, chances are in six weeks, with the right certification, the right exposure, you're going to be able to move up that curve to newer skills, which is helpful in a fast changing technology world…So this allows us to be more deliberate. *(APAC HR Manager, WFT-02)*

A few aspects are worth noting. First, the workforce analytics platform run by an algorithm that the HR director admits is still a "black box" is still seen as more objective than professionals' direct input into the platform. Second, the standardised approach to manage talent 'below the radar' is akin to a spot market of skills based on organisational predictions of how employees should be skilled up, rather than

investing in a human process that allows for autonomy and judgement from professionals on how to build their skills over time. Of note is that these professionals 'below the talent radar' are described as building skills in only "six weeks" as opposed to those who are identified as talent and developed over a more extended period of "12, 18 and 24 months". This put professionals 'below the talent radar" through a process of precarity. Through the workforce analytics platform, the organisation's global visibility of the professional workforce is now mediated by a technology platform that further strengthens managerial control of talent 'below the radar'. The APAC HR director highlights how the platform is allowing for greater convergence within the managerial team as they start "having the same lens on the data", leading to "same sets of conversations" as employees are put on "dashboards".

Again and again, we see how platforms are imagined in ways that will lead to the upward transfer of discretion to managers and machine designers. It is the same in *WFT-04*, in which the expertise of professionals is anticipated to be mediated by algorithms. The HR manager describes the process:

> Instead of a human being, the AI could search for keywords and reply to the customers. If a customer wants us to propose itineraries, they put in keywords. The AI can recommend the itinerary for them, where should they visit etc. So, these are the things that we can think of. It can be like 24/7. It might be that some positions might disappear, but of course, we will still need the human touch. Perhaps, they will do a follow up call after the initial AI touch. *(Singapore HR Manager, WFT-04)*

Meanwhile, there is hardly any effort put into using digital strategies to enhance the jobs of non-professional workers in 'war for talent' firms. *WFT-F03* has a substantial pool of non-professional workers. Its frontline staff are given iPads, but only for the purpose of getting customers to provide data that is then analysed centrally for managerial decisions. There is no attempt at enabling a data-centric approach to support new ways of delivering customer service. The HR manager in *WFT-F03* is of the view "that there's only so much you can do for the frontline [staff]".

Here, I summarise the effects of the 'war for talent' on the labour-power of workers. With senior managers choosing to control the innovation agenda tightly, they seek to trust only a small cadre of talent. This leads to a stratification process that reduces organisational discretion among professional workers. Those on the 'talent radar' are constrained in their ability to exercise their discretion. However, professionals 'below the talent radar' are ultimately most at risk as digital strategies are drawn up without their input. The ongoing curtailment of their organisational discretion is being cemented through digital technologies to limit their professional discretion in the future, as control is transferred upwards to coordinating managers and machine designers. Meanwhile, little is being done to use digital

tools to augment the skills of non-professional labour. In the next section, I will show the contrasting labour outcomes in 'wealth of talent' firms.

'Wealth of talent' firms

Talent empowerment as a business strategy

Like 'war for talent' firms, 'wealth of talent' firms are as concerned about their future fortunes, similarly perceiving complex market changes ahead. For *WOT-01*, the challenge is existential. It forecasts that its chemicals business is "basically sunsetting" over the next 20 to 30 years as the climate change agenda intensifies. In response, the company is pursuing about ten initiatives to take the company forward, including agritech, bioalternatives and carbon sequestration. Its Singapore hub director quips that the company is "basically trying to reengineer [itself for] the next 300 years". For *WOT-02*, being in the IT industry at a time of digital transformation is challenging. As a global SME, it must be extra savvy to deliver a strong value proposition to compete with larger, well-resourced technology firms effectively. *WOT-03*, which is in the F&B-cum-retail industry, and *WOT-04*, which is in the training and consultancy industry, find themselves in a sticky situation with the COVID-19 pandemic. Being in industries that have traditionally been focused on face-to-face interactions, they need to substantially evolve their service offerings into the digital space in record time.

What makes 'wealth of talent' firms stand apart from 'war for talent' firms is their expansive labour strategy to deal with the changing market contexts, in contrast to the stratified labour strategy of 'war for talent' firms. While 'war for talent' firms seek to control the agenda from the top by handpicking a few to work closely with senior managers, 'wealth of talent' firms take the opposite route to empower their broad workforce with high occupational and organisational discretion so that they can identify new possibilities for the firm working directly with customers. The vision of *W0T-01* for agrotechnology deliberately takes a non-conventional perspective. Recognising market saturation within the professional farming industry in advanced economies, which has been its traditional focus, the firm now aims to tap into the vast potential presented by the multitude of smallholder farmers in developing countries across Asia and Africa. It would like to serve these farmers by building a sustainable relationship through engaging in what matters the most to them – financing but avoiding the predatory strategies of typical fintech solutions. Its hub director explains:

> In the agricultural space, especially the smallholder space, the number one demand is better financing. However, traditional micro-financing is an extortion ring within the developing economies, because the banks and the finance industries will play it as this great, wonderful thing, whilst getting 30%, 40% annual interest rates…We're wary of the fact that we may produce negative outcomes for our farmers… [Instead] we're looking at, 'How can we use our

expertise and our knowledge to basically help those farmers follow the crop plan and produce a higher quality crop so they can receive that money?' *(Hub Director, WOT-01)*

In other words, the firm is looking at what smallholder farmers truly need, which is financing and embedding their products and services into the farmers' operations over the long term. This non-conventional approach entails high levels of experimentation, requiring its developers to intimately understand smallholder farmers' business needs, including their articulated and unarticulated needs. The hub director explains that their strategy is to "make sure [employees] have autonomy over their work and decisions that they make, that they have efficacy over the work that they're doing." Achieving efficacy means creating a safe space for professionals to experiment, including challenging the managerial agenda when necessary.

Indeed, professionals enjoy occupational and organisational discretion in 'wealth of talent' firms, supported by strong trust between managers and employees. The driver of this pattern of managerial-employee relations is a business model that values deep customer-centricity that requires unlocking labour's creative potential. For *WOT-01*, this customer-centricity manifests in the long-term support it wishes to offer its smallholder farmers that require ground knowledge from employees. Its digital team are known to go direct to the farmers in Asia and Africa to build a thorough understanding of community needs. It is similar to *WOT-02*, which describes its brand of customer-centricity as a business strategy of "land and expand". Consultants are directly sited at clients' premises to build a close relationship with clients, and to secure additional projects and recurring revenue. This makes managers very dependent on the professional discretion exercised by those on the shopfloor. The managing director of *WOT-02* shares:

> We get a small piece of business and then we prove ourselves, and then we slowly get more and more business – so we get more and more trust from them. And I think it's a bit of a relationship. So when we do well for them, they will give us more business. We get more revenue from services rather than from license sale…The servicing is where the long tail is…So, if you ask me, what is the basic strategy, it is really to provide good service, think for the customer, don't just accept what they say and be a follower. If we know that what they ask [won't work], we have to challenge and clarify. *(Managing director, WOT-02)*

Various strategies are employed to support the exercise of occupational and organisation discretion by those on the shopfloor, with gains mutually shared with the professionals. A customer solutions manager at *WOT-02* describes an unusual strategy of incentivising professionals to achieve a higher work-life balance that meets both the firm's profit goals and workers' own personal goals. He shares:

So the daily goal we set for our consultant is to finish 8 hours of work [as part of billing]. [These] 8 hours of work should be something that the customer's internal engineers cannot achieve even if they work for 12 hours. So you can say this is a very easy because we ask them to work only 8 hours and go back home, enjoy time with your family. But you can also say that these are very high standards because we ask them to have an output that is at least 50% higher than the customer…So they should spend time thinking how to increase their output rather than spending more time on the same path…And surprisingly, this is also out of our expectations, we are really successful in achieving this… We really have zero overtime for the past many years. *(Customer solutions manager, WOT-02)*

Here, the focus is on sharing gains between capital and labour in return for the exercise of labour's creative capacity, which will build the firm's long-term pipeline of business opportunities.

For *WOT-03,* it similarly seeks to advance a unique customer-centric model combining retail and F&B operations. It describes how its front-of-house staff is treated as talent as much as those in corporate roles. This stands in sharp contrast to the practices of *WFT-03,* whereby frontline sales staff are seen to have little strategic value to the firm, with managerial attention placed on employees in corporate roles. The HR manager of *WOT-03* describes the business context as to why frontline staff is so valuable to it:

We try to give our customers a very personalised service. So today, if you are dining with us in our salon, this server would be with you from the moment you step in till you leave our store. If you are interested in any of our products that today in the dining area that you have probably enjoyed or savour, we will bring you to the retail space to show you. For that, we hope to have one person throughout. So, I know many F&B operators out there – they probably don't do this kind of personalised service. So, this is the kind of service that we are looking at. *(HR manager, WOT-03)*

For *WOT-04* that is in the corporate training industry, it similarly avoids providing standard solutions seeking to build a long-term relationship with all its clients. This meant that its trainers are empowered to design meaningful training programmes that meet the spoken and unspoken needs of their clients. Indeed, it is this model of customer-centricity from the bottom-up that distinguishes 'wealth of talent' from 'war for talent' firms. Consequently, employees in 'wealth of talent' firms enjoy high occupational and organisational discretion.

Views from employees

Indeed, managers' descriptions of the autonomy they provide staff are well-corroborated by the experiences of employees themselves. Employees' views reflect the space they have to exercise their professional judgement, including the ability to challenge managerial authority when necessary. An experienced technologist observes that app development in a 'wealth of talent' firm differs from that in other technology companies due to the emphasis placed on meeting customers' needs. She shares:

> I have gone into markets to meet our [customers]. So I think that is very important, because you want to hear their stories, you want to hear their experiences. Not just about the app, but in their everyday life…The question that I always ask my managers, is 'What is the impact that we're bringing to people?'. It's not enough that we create all these products...It's great to think about how many users that we have coming to the product. But what does it ultimately mean? I've been in the media internet companies…and we chase after these vanity metrics…It looks great, because it shows to other people how many users you have. But if we dig deeper, what do [the metrics] mean? (*WOT-Employee 01*)

Indeed, managers in a wealth of talent firms are authentic in encouraging professionals to experiment with new ideas, creating a safe environment to fail. As the technology executive goes on to explain:

> Our managers are very open to hearing ideas…They'll give their feedback, and they generally say 'Yeah, okay good, go try it and see how that works'…I remembered an initiative that I did. It went through quite a few hurdles…I had come up with my own KPIs…Unfortunately I didn't meet them. When I mentioned it to my boss, she said to me, 'Oh, but you learnt a lot, right?' So I said yes...She said it was our first foray into that market in the digital sense, so 'it's good that you get all these sort of learnings'. (*WOT-Employee 01*)

Again and again, we find that employees in 'wealth of talent' firms respond to exercise their professional discretion to deliver non-standard solutions. An employee shares:

> If you see a gap, the bosses…empower you, or they give you the autonomy to keep trying things out. And then hopefully see whether it works…It's a sense making model…once you move into the complex or complicated sphere, best practices don't work anymore. So you really have to keep probing and sensing, probing and sensing. *(IT executive, WOT-Employee 02)*

An equally crucial aspect of the autonomy in 'wealth of talent' firms is the ease with which they can coordinate activities across tasks that involve other professionals in what can be described as professional collegiality. The expansive space given to professionals means reaching out to other

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employees in collaborative, boundary-crossing learning that strengthens their autonomy to coordinate activity across tasks is easy. This practice is in sharp contrast to the employee experiences in 'war for talent' firms. A UX designer describes the ease with which she could collaborate with other colleagues:

> We work within the UX team,…the product owner…, data analyst, of course, especially when the product is launched… We are really in a very collaborative environment. Like everyone is attending to each other. *(UX researcher, WOT-Employee 03)*

Future trajectory for labour

Digital technologies deployed in the context of a high trust, high discretion operating environment means that employees have the autonomy to use digital technologies to augment their practice. Such technologies are proliferated from the bottom-up, ensuring that a wide spectrum of professionals can evolve their practice digitally. This is a significant departure from 'war for talent' practices that treat digital talent as a special breed. The hub director of *WOT-F01* highlights the contrasting practices between his firm and other technology companies. He shares:

> A lot of tech companies have this obsession with the 10x engineer...It's an illusionary concept that you can hire engineers who are 10 times more productive than the average. From my experience, they don't exist. In practicality, a 10x engineer is a monster. They're someone who's usually in the good books of the founder and has free rein to do whatever they want... They do produce a lot of results but over time, there are a lot of results that someone else has to come and fix. So I think for... for me, the hard technical skills are important…and they have to have some level of social skills – like be able to listen, be able to introspect, be able to... to raise concerns when they have concerns and to work things out. *(Hub director, WOT-01)*

The rejection of a special class of technology talent by 'wealth of talent' firms is accompanied by a preference for a build model to grow digital capabilities, as it is felt that existing employees are in a better position to connect technologies directly into the business offerings. The HR manager in *WOT-04* is not unusual in her views of why a build model makes sense:

> In our organisation, we actually have a few people who have really shown an interest in the [digital] area. So rather than go out to hire somebody who is a data analytics person, and then getting this person to understand the ins and outs of our industry…, we thought [it best] if we have somebody internally who really understands us well, and who then has a passion to grow in this area. We actually have a couple of people who have gone on to take courses, even degree-level courses, in the area of data analytics. So they are working and studying at the same time...

We can immediately look at applying it, trying it out and piloting certain things. So this is how we are developing our data analytics capability. *(HR manager, WOT-04)*

The build model means giving employees discretion on the areas they want to develop in, in sharp contrast to the practices of *WFT-02* that seek to orchestrate the learning activities of their employees from the top. These include picking up skills in new areas, even if it is something that the firm does not need at present. The managing director of *WOT-02* shares:

We have one engineer who wants to [take up] machine learning…It may be applicable for us, but not yet. So what we propose to him is to join the course and after that, he can make a presentation to share with us how [machine learning] may be applicable or not applicable to our industry. [If] he can prove that it is not applicable for our industry, it will work as well, right? So, this is something that everyone needs to explore. If nobody attends all these courses, how do we know if this [capability] is related to us? (*Managing director, WOT-02*)

What is crucial, too, is that in the process of technological experimentation, the culture of collegiality means that technologists have to work through peers to link up the digital tools with the wider practice. This leads to the character of bottom-up experimentation with digital technologies that permeate across the broad workforce in 'wealth of talent' firms. An IT specialist in a 'wealth of talent' firm describes a recent project:

We choose the right [colleagues] to pilot it with us – those who were more willing to try, those who already feel the pain. So they were very game to try. And from there, we started to roll it out to the rest of the [colleagues]. *(IT specialist, WOT-Employee 03)*

'Wealth of talent' firms also expand the use of digital tools for workforce augmentation to include non-professional labour. *WOT-03* values the feedback from front-of-house staff as it directly informs their operations. Towards this end, a customer service team has been set up in the corporate office to systematically build upon the feedback from the frontline staff. The HR manager in *WOT-F04* shares:

We try to link our front-of-the-house operations with our digital operations. We have these iPads…Like the first class or business class passengers in [airlines], the crew would actually be able to retrieve like your preference. So that's what we try to do as well. *(HR manager, WOT-04)*

Thus, while frontline staff in *WFT-03* do not get digital tools to delight their customers, being required to get clients to fill up digital forms, this is not the case in WOT-03, whereby the company seeks to

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strengthen the digital capabilities of the frontline staff. This is done by providing a comprehensive data analytics platform to support their professional judgement on how best to enhance the customer experience. The stark difference in approaches for similar non-professional roles between *WFT-03* and *WOT-03* is striking. It supports this study's hypothesis of organisations' critical role in shaping labour outcomes from digital programmes.

Finally, the expansive space in 'wealth of talent' firms provides a context for understanding the unusual finding in the quantitative analysis that Cluster 2 firms had the highest attrition despite being a high-trust workplace. The reason lies in the extensive autonomy granted to employees throughout the organisation, enabling their involvement in high-impact work that substantially enhances their labour market standing. One employee in a 'wealth of talent' firm shares that he had a weak resume as a fresh graduate and struggled to get a job prior to being hired by the firm. In just three years with the company, he experiences a notable surge in his standing in the labour market, and is now being recruited by a high-profile startup.

Assessment of changes to labour power

The contrasting cases presented in this chapter between 'war for talent' and 'wealth of talent' firms provide robust evidence of the crucial role that social relations of production at the firm level play in shaping labour fortunes, in contrast to technological deterministic accounts of the digital process. There is no one way in which technology shapes labour outcomes. Corporate talent management is an expression of the social relations of production that is integrally connected to firms' valorisation strategy. The design of digital programmes and their effects on labour sit within this valorisation process. This design of the valorisation process is not neutral and may be subject to managerial bias. As seen in *WFT-03* that pursued a digitalisation process to compete with born-AI retail players only to realise its strengths in warehousing belatedly, managerial decisions may not coincide with what is the most effective (Noble, 1986; Thomas, 1994).

From the qualitative data, there is minimal risk of labour substitution or standardisation of professional work from digital programmes in 'wealth of talent' firms. Due to the bottom-up innovation and constant customisation strategy, there is ample space for both professional and non-professional workers to be involved in designing and using digital tools to augment their practice. The likely outcome is skills-biased technological change as more complex skills are embedded into their job roles, together with the strengthening of their ability to coordinate activities across tasks. The BPSS findings converge well with the qualitative data, showing statistically significant findings that 'wealth of talent' firms are less likely to reduce workers due to technological change, and are more likely to upgrade the skills requirements of new hires for high and mid-level skills. 'Wealth of talent' firms, therefore, are the ideal corporate partners, as imagined by the Singapore developmental state seeking to create quality jobs

through encouraging digital innovation. However, with the BPSS cluster analysis showing that only 25 per cent of establishments in Singapore exhibit 'wealth of talent' practices, policy expectations of pervasive skills-biased technological change across the economy to meet the high aspirations of Singaporeans are likely to be misplaced.

'War for talent' firms, on the other hand, maintain a restricted view of the workforce that is a manifestation of its top-down innovation agenda to valorise through a model of adaptive customisation – creating a high-end product with limited customisation to control operational costs. Only a small group is entrusted to lead the innovation process, but they, too, feel constrained by the tight control of the innovation agenda. In the context of the stratification of high-skilled workers within firms' internal labour market, the casualties are high-skilled professionals. Firms rely on them to exercise professional discretion to carry out complex tasks. However, they now lack the autonomy to coordinate activities across tasks and influence the strategic direction of the business, including technological innovation. Non-professional workers remain peripheral. They are increasingly expected to use digital tools, such as the customer service workers in *WFT-03,* who now have to ask customers to fill out surveys without involvement in analysing and using that data. Such strategies may increase the skill content of the job but may not increase the demand for complex skills or the discretion to coordinate activities across tasks. The BPSS findings converge well with the qualitative data in some respects. It shows statistically significant findings that 'war for talent' firms reduce workers as a result of technological change in sharp contrast to 'wealth of talent' firms. However, as BPSS did not ask which category of workers was reduced, it is not possible to conclude which labour segment was impacted. What is interesting is that both 'war for talent' and 'wealth of talent' firms are as likely to increase training for new hires in both professional and technical roles as a result of technological. Regardless, the qualitative data suggests the limits of training as the sole variable for assessing skills upgrading.

In summary, this chapter has compared the corporate talent management practices of 'war for talent' and 'wealth of talent' firms, showing how the talent models interlink tightly with the valorisation strategies of firms. The creative potential of labour is enhanced in 'wealth of talent' firms, underpinned by a valorising strategy of constant customisation relying on a broad spectrum of the workforce. Digital tools are made available to the workforce as part of the customisation process of products and services. In contrast, 'war for talent' firms seek to stratify their workers as part of their valorising strategy that depends on strengthening the efficiency of their processes through digital technologies, which transfer discretion upwards to managers and digital specialists.

Chapter 7 | 'Constrained talent' vs 'zero-talent' firms

Comparing 'constrained talent' and 'zero talent' firms

'Constrained talent' and 'zero-talent' firms differ from 'wealth of talent' and 'war for talent' primarily by differences in levels of occupational discretion. The nature of the business activities of 'constrained talent' and 'zero talent' firms means they tend to rely on an underlying model of cost-efficiency. This does not mean that they operate a simple business. Instead, as I will show in this chapter, 'constrained talent' and 'zero talent' firms offer complex services in healthcare, finance and manufacturing in keeping with the context of Singapore as an advanced economy shifting to a 'global city' strategy. Rather, the market that 'constrained talent' and 'zero-talent' firms play in gives rise to a valorisation strategy that requires hedging costs, including prohibitive labour costs. Unlike 'wealth of talent' and 'war for talent' firms, 'constrained talent' and 'zero-talent' firms primarily avoid taking the risks of creating new products or services. Instead of value-creation, they seek to offer simple value-add to products and services. This may include activities such as being an intermediary for selling stationery supplies, insurance products and medical services to corporate clients or offering a low-end range of services such as standardised accounting/taxation services or mass home-cleaning services.

Pulling off an underlying business model of cost-efficiency in the context of Singapore as a high-cost economy with expensive labour costs, is challenging. However, as outlined in Chapter 3, this business strategy is sustained by the foreign worker policy of the Singapore government that has facilitated the flow of cheap foreign workers into the economy since the 1980s. Since 2010, the share of foreign workers in Singapore has remained constant at about one-third of the total workforce. Of these workers, 70 per cent are hired for semi-skilled work, 15 per cent for mid-skilled work, and another 15 per cent for high-skilled work (Sadik et al., 2023a). The design of narrow jobs is thus an essential part of a cost-control strategy for 'constrained talent' and 'zero-talent' firms, as it will qualify them to apply for semi-skilled and mid-skilled work passes to hire workers who are significantly cheaper than locals. For example, one 'constrained talent' firm shares that its basic approach is to 'maximise' the quota of foreign workers before hiring local workers.

The consequence of a cost-driven strategy to hire low- and mid-skilled foreign workers is the creation of job environments with weak levels of occupational discretion at lower wages, which makes it difficult for firms to attract and retain highly educated workers. One of the indicators in the BPSS analysis relates to the jobs in the establishment that require frequent learning, which is a crucial marker of task complexity. 'Constrained talent' and 'zero-talent' establishments report average values of 15-25 per cent and 11-20 per cent of the workforce that are engaged in jobs that require frequent learning, whereas

'wealth of talent' and 'war for talent' establishments report substantially higher average range values at 45-55 per cent and 31-40 per cent respectively. The vast majority of jobs in 'constrained talent' and 'zero talent' firms have indeed been designed to be narrow.

In a business with narrowly designed jobs, managerial power manifests in centralising conception and planning activities in a few people who also oversee execution activities. 'Constrained talent' firms offer a little more space for workers to exercise organisational discretion as part of the 'cosmetic customisation' strategy to make up for their standardised products and services (Gilmore & Pine, 1997). However, the overriding valorisation strategy of controlling costs significantly limits the space available for labour to exercise their creative potential. 'Zero-talent' firms offer little occupational and organisational discretion to their workforce, with managerial power coming across as unyielding. The primary emphasis is on the top management, with a clear and organised distribution of tasks for the rest of the team.

SMEs are found to be most likely to be 'zero-talent' firms based on the BPSS analysis. As highlighted in Chapter 3, the current period of digitalisation is seen as an opportunity to help the weak SME sector make the leap, by encouraging their use of technology to upgrade jobs and skills. However, our mixed method analysis shows little evidence that digital innovation will transform 'constrained talent' and 'zero-talent' firms to demand jobs with high occupational discretion that highly-qualified labour in Singapore will find satisfying and a good use of their qualifications and expertise. What is prevalent instead is the firms' use of technology to sustain their price competition models through process innovation rather than product innovation. The BPSS analysis demonstrates statistically significant findings that when these firms engage in technological changes to their work processes, they do not demand higher skills from new recruits, which would indicate an increase in skills demand. Without changing the underlying valorisation strategy of these firms, there is little space for creating high-discretion jobs through technological change. In this chapter, using qualitative data, I will show how job roles with low discretion are reproduced in these firms' digital innovation context.

A total of six 'constrained talent' and 'zero talent' firms are presented in this chapter for in-depth comparative analysis. Their profiles are outlined in **Table 16**. Managerial interviews are discussed in relation to their firms. Employee interviews are discussed in an aggregated manner without specific reference to their firm for ethical reasons, as explained in Chapter 4. Only constrained talent firms facilitated access to employees for work journey interviews. In the next section, I first discuss the practices of 'constrained talent' followed by those of 'zero-talent' firms.

Table 16. Demographics of selected firms for comparative analysis

4 'constrained talent' firms (CT)	3 'zero-talent' firms (ZT)
Managerial interviews	
CT-01 provides cleaning services in Singapore, employing more than 200 workers. Most of the workforce comprises cleaning crew, with less than 15% holding a degree qualification. It has started hiring professional workers who work remotely. The CEO and operations manager were interviewed.	*ZT-01* (TNC) is a Singapore-headquartered global healthcare provider designing customised medical services for corporate and insurer clients. It has more than 1,000 workers in the region. The Asia-Pacific HR manager was interviewed.
CT-02 (SME) provides business supplies to over 10,000 corporate clients in Singapore. It has fewer than 50 employees. The managing director and head of technology were interviewed.	*ZT-02 (SME)* is a professional services company providing accounting, taxation and secretarial services to SMEs in Singapore. It has fewer than 10 employees, with a core staff strength of 3 while the rest are freelance labour. The managing director was interviewed.
CT-03 (SME) is an insurance brokerage firm servicing an SME clientele base. It has fewer than 20 employees. The CEO was interviewed.	*ZT-03 (SME)* supplies niche parts to high-end manufacturers in Singapore. It currently has fewer than 10 employees. The managing director was interviewed.
Work journey interviews	
All three constrained talent firms provided employees for work journey interviews (total n=6). Their job roles included sales, IT and multimedia design.	None of the zero-talent companies provided employees for work journey interviews.
Total corporate interviews: 5 **Total employee interviews: 6**	**Total corporate interviews: 3** **Total employee interviews: 0**

'Constrained talent' firms

Shifting to a digital platform strategy

During the research study period, all three 'constrained talent' firms are going through a leadership renewal process. In keeping with Singapore's significant change in skills formation in the last 30 years, the new generation of leaders has substantially more education with a cosmopolitan profile and exposure to sophisticated work practices than their predecessors. The new business leaders at *CT-01* and *CT-02* are economists with stellar university credentials, taking over the business from their parents, who are first-generation owners with substantially less education. The CEO of *CT-03* is an internal

promotee with an education profile that makes him feel less than pedigree. He was educated in a government polytechnic before doing a degree programme at an open university. Nonetheless, all three are degree holders in business outfits in which the vast majority of jobs do not require a degree, even if some in the workforce may have them.

All three leaders are pursuing an aggressive strategy of modernising the business, with digital technologies featuring heavily as a core strategy. They show good knowledge of the technology trends in their sectors. However, none of the leaders are attempting to use technology to create substantially new customer value, thereby upgrading the business to pursue value-creation. Instead, technology is leveraged to optimise current processes, without changing the firm's underlying cost-efficiency business model. Consequently, the pattern of low professional discretion will likely remain unchanged for the bulk of the workforce, even for new job roles being created. In the interviews with all three leaders, it comes across that the 'price competition' nature of their business is assumed to be inevitable even if all three leaders acknowledge that evolving industry practices mean their profit margins are taking a significant cut.

CT-01 provides cleaning services to home and commercial establishments in an industry famed for race-to-the-bottom strategies that lead to declining wages of workers. To win contracts, firms charge less, leading to workers being paid less. This creates a challenge for attracting and retaining workers that impedes the firms' ability to get the next contract. The new CEO at *CT-01* seeks to use digital technologies to reverse the strategy, focusing on keeping administrative costs lean so that it could still charge clients less while paying workers more. Its CEO is cognisant of the tension between increasing the wages of the field staff and getting contracts in the industry. He views digitalisation as a crucial strategy to overcome this tension. The CEO shares:

> A lot of the equation is [based on the assumption] that I will pay you more, but I will charge the client more. That's not sustainable in the long run. The reverse normally happens – I will charge a client less so I will get the contract, and I will pay you less. But for us *[at CT-01]*, we are trying to reduce the administrative overheads. So we digitise and automate a lot of things. So we can pay workers more, and get better quality workers. At the same time, we charge clients less so we get more clients. That's the virtuous cycle that you need. *(CEO, CT-01)*

Since taking over the business, the CEO at *CT-01* has been investing in building a platform to drive its processes to achieve the scale and efficiency needed to create this 'virtuous' cycle. It is not just about technology adoption but also about making crucial decisions on redesigning his business as a platform, particularly using gig workers. The CEO is familiar with low-cost gig platform models such as Grab

and TaskRabbit. However, he still opts to retain his workers on a full-time and part-time employment model, citing business and societal reasons. He shares:

> [From] a business point of view, if the product is not homogenous, a freelancer model works less well. Delivery and ride hailing are very homogenous products…Do you remember the face of your last Grab driver? You don't. But would you remember the face of the person who cleans your house? You would, right? Because for house cleaning, [you would want] to teach someone how to fold your clothes – you don't want them to be folded the other way…If I send a random person to your house every time to clean up, you would be very upset…[There is] repeated interaction. If there is repeated interaction, at some point the freelancers [would ask], "Why am I paying a platform fee? How about you pay me a bit more, and then we will sign contract?". In this particular model, freelancing doesn't work so well.

> [From a society point of view]…the [Singapore] government is…mandating the social security net that everybody builds. A freelancer platform is essentially able to get workers by arbitraging this. [If I employ you], I'm paying $20, but you are getting $14 or $15 [as the difference goes into social security payment],..As a freelancer platform, I will pay you $16 or $17…We know that people value…immediate money more than [future money]. But I think that it's not a sustainable model in the long term. Governments are realising this as well. *(CEO, CT-01)*

Digital technologies are thus used to re-energise the current valorisation strategy of *CT-01*, through strengthening backend operations so that the company can maintain low costs while achieving scalability in sales through enhanced services to customers to book an appointment digitally with transparency on backend availability and billing. The CEO is, therefore, creating new job roles as part of the shift to a platform-mediated business. This is done by strengthening the executive layer in operations, sales, marketing, finance and IT to deliver his technology vision. The role occupants of the executive layer are those with degree qualifications and form less than 15% of the total workforce. Such roles are premium in the firm context, sitting as a layer on top of the cleaning field staff who require little education. However, these executive job roles can hardly be described as high discretion by standards expected of professional work, as the platform's goal is to achieve predictability in interdepartmental interactions. He explains his vision:

> I told my departments that you should operate with each other like APIs [Application Programming Interface]. Department A sends Department B things in a predictable format. It then comes back in a predictable format. So, at that point, you sort of abstract the personalities out of their workflow…There will always be like fuzziness around the edges. That's where the managers are supposed to work with one another to resolve edge cases. But 80% of workflow

should be pretty standard. If billings were to ask operations for something, it must come go across in a certain format, and the data must be returned in a certain format. *(CEO, CT-01)*

Here, job content is highly technical but in a standardised manner that can be done remotely through hiring cheaper professional labour from the region, requiring little need for expensive Singaporean workers. He shares:

> A lot of the human-robot type work – honestly, it does not matter if you don't hire a Singaporean. The price difference regionally is about 5x. *(CEO, CT-01)*

Consequently, his executive team is built by setting up permanent remote job roles at significantly lower costs through hiring from the region. Planning, strategy, operations and HR departments remain in Singapore. However, sales and customer service departments are based in the Philippines, while IT work is shared across staff in Indonesia, the Philippines and India. He develops an exclusive approach to hiring and developing such executives. The hiring process includes a series of tests, video and face-to-face interviews and reference checks, which, in his view, allow recruits to feel that his company is "different" from other SMEs. He spends significant time developing them through weekly one-to-one check-in sessions and discussions of book chapters penned by management gurus worldwide. His executive team in Singapore and the region greatly appreciates the guidance and coaching he provides them, but their job roles remain execution roles. Overall, the firm is expanding. The executive roles, described as the "mid layer" by the CEO, are growing, although the numbers are small. He is also expanding "the bottom layer" comprising field service staff.

What is worrisome is that due to the organisation's strategy to innovate by strengthening the administrative processes, the field cleaning staff that form the bulk of the firm's workforce are entirely marginalised in the firm's digitalisation process. In the discussion with the CEO, the cleaning workforce appears invisible as he is focused on sharing what he is doing to build his executive layer. To the CEO, managing the executive layer is a complex activity, but the field cleaning staff requires handling using the "carrot-and-stick" approach, in his own words. It comes across that the latter are regarded as drones in the firm, even though the firm takes a benevolent view towards them by trying hard to reduce costs to strengthen their wages. There is hardly any effort to transform the cleaning staff's work, even though they deliver value directly to customers. The operations manager acknowledges this and admits that the firm has not considered these issues.

More crucially, creating an executive layer through technology-mediated, remote roles means a ceiling on the career progression of field cleaning staff. Where industry practices typically provide opportunities for cleaning crew to progress to supervisory roles after chalking up enough experience,

this career progression is no longer possible within *CT-01*. The CEO does not see much progression for the field cleaning staff. He takes a different approach to his executive layer. He shares:

> So, field service staff to engineer, that's like non-existent, not possible, right? A 60-year-old "Ah ma" [Chinese term for 'grandmother'; colloquial to refer to field cleaning staff] will never become a software engineer, to be very frank. But I think as a business, the way that we operate is we always try to promote internally first [for the executive layer]…We always try to help you grow as much as you want to and are willing to. *(CEO, CT-01)*

Indeed, there are important productivity gains from the firm's digital initiative, as described by the operations manager, who shares that scheduling, billing, and customer service are much more efficient in the company now. However, the marginalisation of the field service staff may limit the long-term capacity for the firm to innovate as the compartmentalised job roles mean that the executives in the remote team will struggle to fully connect with the needs on the ground, and identify areas for improvement.

A similar digital strategy to enhance processes is being adopted by *CT-02*. The firm is a wholesale retailer supplying business supplies to corporate clients. To differentiate itself from other stationery suppliers in the industry, it seeks to offer customised product bundling traditionally delivered through account managers who customise ways customers can achieve cost-savings when they purchase stationery supplies from the firm. However, its clients have shifted to using technology in their procurement and finance processes. This has created a challenge regarding the firm's ability to reach clients using traditional sales and marketing strategies. The firm is, therefore, seeking a strategy that can allow it to reproduce its cosmetic customisation business model via digital means. Its head of technology shares:

> We [used to have] salespeople knocking on doors and visiting companies and offices. But now, that's not doable. So, we need someone to be able to pull customers without leaving the office chair...We have a lot of small, little, intricate things [for our e-commerce website]. Let's say, we have a bulk price that when you buy 12, you get 1 free…. [Or] if you buy 36, you get a cheaper price, and you also get a free item. Plus, if you are a special customer, you get a different kind of discount. So, it's a lot more complicated. *(Head of technology, CT-02)*

In other words, *CT-02* seeks to imbue the same level of customisation that it previously could do face-to-face into its platform to keep customers coming back within an underlying model of price competition. In the context of a firm with high levels of managerial control and narrowly designed jobs, there is little recognition of a pathway of expanding the digital skillsets of its sales and marketing team,

whom the business leaders continue to see as an important contributor to the company due to their strong work ethics. Instead, the approach taken at *CT-02* is to build a separate technology team. Led by the head of technology, it is investing in building a digital platform that could model and deploy machine learning algorithms as micro-services, which include product recommender systems and survival analysis models for predicting user checkout behaviour, as well as running experiments. At first, the firm bought off-the-shelf technology using government grants. However, it found that standard digital tools did not give it the nimbleness to customise the digital experience it wanted to offer its customers. The way out is to build an in-house technology team. It has managed to recruit two persons but struggles to hire more due to the need to maintain costs. The head of technology shares:

> There are a lot of capabilities that we want to have. But whether we can afford to bring such a person in is a different matter. We need someone who is more comfortable with data. We are always on the lookout for engineers. I don't want to keep doing this engineering part because I want to oversee other things. But I don't think I can find someone to replace myself anytime soon. The cost to hire someone with a technology [background] is now even more expensive. So, [there's] no choice. I have to get stuck in the backend work….We [also] hope to develop a more dedicated marketing department that is more in tune with handling data…There is this saying. 50% of your marketing dollars are well-spent but you just don't know which 50% is it. Now it is different. We can pinpoint exactly which works and what does not work. *(Head of technology, CT-02)*

When asked about how its profit margins could be bolstered, it is evident that there is little scope to do so, notwithstanding the digital strategy. The head of technology explains:

> The very fast-moving items, prices are very sensitive. So, there's nothing very much you can do with the suppliers…For paper, the profit margin is very slim…You can only use paper as a door opener…You don't actually make money on paper, but you might be able to make money on other things that go along with it. Those would be the niche items that is not selling every day,…such as machines... Normally, [these items] will have higher margin…At our current target, we just hope to grow the top line revenue first with a very healthy growth rate. *(Head of technology, CT-02)*

Fundamentally, the digital strategy of *CT-02* does not seek to help the firm create new value for the customers to overcome its primary model of price competition. Being unable to grow its revenue also means not being able to develop the capabilities it needs for deeper transformation.

Similarly, *CT-03* seeks to employ digital strategies to alleviate the strain on its revenue streams. It is an insurance brokerage business serving the SME sector in Singapore that tends to be price-sensitive. By deliberate design, *CT-03* has always avoided the cut-throat, profit-first model for which life insurance companies are well-known. It strongly emphasises prioritising clients' needs, even if it means sacrificing immediate profits. It views delivering quality advice as something that would help it retain its customers. With market trends cutting at its profits, it seeks to use digital to make its processes as efficient as possible. The CEO explains his approach:

> We used to be paid 25-30% commission on a home insurance back in the 80s. Today, we are paid half of that. So that means…double the work. That's the reality. But how do we do it smartly and efficiently?... So, I will be looking at internal processes to be as digital as possible…We need our processes to be really efficient, but the advisory is going to make us different. *(CEO, CT-03)*

Like the leadership in *CT-01* and *CT-02*, the CEO at *CT-03* similarly directs technological activities personally. This inevitably leads to top-down decisions of who and what is included and excluded from activities that may not coincide with what is best for the business. In *CT-03*, the digital strategy is full of contradictions. On the one hand, the CEO emphasises that the business model aims to provide relational advisory services that cannot be easily aligned with the standard platform approach, which is more suited for transactional client relations, like purchasing individual travel insurance. However, he remains keen to explore a digital solution. His strategy is to get younger team members to work on a suitable digital product. This is even though he feels that the younger staff may lack sufficient experience to deliver a high-quality tool. In his words, the older staff "can see the big picture, but not the technology", while the younger staff "can see the technology but not the big picture". Regardless, younger staff have been asked to create a chatbot. He finds the chatbot they are developing "quite annoying" and is "trying to get rid of" it. However, he is not keen to involve the more experienced staff as he feels it will take "too much time for the most expensive employee in the company". Here again, we see how digital strategies cannot augment the job roles in 'constrained talent' firms, being limited to processes rather than actual product innovation.

Within the framework of narrowly defined roles necessitating extensive managerial involvement in conception and execution activities for cost control, implementing a bottom-up innovation model akin to what 'wealth of talent' firms adopt proves challenging in 'constrained talent' firms, despite the ostensibly benevolent views that management may hold regarding their workforce. This reflects the complexity of building high-innovation systems, which is not a simple process of giving an individual space to contribute but is related to broader strategies, including the type of products and services the firm seeks to offer and the market it seeks to play in.

The limited job design in 'constrained talent' firms significantly influences employees' ability to showcase their talents. The top-down control of managerial and execution activities restricts the workforce's ability to exercise their discretion.

An employee involved in her firm's digital activities describes her role as mainly executing. She is a diploma holder and joined the firm to build her digital skills. However, she does not think her role is to develop ideas. Her work requires her to collaborate with other colleagues, but they do not fundamentally have the ability to appreciate her expertise. She shares:

> My role is actually executing. [I'm] just helping the frontend developer. Not much on ideas. Basically, [ideas] come from managers...My role is just updating the product. [My co-workers in other departments] don't know anything about [my field of expertise]. So I will basically have to depend on myself. Even if I tell them what is good – they don't really get what I mean. They have no knowledge on [my field of expertise], so it's quite difficult…Everybody have different suggestions, so sometimes it's hard to take the right decision. It might be that the boss feels that 'I want this button to be blue colour'. Other colleagues feel that blue is not prominent enough., and want a contrasting colour…Or maybe [sales people] feel that the text…on the website is too small [for older clients]. *(CT-Employee 01)*

In her previous company, a large transnational corporation, *CT-Employee 01* communicated directly with clients. In her current firm, however, she loses that direct interaction with users, which now needs to be mediated by her sales colleagues. She shares:

> We are an in-house team so we don't have clients. Our clients are our colleagues…Our frontend [sales staff] will talk to them. We don't have to talk to them. [Clients] just feedback to the salesperson if something goes wrong with the shopping cart or the checkout process. *(CT-Employee 01)*

It is a similar story for another employee involved in his firm's digital activities. In the context of narrowly designed jobs, there is little space for him to influence the firm's overall digital strategy. His primary role is to advise customers. He is also tasked to coordinate the IT activities in his firm, which he sees as a separate job role. What is invisible to his firm is that the employee is, in fact, a passionate business analytics diploma holder. He sees his work in the firm as a temporary stint while pursuing a part-time degree in business analytics. He aims to eventually find work as a business analytics practitioner in other firms. Given the top-down control of the digital strategy to optimise processes and keep costs low, he could not immediately see the value that business analytics could provide to the firm.

However, after some prompting during the research interview, he could connect the dots, seeing the opportunity to use his business analytics skills to improve his current job. He shares:

> As a business analyst, the job is to clean up the data, come up with charts, use Tableau, SPSS... But to make use of the insight, you really have to be a product expert….For my degree programme, they do teach us how to use the charts and all but it's useless once we go out to the industry…We must first understand what the [client's] needs and what products the company have before we can explain to the client how to make use of the insight. *(CT-Employee 02)*

Fundamentally, however, creating data-driven product experts requires a productive environment receptive to expanding product range and market reach. In this regard, managerial activities in 'constrained talent' firms have shown minimal inclination towards a strategic orientation of expanding into markets beyond the price-sensitive clientele they currently serve. It might, therefore, be a challenge for enthusiastic talents like *CT-Employee 02* to use their talents to shape the companies' business activities. The trajectory of digitalisation within the firms is to optimise processes rather than use digital tools to create new products and services, unlike in 'wealth of talent' and 'war for talent' firms. This holds back the creation of jobs with high professional discretion in 'constrained talent' firms, even when they increasingly hire more high-skilled workers.

The scope for non-professional labour to have their jobs augmented through the digital strategy of 'constrained talent' firms is even more limited. Often, their work is not even on the radar of managers who have fixed views of their contributions. The interviews with managers and employees suggest that the latter are often excluded from the conceptualisation of digital tools, being involved as end-users of digital applications. Not only do they have limited opportunities to shape the digital tools to meet their work needs, but they also find themselves having to circumvent the tools to deliver their work. An employee shares:

> I was given an email login. Clients may inform me of changes, but I cannot make the changes directly into the system. I will have to inform my supervisor, who will make the changes. It is important that my supervisor makes the changes, as otherwise clients may be billed wrongly and it will upset them. *(CT-Employee 03)*

In the example of *CT-Employee 03*, we see how embracing digital at the firm level will not necessarily lead to augmenting the workforce.

Future trajectory of labour in 'constrained talent' firms

The business leaders in all three firms – *CT-01, CT02* and *CT-03* – aggressively pursue digital strategies to take the business forward. However, firms' use of digital technologies is strictly to make existing processes efficient. Digital technologies are not used to move firms in new directions or challenge their underlying cost-competition business models. The focus is on using digital technologies to hedge costs rather than deliver new value to customers, which would entail a more substantial base for demand for complex tasks and the exercise of labour's creative potential across the broad workforce. In all three firms, there is no new value added to the primary products and services they sell – be it the home cleaning service, the stationery supplies, or the insurance products. Non-professional labour is overlooked. There is some increase in skills demand for professional and technical labour, seen in the expansion of the executive layer in *CT-01* and the technology team in *CT-02*, but the growth in employment numbers is small, and the roles do not offer high occupational discretion that is consistent with the expectations of high-credentialed workers. Additionally, the growth in the executive layer in *CT-01* through permanent, remote jobs is problematic in suggesting the availability of a vast market of high-credentialed labour willing to take on professional roles with low occupational discretion. It allows such firms to sustain price-competition strategies that otherwise would not be possible in a high-cost advanced economy like Singapore. The cases of 'zero-talent' firms are analysed in the next section.

'Zero talent' firms

'Zero-talent' firms focus solely on costs, severely marginalising the workforce. This cluster of firms tends to consider only those in management as talent, leading to low managerial recognition of the contribution of the broad workforce.

Technology heavy, manpower light

ZT-01 is a well-resourced firm whose business is known in the healthcare sector as a 'managed care organisation' (MCO). MCOs' role is to support insurance and corporate players in controlling healthcare costs. In the broader healthcare eco-system, MCOs are controversial as their cost-control efforts are sometimes seen as contentious and linked to the need to minimise costs to their clients that may come at the expense of quality healthcare. Some MCOs run a partner network of healthcare facilities as a strategy to help clients control costs. *ZT-01* fits this model, providing customised management and advisory capabilities to support insurers and corporate clients in managing their healthcare costs while delivering primary care, diagnostics, speciality, and ancillary care. This makes their business very complex, with a diverse workforce of more than 1,000 workers in the region. 60% of these workers are in clinical work, and 30% are in corporate functions. *ZT-01* employs a merger and acquisition strategy to grow the business. Despite the twin focus on providing healthcare services and healthcare claim services, it is evident from our interview that the network of partner clinics is part of

the broader strategy to control healthcare costs for its clients. Its HR manager describes the mission of the business as follows:

> You need someone on the ground to give you a panel of clinics that would help you steer the direction of your medical costs. Because as a customer, you want to have a certain visibility on how much you are spending for medical costs. To do that, you need a holistic package from the broker or insurer, and so they will appoint [the company] as one of the providers. Being mostly corporate fronting, we will have a lot of reports that we generate, especially for the customer, [with] certain claims limit or guidance. *(HR manager, ZT-01)*

Consequently, it is evident that the company treated its broad healthcare workers as a cost to be managed rather than an asset to be groomed. Its payroll includes general practitioners and speciality doctors, complemented by a large proportion of healthcare workers such as nurses, clinic assistants, patient care assistants and IT support. The firm adopts a 'buy' model for such labour whereby typically only experienced workers are hired, which takes the load off the organisation to train them. Despite such a broad spectrum of the workforce that would be seen as high-skilled labour, the attention of HR was on the absolute top-end of the workforce, which is a category of doctors who could be groomed into management roles. Its HR manager is a recent recruit and describes the first programme that she has put in place:

> I launched [a programme to groom doctors to be leaders] because we felt that the doctors may not necessarily want to be in practice all their life. There are two tracks that they can choose. One is the technical path..[as] a family doctor [or] specialist doctor…The other path is the management path meaning they want to get out of practicing [with a] desire to be a CEO or an MD. So, this leadership programme gives them mentorship opportunities. We are fronting them to the group CEO level, as well as to our key customers…They have the visibility and the opportunity to interface and work on projects that would influence or impact the organisation and thereby, prepare them for future leadership roles. *(HR manager, ZT-01)*

When probed further, the focus on the category of doctors-as-leaders is less driven by a genuine desire to offer its doctors alternative career pathways but more due to the valorising strategy of the business to strengthen its credibility to corporate customers. She shares:

> You're going to a corporate customer…and you want to be the partner for their healthcare needs…If all your management staff are just regular folks who are not clinically trained – or put it the other way around, if we have our leadership team that is actually [made up of those] who have been trained as a doctor, the influence and the level of authority on expertise becomes

an added advantage. It kind of appeals to potential customers that, 'Hey, we are a healthcare company. The leadership team actually used to be doctors. And they know what they're talking about.' *(HR manager, ZT-01)*

Indeed, cost-efficiency considerations drive how its high-skilled workforce is being thought of in which capabilities to manage healthcare delivery is valued, rather than the actual professional delivery. The next programme the HR manager and her team will work on is talent mobility across the region. Again, this will focus on developing capabilities to manage healthcare rather than its actual delivery. In the context of the mission of *ZT-01*, its technology programmes are inevitably designed to support managing healthcare costs. Although the HR manager is not open to discussing technology programmes in-depth, *ZT-01* regularly communicates its technology programmes through media interviews and public releases. Its public announcements make a clear link to being manpower-light and tech-heavy. This provides the business context for understanding why digital innovation in 'zero-talent' firms like *ZT-01* leads to workforce reduction without upgrading remaining jobs, as only the leadership jobs are crucial, while the rest are costs to be managed.

In contrast to *ZT-01, ZT-02* and *ZT-03* are no enthusiasts of technology. Instead, technology is seen as a direct cost to the business that is taken up only when necessary. *ZT-02* is a 20-year-old establishment that started by providing services to install accounting software before branching out to provide accounting, secretarial services, and taxation services to SMEs in Singapore. It is a small outfit comprising a managing director and two workers, augmented by a contingent workforce. *ZT-02* was interviewed during a challenging period at the height of the COVID-19 outbreak, with many SMEs closing down, which reduced the demand for its services. Its managing director shared that when things were better, the firm could hire 6-8 freelance workers to support its operations. When asked about its positioning in the market, the firm highlights the low margins it could earn. The managing director shares:

> For us, the margin is very low, but you can survive…It's the margin it's low, that's all. Very low…[We attract clients] by being cheaper. *(Managing director, ZT-02)*

The work delivered by the company requires professional knowledge of accounting and taxation software, but it relates mainly to standard submissions to the authorities that require very little extensive training. Consequently, the company has no problem with candidates' skill sets, but getting them at the right price is a challenge. According to the managing director, the minimum qualification for the job is a diploma, but some of his workers are also degree holders. There is minimal trust by the managing director of its workers, as the standardised manner in which services are delivered means that workers trained by him go on to set up their own businesses as freelancers. The research interview was conducted

at his office. He stopped the interview five times during the 1.5-hour interview to take client calls. Meanwhile, the solo staff in the office was quietly on her computer all the time with no interruptions.

To the managing director, adapting to changing technology is a crucial aspect of business for survival so as to "not fall behind". The company uses government grants to purchase new equipment and keep up with evolving technology, such as digital payment gateways and digital software required by the authorities. However, it can sometimes undercut the business when automation software makes it easy for clients to file their returns directly, cutting their role as a middleman. Anything that requires technological upgrading is mastered by him first and extended to his staff only if necessary. The business context of *ZT-02* again allows us to understand why technology programmes in 'zero-talent' firms lead to workforce reduction without skills upgrading of remaining jobs.

ZT-03 is a local representative of original equipment manufacturers (OEM) supplying probe cards to the semiconductor industry. The managing director explains that the probe cards are not based on price competition. His customers are big players in the market who would rather pay high for the products than suffer the cost of manufacturing downtime. However, his competitors are big firms, and he seeks to differentiate from them by offering those products at a cheaper price. As such, he must run a cost-efficient business. He plans to expand his business, given the uptick in demand for his products due to the robust semiconductor industry growth during the COVID-19 pandemic. He explains:

> My plan is to duplicate the manufacturing in Singapore. I think that is a must. Going through the COVID-19 [pandemic], you can't rely too much on your partners. One day, something may happen, and the flight may not take off…My customer here will kill me…It's going to be a heavy investment. [Currently] I'm just a middleman. I collect [and] I pass [the item to customers]. I tell them what to do. Versus I have to do it myself. I need the critical mass to make sure…that [it makes] economic sense. So, it's a very tough decision. (*Managing director, ZT-03*)

Inevitably, setting up the manufacturing plant requires investment in technology and manpower. However, he does not require high skills. He explains:

> The amazing part about this probe card business [in terms of] manpower [is that] I don't need a degree; I don't need a diploma. If I can get an auntie [colloquial term for an older female with limited education] whose hands simply do not shake [and she's] patient by nature, she can do the job…We have the machine. So it's basically the patience, to slowly sit there…polish, and let [the probe card] get to the shape. I don't need high qualifications. *(Managing director, ZT-03)*

He envisages he will need to employ 20 staff and train them, but only a handful will stay on the job. The manual nature of the task means it is physically taxing for the worker who needs to be patient to keep his or her hands still and have good eyesight. He shares:

> With naked eyes, you can't see [the probe card needles]. You have to go [to view it through] the microscope. Imagine you work six hours looking into the scope. If somebody has a very mild temperament, is very gentle and very patient, [the person can do the job]. [Previously] I have set up this maintenance line in Singapore. We started with eight girls. Eventually, we only selected two only…After a while, they also start to go…If you say it's low pay, it's not really low pay. But why no Singaporean wants to take the job? I don't know. *(Managing director, ZT-03)*

He rules out that men could perform the job given the required patience. When asked if it is reasonable to expect older ladies to perform the work requiring good eyesight, he agrees they would have a challenge. He does not think that younger ladies in Singapore have the temperament to perform the work, so Vietnamese or Malaysian ladies are his next options. When probed about the possibility of automating the job, he does not think it is possible. He says:

> No, you can't because the thing is too fragile. Yeah. It has to be human labour. [It is] labour intensive. *(Managing director, ZT-03)*

He has a limited perspective on his workforce, viewing their purpose as fulfilling compliance obligations. He shares:

> When we were doing equipment manufacturing, I always told staff: So long as you don't create a problem for the company, you are a good worker. Imagine you are rowing a boat. You have 10 persons rowing in one direction. If all are cooperative, you have 10 good people rowing forward. You just need one person to be angsty against the company. Then you only have 8 people rowing. You are wasting two manpower. *(Managing director, ZT-03)*

However, even if workers are compliant, they are not talent. To him, talent is somebody who can bring monetary value to the company. This is concentrated in himself as he maintains complete control of the strategy and operations in the firm. He shares:

> Yeah, I am [talent]. I help my investors make money. I draw a salary. They invest and are making money. *(Managing director, ZT-03)*

Future trajectory of labour in 'zero-talent' firms

'Zero-talent' firms see their labour as costs to be managed rather than assets to be enhanced in their pursuit of cost optimisation. There is, therefore, little focus on using digital technologies to augment their workforce, suggesting weak prospects to enhance jobs in such firms in terms of occupational and organisational discretion. In *ZT-01,* the leadership seeks to pursue digital technologies to be manpower-light, advancing a strategy of using digital technologies to substitute labour rather than augment it. In *ZT-02* and *ZT-03*, digital technologies are considered expensive investments to be minimised alongside labour costs. The business contexts of *ZT-01, ZT-02* and *ZT-03* allow us to understand why technology programmes in 'zero-talent' firms lead to workforce reduction without skills upgrading of remaining jobs.

Assessment of changes to labour power

'Constrained talent' and 'zero talent' firms show that societies cannot assume technological change is necessarily skills-biased. Digital technologies can reproduce narrowly designed jobs as part of firms' cost-competitive agendas. Jobs that are typically associated with high skills, such as the executive layer of operations, sales, marketing and IT jobs in *CT-01,* the IT roles in *CT-02,* healthcare jobs at *ZT-01* and accounting jobs at *ZT-02* may be designed as low-discretion, high skills jobs to complement the valorising strategies of such firms. This reflects an ongoing restratification of knowledge work in the context of mass higher education. Such jobs have somewhat higher initial training requirements for literacy, numeracy and digital fluency, reflecting increased task complexity. However, this is not matched by increased task discretion requiring high professional judgement and creativity. Meanwhile, traditional low-discretion jobs such as the cleaning jobs in *CT-01* and production operator roles in *ZT-03* do not seem possible to be fully automated, nor are any attempts being made to increase task complexity or task discretion. Additionally, the strategies of *CT-01* to build an executive workforce of permanent remote workers suggest that cost-competition firms in advanced economies may now have greater opportunities to sustain such valorising strategies, being able to tap on significantly cheaper high-skilled workers in developing economies for executive roles. The opportunities for strengthening labour power in 'constrained talent' and 'zero-talent' firms are weak unless management in these firms is prepared to challenge their cost-competition strategies.

Chapter 8 | Born-digital firms

The case of born-digital firms

Born-digital firms add significant complexity to the challenge of understanding how social relations of production shape the technological strategy of a company. Unlike existing firms in which there is a period prior to the proliferation of digital technologies to observe how corporate talent management may shape firms' digital strategy, born-digital firms have digital technologies built into their operations at the onset. A definition of born-digital firms that has been widely taken up in popular literature is that by the US management consultancy firm Gartner, which describes born-digital firms as "a generation of organisations founded after 1995, whose operating models and capabilities are based on exploiting internet-era information and digital technologies as a core competency" (Panetta, 2016). By embedding digital technologies into the business model right at the start, such firms allow us to properly contextualise social versus technological factors in the design of firms and the impact on labour. The supremacy of technology would imply that we should expect little variation across born-digital firms. In contrast, the decisive role of social relations of production would show up in variations in corporate talent management strategies even of 'born-digital' firms.

Born-digital firms such as Meta and Amazon are among the world's top firms. However, the focus of born-digital firms in this chapter are start-ups seeking capital funding or bootstrapping – the latter referring to those financed from personal resources and/or operating revenue (Freear et al., 1995). This category of new firms allows us to understand the range of contradictions and tensions in the capital-labour relationship at the point of set-up. We seek to understand whether a pattern of corporate talent management exists within such firms even at inception, the reason(s) for it, and the extent to which it shapes the design of technology and labour strategies.

As noted in Chapter 3, Singapore's start-up scene has flourished in recent years due to active government schemes to make Singapore a leading start-up capital globally. The vibrancy of the technology start-up scene is reflected in the BPSS dataset collected in 2016 that included digital start-ups without the BPSS team intending their inclusion. Indeed, the survey did not have adequate constructs to distinguish a digital start-up from other types of firms. We found examples of digital start-up firms only by eyeballing the names of BPSS establishments. This means that the analysis presented in this chapter is indicative, with generalisability limitations to the broader start-up firms in the Singapore economy. Within the limits of relying on eyeballing the BPSS data, we find that such start-ups congregate in two BPSS cluster categories, namely Cluster 1, which co-relates with 'wealth of talent' firms and Cluster 2, which co-relates with the 'war for talent'. This suggests that born-digital

firms in Singapore generally create jobs with high occupational discretion in Singapore but differ in the organisational discretion they give to their high-skilled workers. The same was found in the digital start-ups sampled from our contacts. What then accounts for the digital start-ups' divergent corporate talent management models, in which some seek to constrain the organisational discretion of their high-skilled workers? In this chapter, I locate the divergence in the capitalists' mental model of their steady-state valorisation strategy.

Table 17 describes the five start-ups that will be discussed in this chapter. To preserve the anonymity of the firms, I did not provide their full demographic details, such as the country of origin and the state of fundraising, as this may compromise the anonymity of these firms in what is essentially a nascent start-up scene in a small city-state. It is, however, possible to describe their demographics in the aggregate. Reflecting the outcomes of policy interventions to nurture a vibrant start-up ecosystem, two are start-ups founded by Singaporeans and headquartered in Singapore, two are start-ups founded by foreigners but headquartered in Singapore, and one is a start-up founded overseas with Singapore as its APAC headquarters. At the point of the interview, two were bootstrapping, while three successfully completed Series B, D and E funding. Series E funding is the most advanced prior to an initial public offering (IPO). Perhaps not surprisingly, born-digital 'war for talent' firms were not forthcoming in nominating their employees for research interviews, in sharp contrast to born-digital 'wealth of talent' firms who readily gave us access to a range of employee profiles, including former employees. Managerial interviews are discussed in relation to their firms. Employee interviews are discussed in an aggregated manner without specific reference to their firm for ethical reasons, as explained in Chapter 4. I first discuss born-digital 'war for talent' start-ups, followed by born-digital 'wealth of talent' start-ups. These firms are described with the prefix 'd', i.e. *dWFT* or *dWOT*, to distinguish them from those described in Chapter 6.

Table 17. Demographics of selected born-digital firms for comparative analysis

2 'war for talent' born-digital firms	3 'wealth of talent' born-digital firms
Managerial interviews	
dWFT-01 is a low-code platform-as-a-service firm with a staff strength of more than 500 workers globally. Three regional vice presidents based in Singapore were interviewed with the following portfolio: customer solutions, platform architecture and HR.	*dWOT-01* is a workforce analytics firm. It has fewer than 50 employees on its payroll. Three management staff members were interviewed: the co-founder, head of HR, and head of product development.

2 'war for talent' born-digital firms	3 'wealth of talent' born-digital firms
dWFT-02 is an edtech firm with a staff strength of fewer than 50 employees based in Singapore and India. Its managing director was interviewed.	*dWOT-02* is a start-up in the medical industry. It has operations in Singapore and other Asian countries, with a total staff strength of 200 employees. The founder was interviewed.
	dWOT-03 is a fintech start-up with over 100 employees, most of whom are located in Singapore. The founder and HR director were interviewed.
Work journey interviews	
The born-AI 'war for talent' firms did not facilitate access to employees for work journey interviews.	All three born-AI 'wealth of talent' firms facilitated access to their employees for work journey interviews (total n=10). Their job roles include sales, product development and customer service.
Total corporate interviews: 4 **Total employee interviews: 0**	**Total corporate interviews: 6** **Total employee interviews: 10**

'War for talent' born-digital firms

Customised tools now, but standardised tools in the future

Both *dWFT-01* and *dWFT-02* are engaged in complex digital machine creation that requires collaborative development with stakeholders. Specifically, *dWFT-01* is building a low-code platform, positioning itself as a platform-as-a-service (PaaS) firm. Its platform allows applications to be built in the cloud speedily and at a lower cost than traditional application development. The firm envisions that 60% of all applications could be designed using its platform. The range of applications possible include internet banking, e-commerce applications, billing systems and operational dashboards. Its vision is to have its platform adopted by every company as part of its portfolio of technology tools. Its regional vice-president for customer solutions explains the firm's value proposition:

> The value proposition [is that] – like every company doing CRM [Customer Relationship Management software], we believe that every company needs a Low Code platform like [the firm]. Why would you want to pay –like $150,000 - $200,000 for projects when, with our systems, it can be done at a much more effective cost? You can learn fast, you can sell fast, and you can adapt quickly. So that is our value. So, over time, we would want every company to

have our platform in their portfolio of technology tools. *(Regional vice-president for customer solutions, dWFT-01)*

Although the platform solution by *dWFT-01* removes clients' need to invest in legacy infrastructure, complex integration with clients' existing systems is still required. Therefore, the adoption of the platform still requires substantial customisation by companies. The firm works through partner consulting firms and the developer community to build and integrate solutions for clients. The regional vice-president for platform architecture adds:

> When we sell to customers and our partners, they also think about how they can sustainably do projects using [*dWFT-01*'s platform] if there is no talent pool to help them. And this is where it's kind of like chicken and egg…[The firm puts in] effort in terms of community building of the developers...But what we want is actually for people – these developers – to embrace [*dWFT-01*] so that our customers and partners have access to people. *(Regional vice-president for platform architecture, dWFT-01)*

Here, we can see that the process of machine creation and platform utilisation remains a creative, collaborative process in *dWFT-01*. The same is observed in *dWFT-02*. The firm seeks to develop a machine-learning edtech platform with a unique value proposition to allow clients to connect employees' participation in learning activities directly to organisational performance. This involves the creation of an assessment-driven solution with the capacity to automate the testing of employees' capabilities and readiness for work. Building the platform entails unpacking the knowledge work in industries like healthcare and transport through identifying standards in current practices, which are then codified and put through machine learning to assess a learner's skills and competencies. The collaboration with end-users is deep, requiring many months of co-creation in which machine designers embed themselves at worksites, working directly with the firm's employees to codify standards associated with the practice. Its founder describes this extensive process as necessary for "accurate outcomes". The managing director explains:

> That's the only way possible. We go so deep that I got my three-months [access] pass to the firm. I am going to be [enrolled] in the employee onboarding for one entire month…I must attend all the [courses] to understand what is happening. Now, the advantage of that is that it's like having someone from their team embedded into our team. So that when we are looking at instruction, when we were looking at rubric, when we are looking at curriculum, right, when we are looking at data,…when we create the AI models, we can get pretty good results from the get-go…Because…we don't tell them, "We don't understand this. I have no idea what this thing is. I have no idea what is right or not"… They don't have to explain so much…So now,

our sales and engineers know how to [deal with customers] because when we see the data, we know the requirements. *(Managing director, dWFT-02)*

Thus far, we see that the labour process in *dWFT-01* and *dWFT-02* requires high levels of creative labour. However, both firms go on to articulate the valorisation strategy of developing standardised tools for the future that currently shape who they regard as valuable talent. This end goal of scalable, standardised platforms makes 'war for talent' born-digital firms stand apart from 'wealth of talent' born-digital firms, as we will see further in the chapter. The end goal forms the 'mental model of production' described by Marx & Engel (1970:64), which shapes how *dWFT-01* and *dWFT-02* structure their current workforce and their plans for their future workforce.

dWFT-01's biggest struggle currently is to get adequate talent within the developer community with the expertise to use its platform. A significant concern is that its partners and clients struggle to get developers with the skills and expertise to quickly design applications on its platform that stand at odds with the platform's promise of speed and ease of building new applications through the platform. The interest of *dWFT-01* to speak with us as part of this research is to help it identify new ways to build talent speedily within the developer community with the expertise to use its platform. It has little issue with getting talent as employees, but its inability to build this external labour pool speedily hinders its growth. As the interview progresses, we realise that the main challenge is the labour model it operates with. This model cuts out any possibility of growing the developer team internally in the same way as other professional services companies have, such as SAP, in which a developer team is always built alongside the creation of digital tools such as SAP's Enterprise Resource Planning (ERP). Instead, *dWFT-01* operates at inception with what can be described as an ideology that a platform business must minimise labour growth. The exchange with the firm's representatives is illuminating as they feel frustrated when we try to unpack why increasing the internal hiring of developers is not seen as a viable labour option, even as the firm sees the shortage of developers as the biggest obstacle to its growth. Here, we provide a range of excerpts of the views expressed by the regional vice presidents across the one-hour interview as they reiterate their points of how building a platform company necessarily entails an asymmetrical relationship between labour growth and adoption growth.

> So we are not a services company. We are a platform company…So that's why, as we grow our business, we don't like to hire proportionately or linearly. Because we believe that the way we approach…[business] growth, we got to work with our partner community to scale. Because if we scale by ourselves, it doesn't make sense. If you take a look at our sales team, the way we lay out in Singapore, our sales team [comprises] only three people. When you look around [downtown] Singapore, you look at the skyline with all the logos, you would expect companies like Accenture to have at least one account manager to every one of those buildings. We just

don't believe in growing that way, that's all….As the company grows, definitely we need to grow our team as well… but our growth may not be as fast as we want for our customers to grow themselves, our partners to grow themselves. *(Regional vice-president for customer solutions, dWFT-01)*

So just to add on, when [vice-president for customer solutions] mentioned that we are not growing linearly, it's basically from [the firm's] employee perspective. It's not, you know, [the firm's] community for our customers and prospects. For those, we want them to grow exponentially, so that [customers] have a lot of choices to choose from. But for us as a company itself, we are not trying to double ourselves. *(Regional vice-president for platform architecture, dWFT-01)*

We build [our employees] to be experts of the platform for the company. But we can't do that [for others]. It is not scalable. We don't want to be in the business of training 10,000 staff a year. That doesn't make sense. We need our partners and customers to help us with that because it doesn't make sense to have so many people on our payroll. My payroll is already over $2 million across Asia-Pacific. You don't want me to put another zero on it. It makes no sense. It is not how we grow the platform company. *(Regional vice-president for customer solutions, dWFT-01)*

It can be observed here from the critiques by Noble (1986) and Thomas (1994) of how the ideological bias of senior management mediates the labour strategy that may not coincide with what is the most efficient. In other words, tapping on the gig economy to keep its labour costs low has been imagined to be an essential valorisation strategy of *dWFT-01*. Its goal is to avoid incurring labour costs from the services of developers, even if these developers are an essential part of its value chain currently such that the lack of critical mass of such developers limits the platform's growth. The business strategy of *dWFT-01* instead is to integrate as many clients as possible into its platform so that they would, in turn, demand that application developments be done within the platform environment of *dWFT-01*. This is envisioned to strengthen the recurring revenue base for *dWFT-01* through platform subscription while keeping the labour cost of developing applications outside the platform's cost structure.

Here, we see the labour process set up: the machine designers who are employed full-time who conceptualised the platform while its developers are gig workers hired by its partners and clients who execute the process of application development. Within this process, we already see the limits to conception activities that developers would have when working with the platform. At present, the firm still requires collaboration with the developers to integrate the platform with clients' existing systems. However, as take-up improves, the developers will likely have less leverage to shape the platform's

architecture. Here, we see that the organisation's policy of not putting developers on the firm's payroll would shape the eventual sharpening of the developer role to be limited to execution activities in the future.

For *dWFT-02*, it similarly seeks to develop its platform as a standardisation tool. Its goal is to operate as a software-as-a-service (SaaS) model in which tools are modular for firms to adopt. For this reason, it targets industries with established standards, in which the curriculum is well-established and the requirements are mandated. In the discussion with the managing director, the standardised approach is necessary for two reasons. First, it supports the development of the machine learning platform because having a significant amount of procedural and operational information makes it "easy for algorithms to be able to make sense of". Second, it makes the valorisation process easy as regulated approaches in one firm will look similar in another firm. The managing director explains:

> If you solve one firm's problems, [you are likely to see] the exact same problem in the entire cluster, which means that adoption can be achieved in a hub and spoke manner. You target the hub and the spokes are able to then actually adopt it. As long as it is validated in one champion, you can actually see the followers following on. *(Managing director, dWFT-02)*

Because the goal is a standardised tool, the firm is not investing in building a team of pedagogically trained workers or with domain expertise in the industries it seeks to support. Therefore, its strategy is not unlike that of *dWFT-01*, which seeks to keep developers out of its payroll. The current process of deep collaboration with stakeholders that *dWFT-02* institutes is part of its strategy of externalising such labour costs. He adds:

> [The industry professionals in the firms] are committed to lending us their expertise in exploring these ideas, [and] also provide us data and access. So, by not charging these firms consultancy rates…[it] means that it becomes easier for them to actually adopt [the platform]. But it also means we benefit from it. We find a home for…these technologies, [the industry professionals] are able to validate, provide us feedback…So they are paying in a slightly different way. *(Managing director, dWFT-02)*

Neither is the engineering team tasked to create the platform properly invested as talent. A remote team based in India has been set up since as early as 2011, with limited access to the sites and clients for which they are delivering a solution. The choice to locate its engineering team in India is for cost-effective reasons, as hiring engineering talent in Singapore is seen as prohibitive. In contrast, access to qualified developer talent is plentiful in India. The firm recognises that Singaporean talent is skilled but does not justify the price tag that comes with it. For instance, the managing director shares that most

fresh graduates in IT fields in Singapore would have easily passed the test the company sets, unlike the case of many IT workers that it recruits in India who often fail to make the cut even if they had come from top-tier engineering companies. However, from the perspective of *dWFT-02*, the price point of technology labour in Singapore does not justify the investments into an engineering function of what essentially has been conceptualised to be an execution role of a technical kind, even though it is a highly complex activity. The managing director describes the complexity of software engineering work:

> Don't get the misconception that the engineering is less difficult than the AI. In fact, the sort of problems that we actually have, engineering is actually harder than the AI part… The learning experience is complicated…We have to hide that experience in a veneer of simplicity for the learner...For example, I [as a learner] respond to the situation. At the end of it, there is a report card. What determines the report card is actually not your AI. Your AI only decides whether you have met certain assessment criteria or not…This goes into another middleware that will decide and interpret based on what the AI is saying, against my rubric versus my weights and scoring, and then decide, okay, I need to give this particular score now. *(Managing director, dWFT-02)*

Who, then, is a talent in *dWFT-02*? It is those who can build networks to scale its model, which is currently a core team of five people. Why does *dWFT-02* need to set itself up narrowly, with a tight grip on conception activities despite hiring and requiring high-skilled workers? In the conversation with the firm, the managing director describes the relationship between born-digital firms and labour that amounts almost to an ideology, not unlike that articulated by *dWFT-01*, to eventually automate labour out of the system. Although not particularly referring to his firm, the managing director of *dWFT-02* describes the pattern he observes of 'born-AI' firms. He shares:

> The gig economy [has been created] by a very interesting business model that was born AI. So if you take a look at the gig economy, that is a model that is only profitable if it was actually delivered through AI…Uber and Grab knew that their survival and their ability to make money is if you have automated taxis. So the human in the loop is just the interim, everyone knows that, right? So they say, 'Okay, today we are going to deliver a service, and at some point, all of our services are going to be delivered through AI. In-between, to help develop our technology with data…being able to actually develop the [data] for autonomous driving. So that you can actually deliver the service on its own without the humans. [The gig workers] are just temporary until this AI replaces you…[So born-AI companies], their fundamental business starts off with seeing human not as additive of value added, but as a cost centre that I am trying to squeeze out slowly. As long as I am able to optimise certain operations, I move the humans

out of the system. At some point, I am able to remove all of them, then I have the most perfect system. *(Managing director, dWFT-02)*

Perhaps this mental model of production significantly shapes the organisational policies that the managing director in *dWFT-02* sets up. Without speaking to employees and contractors in *dWFT-01* and *dWFT-02*, it is difficult to assess the extent to which they feel empowered or disempowered in their work. However, an anecdote shared by the managing director of *dWFT-02* might provide some clues. He described how he trialled a strategy to hire a fresh graduate in India to support his engineering team, but the new hire required significant handholding. The lead engineers did not mind guiding the new hire, but the managing director was concerned it disrupted the productivity of his engineers. The new hire was let go within three months. The managing director describes the disruption to the productivity of the lead engineers:

> The [new hire] is struggling, and he is actually asking for help, which we want people to do… [But] my three engineers now they are down by 40%...[It] was a cost that we as a small company could not bear. *(Managing director, dWFT-02)*

The managing director's description of his decision to override the lead engineers and his assessment of the effects on their productivity suggest a strong grip on organisational policy that would limit the ability of his workforce to have control over the social relations to coordinate the production process, even if he entrusts them with occupational discretion to design the complex digital machine.

Future trajectory of labour

The model of minimal labour growth in *dWFT-01* and *dWFT-02* is plagued with contradictions and tensions. The regional vice-president of customer solutions at *dWFT-01* says that it is already investing a lot in online content and online training for developers and needs 'motivated citizens' to want to take on development work. One idea is to work with Singapore universities so that by the time the students graduate, they will have the skills to use the platform. However, the regional vice-president is not confident that it could build a developer community in Singapore at scale and the right price point and is taking a bet to develop the community in India or Malaysia instead. What will remain in Singapore is a core leadership team. The regional vice-president for customer solutions explains:

> We are actually building our support centre out of Kuala Lumpur. We were able to find more talents there. This year, we are excited about our R&D…extension that will be in India. I am not looking at putting out any development centres here [in Singapore]. It's easier to work with that elsewhere. But if we want to find legal expertise, HR expertise, we find it here as part of our leadership team. But we are not going to hire a hundred developers out of here because it

is not going to work and the cost of enablement to sustain is a little bit on the high side for me. *(Regional vice-president for customer solutions, dWFT-02)*

For *dWFT-02,* it has decided to hire only experienced engineering talent in India, with no plans to grow an engineering team in Singapore and with domain expertise outsourced to partners. The firm faces a contradiction given what its managing director describes as engineering having "a lot of dependencies because everyone is creating their little part..[that] have to be all put together". This requires consultation, but the organisational policy of control may limit the firm's ability to structure solutions at the scale and speed required.

In both cases, we see that the future of work opportunities in Singapore may be marked by a decrease in employment opportunities for high-skilled work, which workers in the region will take up at a lower cost. The jobs that remain in Singapore are likely to be managerial roles. What is disconcerting is the spillovers that the platforms of *dWFT-01* and *dWFT-02* may have on the industries they support. *dWFT-01* is accelerating the changes in job content and job context of software engineers as it seeks to build an outsourced developer community at scale with limited discretion in software design through its low-code platform. *dWFT-02* seeks to automate the work of trainers without clear pathways of how the trainers could move into higher-end roles. That *dWFT-01* and *dWFT-02* envision such changes to labour does not suggest that such changes would happen. However, it represents an important area to monitor in the context of forecasting the future of work. Again, we see that the driver of employment opportunities in *dWFT-01* and *dWFT-02* is not the technology itself but the model of labour strategy the firms operate within the context of their valorisation strategy.

'Wealth of talent' born-digital firms

A model of labour-centric perpetual customisation

In sharp contrast to 'war for talent' born-digital firms, 'wealth of talent' born-digital firms are not seeking to develop standardised tools. Instead, they are investing in solutions that require perpetual customisation with their customers. Similar to 'wealth of talent' firms in Chapter 6, the issues imagined to be solved are not framed as engineering issues to be broken down into tasks and tackled but broader missions. Consequently, labour centricity is a crucial strategy in 'wealth of talent' firms as the creative process is seen as enduring rather than frontloaded, as is the case of the valorisation strategies of *dWFT-01* and *dWFT-01.* Digital tools in 'wealth of talent' born-digital firms sit within the broader context to support their missions rather than as the central product in the valorisation process.

The sharp contrast between front-loaded and perpetual customisation is amplified by the differences in valorisation models of *dWFT-02* and *dW0T-01*. Both are in the learning business using platform strategies. *dWFT-02* frames the issue to be solved as an engineering one, having narrowed its focus to

the automation of the assessment function, given that human trainers are currently unable to assess learners at scale and with precision. In contrast, *dW0T-01* puts the learner at the centre, seeking to understand the range of ways in which the learner requires support and which digital tools are most meaningful. The problem to be solved is not an engineering issue but a relational issue of putting together a range of stakeholders to support the learner meaningfully. The head of research and innovation at *dW0T-01* explains its value proposition:

> It seems counterproductive to be manufacturing systems that build humans out, when we are trying to think about providing employability [and] meaningful opportunities for people. I have the privilege of working with individuals who are absolutely committed to helping people find jobs. It is their thing that they have worked for their entire careers. And so to deprive them in the face of an algorithm…is hubris… [We] talk a lot about pit crew [as a metaphor] – about the idea [of the team that support] Formula One drivers. If we think about potential employment seekers as Formula One drivers, [we can imagine them to be] surrounded by a pit crew of expert technicians, facilitators, psychologists, and those that support them on their journey. (*Head of Research & Innovation, dW0T-01*)

Therefore, in contrast to *dWFT-02*, in which the digital platform that is being built is seen as doing the assessment work that human trainers cannot do, *dW0T-01* builds the augmentation of tasks of existing professionals into the design of its digital platform as part of strengthening relations across different stakeholders to support the learner better. The difference may be mere variance between the design of different digital products. However, the contrasting valorisation strategies significantly affect how labour is considered and deployed within the firms. The Chief Strategy Officer of *dW0T-01* is a long-time mentor and investor of many workforce analytics start-ups and is in a good position to comment on the critical distinction between the business strategy of *dW0T-01* and other start-ups. He explains the difference:

> I have mentored or invested or at least have conversations with pretty much every major HR tech start-up in Singapore over the last four or five years…All of them have a product vision. So, they will say, I am going to be the best employer engagement company…or I am going to be the best microlearning start-up…They will take x number of licenses from me. With *[dW0T-01]*, it's actually a very different vision…[It] starts with what do I need to make people – whether they are white-collar or blue-collar –on the right path for their career and help them in their journey from a development perspective, coaching perspective, job match-skill match perspective and finally employment perspective…We are not a sales-driven organisation. We are a mission-driven organisation. That is a very big difference…Money counts, we know it. We are not naive people who say, 'I want to change the world and I don't care where the money

comes from'. We understand we have to make money. But the commercial imperative is not the number one imperative for us. It is downstream; it will come. *(Chief Strategy Officer, dW0T-01)*

dW0T-01, therefore, is not seeking to create a mass product. It selects its customer base carefully, working with national-level stakeholders. These players are prepared to engage with the firm at the desired level of complexity. As no national context is identical, significant development of local knowledge and customisation of solutions is required. Its Head of Research and Innovation shares:

We have an internal research team – a large team with a variety of talents. We ourselves direct research into product improvement and product development, with a view to contributing to human knowledge on these issues. We have experts in occupational mobility and organisational management and organisational structuring, as well as psychologists and those that deal with the data side, the statistics and the analysis pieces. And we also form a lot of relationships. So we are pro-social as an organisation. *(Head of Research & Innovation, dW0T-01)*

The investment in a range of human capabilities at *dW0T-01* sits within its model of perpetual customisation, which contrasts sharply with the strategy of *dWFT-02* that is trying to scale through massification of an assessment product. Even the development of AI tools is imagined differently. While the founder of *dWFT-02* sees the AI feature as "easy" within the framework of a mass product that it was developing, the co-founder of *dW0T-01* describes AI features as highly complex in the context of the customised tools it was developing that require deep human understanding. The co-founder of *dW0T-01* shares:

If the AI is to help humanity, then the AI cannot be based on just raw data. Because the raw data will reflect what the environment is. Let's say we are building an AI algorithm for an interview process [in South Africa] and you are mirroring a real-life situation. In the real-life situation, there is in-built biasness that the dark-skinned candidate always don't get [the job] and the white guys always get it…Some of the tech, for example, that I have seen – they are saying [you'll] have greater efficiency in screening your candidate, but it doesn't promise you the right candidate. It's just very fast to say no, which is really different from getting the right guy. *(Co-founder, dW0T-01)*

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The deep skills and expertise of the broad workforce are thus crucial to the valorisation strategy of *dW0T-01*. More importantly, they are given organisational discretion to design the products. The co-founder of *dWOT-01* explains:

> We recruit people with a strong sense of mission, and we trust that they will execute. We make sure that we create the cadence for people to come in and synchronise in small groups on their own. *(Co-founder, dW0T-01)*

The same example of labour-centric perpetual customisation can be seen in *dWOT-02*. The example of *dWOT-02* shows that it is not the type of product a company sells that matters but rather its valorisation strategy. Specifically, *dWOT-02* sells a category of non-complex medical devices. There is recognition that the firm is in the market of standardised products that would make it easy for competitors to enter. However, it is valorising a highly customised user experience that differentiates it from existing and upcoming competitors. The CEO explains how service is a differentiator for the firm:

> In theory, anybody can come up to start offering the kind of services we offer. So, from that perspective, we don't have a strong competitive mode via IP [intellectual property], for instance. But what you need to make it is a lot of focus, a lot of hard work, a lot of heart. (CEO, *dW0T-02*)

To deliver a highly customised experience for its users, the CEO highlights that the company thrives on taking a "very operations and execution-based" approach to ensure that every touchpoint a customer has with the company is top-notch. This means giving discretion to its broad workforce to deliver whatever it takes to delight the customers, with little distinction between conception and operation jobs, both of which are equally valued for delivering on the broader mission. Consequently, we see the empowerment of front-facing customer service professionals who, in typical platform businesses, would be subjected to significant managerial control. The CEO explains the space he gives to his team to design the customer experience:

> Where I come from, sales cultures are like shark attacks. You want everybody to hunt for the biggest target. At some point, I was telling [the Customer Success Head], 'Let's put a screen up somewhere in the office, where we live show who is the best-selling agent'. [The Customer Success Head] looked at me and he was like, 'Are you crazy? That's not the type of culture that I want to build in my sales team. We are playing [*dW0T-02*] team as one, right? We want to build a community. We want to actually close [sales] for each other. We want to be there for each other.' I was socialised in my early twenties in London, and that is a very intense…boasting around sales target [type of] culture. All I could say at that point is, 'Okay, I

have to trust that I have here somebody that knows this place much better than I do and he has been bringing amazing results so far. So I will give my inputs but eventually, I'll let him build it in the way that he wants.' And he was right, 100%. It's a much better culture for Singapore. It's much healthier, it's generating lower turnover. Sales is a tough setup anyway… but they are coping much better with it. *(CEO and co-founder, dW0T-02)*

The same level of mission and labour empowerment runs through *dWOT3*. Its core service is an over-the-top (OTT) fintech application that underwrites foreign exchange risks. Its business model is to avoid standardised approaches, seeking to embed its proprietary technology in major cross-border platforms. This means avoiding the subscription platform model and differentiating the firm's offerings by its customised services that require complex integration with customers' platforms. The HR director describes the broader mission it operates with:

> Whatever platform that does cross border transactions, we hope they will have our product inside. And we don't mind that people don't know [about our product]. Let's say that [a platform] offers very good rates. Nobody will know that [the rate is possible] because it's using our product. It brings back to our mission, which…is to benefit the world. Like when [a platform] uses our product, it benefits four parties – the buyer, the seller, the platform, and us. We want more people to benefit from this ecosystem. It will also encourage more transactions. Because quite often than not, a lot of us will think twice about doing foreign currency transactions because of the high rate. *(HR director, dWOT-03)*

Like *dW0T-01* and *dW0T-02,* the mission-centric focus of *dWOT-03* requires perpetual customisation, which means taking a long term-view of the workforce in terms of the broad capabilities it needs now and in the future. The HR director emphasises that its model of labour-centricity is fundamentally about the business:

> So it goes back to business. It's still about business. It's something we should not forget. When we decide to hire who, how senior, what it the job worth, what is the scope, we must always link back to business. But the business may not be now, but in the future. So we clearly have in mind that we are working on some future products. We prefer someone in-house…It's back to this concept that we cannot blindly apply what many companies would do…My colleagues in other companies outsource [job roles such as] marketing and comms. But we are designing to disrupt the market. Our product is innovative. We would rather have in-house staff who understand the product. Sometimes when you outsource, [those hired] don't really understand the company well. So back to the new roles on why we hire data scientists, why we hire UI/UX staff, and have marketing in-house, it's really to put ourselves in a position of strength to fulfil

our business strategy in the near future…When we hire a PhD holder, we say 'We don't have anything for you to do, but we want to work on this product together.' *(HR director, dWOT-03)*

Here again, we see how the 'mental model' of production shapes the labour strategy of firms. In this case, the future direction of the business is to keep the creative process enduring rather than frontloaded, as is the case of the valorisation strategies of *dWFT-01* and *dWFT-01*. *dWOT-03* is not seeking to develop standardised products, and the autonomy it provides to its workforce is likely to endure.

Views from employees

The managerial views of the high levels of empowerment they provide the workforce are well-corroborated by the views expressed by employees. An employee in product development with prior experience in other type of start-ups is highly appreciative of the high level of empowerment he now gets. As the head of product development, he always looks for the most meaningful functionalities for customers. However, in his previous companies, managers often overrode the recommendations of product development teams despite the strong evidence provided. He no longer has to deal with excessive managerial interference in his current company, allowing him to serve customers' needs authentically. He shares:

> Here, I have data…I can do some surveys. I can speak to my users directly. I have data available online. I have data on the website, on which I can take a calculated decision, like what works best for the users, but does not work for rest. I'm not like trying to please someone else. I'm trying to please the end users directly. *(dWOT-Employee 01)*

A customer service professional with experience in other platform businesses, such as Expedia, describes how her current firm is orientated towards providing deep support for those fronting the customer experience. In other firms, managers often use digital tools to track the performance of customer service professionals. However, in her current firm, digital tools take a different character, being a means to support the full journey of customers. This allows for the customer service role to be augmented by technology. She shares:

> If you do customer service [in other platform businesses], [when] a customer asks you, someone will answer it but the next time it will be a different person. But for [my current firm], one person will answer you all the time and you know who will be the one that answers your questions. And, of course, you understand that he or she will remember what happened to you. For that 'remembering' part, [we] need technology. So we have a CRM to actually record everything to help us. *(dWOT-Employee 02)*

A software engineer similarly describes the autonomy of the average shopfloor worker to propose technological solutions. This is often done in a data-driven way through bottom-up experimentation to determine whether the technology indeed brings in the envisioned benefits. He shares:

> The company gives you an opportunity to experiment with a lot of new technology. You can bring in ideas and they are respected. It's a very flat organisation...So you can do proof of concepts, give ideas and suggestions, bring in new technologies that you think are apt for the company. *(dWOT-Employee 03)*

The empowerment extends beyond employees to the partners contracted to support firms' activities. Due to the mission-oriented business of the *dWOT* firms, their contractors similarly enjoy a long-term relationship with the firm. An employee explains:

> The developer house that I work closely with,…I work with them as a partnership…They are really used to, 'Oh but you hired us, so you tell us what to do'…We are more used to like, 'But you are also good at what you do so you can advise me, like if you think maybe this is the better way of doing something, let me know'…It's like a several-year contract and we have to work together.' (*dWOT-Employee 04*)

Notably, in this model of labour-centric perpetual customisation, the workforce cooperates to assist the firm to meet its Profit & Loss (P&L) objectives. Cost concerns are considered actively by the employees. Two employees in separate firms share how they are mindful of the best ways to optimise costs when proposing ideas. Their views are as follows:

> In my team, we are very open to pitching new ideas, as long as it increases our productivity. So, I have shared a few. It's just that we have to make sure it doesn't cost so much because cost is always a factor. And then to make sure the use case is good and the maintainability is low. *(dWOT-Employee 05)*

> In a perfect world, if you can give me 50 customer care officers..., I think the personalisation will be fantastic. But then that's the ideal situation. If you were to look at it from P&L wise, budget, efficiency, it really doesn't fit. *(dWOT-Employee 06)*

It is noteworthy that managers also look out for their workforce in a reciprocal manner. In the same way that the workforce at 'wealth of talent' firms is actively looking out at the valorisation process for the firm, the founder and managers at the firms are similarly ensuring that they are attracting the right investors committed to the firm's mission.

The HR director at *dWOT-03* shares:

> [The founder] himself has said it's like a marriage…One of the key jobs [of the CEO] is to keep looking for investors and…to choose to partner with the right investors…At the later stages where the investors are private equity firms, they also will want to be a part of your group, give advice, mentorship, link you up with other companies, look at your whole organisational structure and say, 'Okay, maybe you need to change this and that'. We need to embrace that. But before that, [you have to] make sure you strike up a very good rapport and understanding. And that's why [the founder] also shared before, [the partnership with a private equity firm] doesn't just come overnight. They had quite a long-standing discussion and negotiation and understanding of each other…[The founder] wants to ensure that [the private equity firm] understands us, and are willing to support what we do. *(HR Director, dWOT-03)*

Future trajectory of labour

In all three 'wealth of talent' born-digital firms, we see the pattern of skills upgrading as labour power is strengthened, with the firms not averse to increasing their employment numbers in Singapore. Each of the firms allows us to identify various ways labour power can be enhanced.

In *dWOT-01* especially, we see evidence of how digital tools can augment existing domain knowledge. Traditional knowledge bases such as pedagogy and organisational sciences are reinterpreted and redeployed through a digital platform model in ways that will allow the knowledge to benefit end-users in new ways.

dWOT-02 is exceptionally interesting for its customer experience brand, which allows for the reinterpretation of customer service into customer science, described as the fusion between AI, behavioural sciences, and data (Shaw & Hamilton, 2016). The firm hires diploma holders as part of its customer service team. Thus, there is potential for creating equitable work opportunities for diploma holders in Singapore. With the strategic importance of customer service to the business of *dWOT-02 and the high trust and high discretion* it has of its workforce, such diploma holders now have viable routes into specialist routes, empowered by data and digital tools to deliver a highly personalised service experience.

dWOT-03 is remarkable because it is interested in hiring a diverse spectrum of expertise beyond technology talent and giving the workforce space to reinterpret their skills. Its expansion is interesting in terms of hiring data scientists, UI/UX designers, and marketing professionals in-house, as it suggests that a broader set of talents is necessary in a digital economy.

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Assessment of changes to labour power

Born-digital firms may have selected the same production technique, but they decide to valorise the technique in vastly different ways with contrasting implications for labour. In 'war for talent' born-digital firms, control of the corporate agenda is limited to a core group of selected talent, as outsourced and offshored talent are used to perform high-skilled work but with lower levels of discretion. Even though the labour model now requires significant creative power, the longer-term direction is to operate with a minimal labour cost model as part of their valorisation strategy to develop scalable, standardised tools. In contrast, 'wealth of talent' firms seek to develop customisable tools as part of their broader mission, which would always require high levels of labour's creative power. In doing so, they are committed to investing in their workforce over an extended duration and forming high-discretion partnerships even with their gig workers. Labour power is thus enduring in 'wealth of talent' born-digital firms with workers supported to exercise occupational and organisational discretion to coordinate tasks. Similar to traditional 'wealth of talent' firms in Chapter 6, not only is the labour-power of professional workers preserved but there is scope for the expansion of discretion at other levels of the occupational structure that the Singapore developmental state needs as part of its bold SkillsFuture initiative to offer alternative pathways to non-graduates.

Chapter 9 | Link between corporate talent management, digital technologies and the future of work

Delving into the intersection of corporate talent, digital technologies and the future of work

In this chapter, I connect the findings outlined in Chapters 5 – 8 to the two research questions (RQs) of the study, namely:

- **RQ1:** How does corporate talent management, as a form of social relations of production in a firm, mediate organisational decisions on how digital technologies are being thought of, constructed and deployed within a firm, and the subsequent impact on jobs and the division of labour within the firm?

- **RQ2:** To what extent do practices of corporate talent management at the firm level prefigure upcoming changes to the division of labour at the aggregate or national level with digital technological change?

I also situate the findings in relation to the academic literature described in Chapter 2. Thereafter, I describe the policy implications of the results.

RQ1: Corporate talent management, digital programmes and the use of labour

Chapters 5-8 illustrate how corporate talent management offers insights into capitalists' 'mental model' of production, revealing the perception of labour within firms' broader business strategy as they begin to adopt digital production techniques. Businesses have the choice to select the valorisation strategy that best aligns with how they aim to differentiate themselves in the market and deliver value to their customers. Each valorisation strategy has a corresponding talent model. On the surface, 'wealth of talent' and 'war for talent' firms may look similar in their focus on high value-creation activities using high-skilled labour. However, these two firm archetypes operate with different valorisation strategies, leading to different talent models. 'Wealth of talent' firms prioritise building enduring customer relationships and pursuing constant innovation through collaborative customisation with their stakeholders. This gives rise to a labour strategy that seeks to optimise the creative use of labour across its broad workforce. In line with the long-term orientation of 'wealth of talent' firms, the broad workforce in such organisations is highly valued and actively invested in, recognising their importance for the business's current and future operations. This pattern of business-people strategy gives rise to a bottom-up digital strategy that provides space for the broad workforce to experiment with digital tools and collaborate to advance customers' needs. The process enhances workers' exercise of discretion to

master the complexity of skills as business contexts evolve while also strengthening their ability to coordinate activities across tasks. Even workers who do not hold professional positions can experience upgrading in terms of occupational and organisational discretion. In Chapter 6, we see how *WOT-01*, a chemicals firm, seeks to overcome market saturation in the professional farming space by shifting its attention towards the multitude of smallholder farmers in developing countries. It aims to distinguish itself from typical predatory approaches that would leave farmers more vulnerable. Instead, it opts to build lasting connections with them in ways that allow them to enhance their crop yield sustainably. It harnesses its extensive workforce, including software engineers, UX/UI designers, marketers and more, to realise this vision. This team of multiple talents works directly with the farmers, employing a strategy of collaborative customisation to devise optimal solutions. In the process, the workforce has significant autonomy to design digital platforms in ways that augment their skills and capacity to coordinate activities across tasks.

In contrast, 'war for talent' firms adopt an approach centred on value-creation coupled with swift value-capture strategies. A small category of workers, identified as talent, is allocated to value-creation tasks. Once these tasks are completed, the outcomes are pushed out to the rest of the workforce, who then present them to clients with a range of predefined functionalities for customisation. In 'war for talent' firms, the broad workforce is valued for their present contributions to deliver value-capture strategies but is not deemed crucial to support the future of the business, as a small group tightly controls the value-creation agenda. The organisational strategy these firms employ results in a top-down digital approach that restricts experimentation to the 'talented' segment of the workforce. Consequently, the broad, high-skilled workforce encounters notable limitations in evolving their professional expertise using digital tools. Their capacity to coordinate activities across various tasks is at risk because these activities are progressively funnelled through digital platforms over which they have limited influence or control. The digital activities in 'war for talent' firms indicate an ongoing transfer of occupational and organisational discretion to the coordinating capacity of digital platforms. This is even though the broad workforce in 'war for talent' firms comprises credentialed, high-skilled workers. In Chapter 6, we observe how *WFT-01*, a prestigious European equipment manufacturer, responds to its perception of market saturation prompted by the emergence of Chinese competitors. It opts to adopt an efficiency-driven strategy to oversee the customer experience from the top, utilising its R&D engineers. This involves using machine-driven predictive maintenance in its new equipment range, which could automate or standardise tasks usually done by field engineers.

'Constrained talent' and 'zero-talent' firms aim to optimise costs rather than engage in value-creation activities. This reduces the likelihood of them using digital technologies to upgrade jobs despite their acknowledgement that more of their workforce have degree qualifications. When these firms use digital tools, their primary objective is to sustain their basic business model of cost optimisation. To some

extent, 'constrained talent' firms seek to differentiate themselves through a strategy of cosmetic customisation that allocates slightly more space for their broad workforce to exercise their creative power within the limits of narrowly designed jobs. There are indications that these firms are creating new executive roles, such as IT engineers and digital marketers. Still, these positions tend to be low-discretion and limited in number. At least one firm, *CT-01*, which is discussed in Chapter 7, has already implemented digital offshoring practices by incorporating permanent remote work positions into its workforce. This involves leveraging degree-credentialed labour from the Philippines and Indonesia to perform sales, customer service and IT engineering tasks. These high-skilled labour perform executive duties for the firm remotely but are cut off from their ability to coordinate activities fully across the production process. For the rest of the broad workforce in low-skilled jobs in the firm, there are increases in job content when digital tools are deployed. However, this increase does not strengthen their capacity to engage in more complex tasks and be entrusted with higher discretion to coordinate productive activities. 'Zero-talent' firms are crystal clear in their pursuit of cost-cutting strategies. Labour, as well as digital technologies, are seen as a cost expense. When digital technologies are used, they are employed to automate labour without necessarily upgrading the broader workforce to maintain costs. *ZT-01*, discussed in Chapter 7, describes its strategy as being lean in manpower and heavy on technology.

In relation to RQ1 therefore, the study finds evidence that corporate talent management, shaped by business strategies, influences how digital technologies are being thought of, constructed and deployed within a firm, consequently affecting jobs and the division of labour within the organisation. Depending on the firms' business strategy, digital production techniques can be used in labour-enhancing or labour-degrading ways. The business strategy shapes the talent model of firms that determines who is included, empowered, and left out in the transition to digital production techniques. Four archetypes are found. **Table 18** describes the interaction of two factors, namely business strategy and corporate talent management, and the projected labour outcomes to technological change.

Table 18. Business strategy, corporate talent management and projected labour outcomes to technological change

Interplay of business strategy, corporate talent management and digital technologies		Projected impact on labour due to digital innovation
Business strategy (including digital production techniques)	**Corporate talent management**	
Collaborative customisation • High proportion of workforce involved in	*'Wealth of talent'*	*Labour enhancing* • Low risks of labour substitution/

Interplay of business strategy, corporate talent management and digital technologies		Projected impact on labour due to digital innovation
Business strategy (including digital production techniques)	**Corporate talent management**	
• designing new products and processes • High proportion of workforce engaged in complex work • High proportion of workforce engaged in working collaboratively activities with other workers	• High proportion of jobs requiring high skills (degree qualifications, initial training, frequent learning) • High proportion of workforce seen as adding significant value • High proportion of workforce seen as high potential, promotable and difficult to replace • High proportion of workforce seen as showing discretionary effort	standardisation/ offshoring • High likelihood of upgrading of existing jobs
Adaptive customisation • Low proportion of workforce involved in designing new products and processes • High proportion of workforce engaged in complex work • High proportion of workforce engaged in working collaboratively with other workers	*'War of talent'* • High proportion of jobs requiring high skills (degree qualifications, initial training, frequent learning) • High proportion of workforce seen as adding significant value to firms • Low proportion of workforce seen as high potential, promotable and difficult to replace • Low proportion of workforce seen as showing discretionary effort	*Labour restratification* • High risk of labour substitution/ standardisation/ offshoring of jobs 'below the talent radar' • High likelihood of upgrading of remaining jobs
Cosmetic customisation • Low proportion of workforce involved in designing new products and processes • Low proportion of workforce engaged in complex work • High proportion of workforce engaged in working collaboratively with other workers	*'Constrained Talent'* • Low proportion of jobs requiring high skills (degree qualifications, initial training, frequent learning) • Low proportion of workforce seen as adding significant value to firms • Low proportion of workforce seen as high potential, promotable and difficult to replace • High proportion of workforce seen as showing discretionary effort	*Creation of new PME roles but that they may be offshored* • High risk of labour substitution • High risk of offshoring of newly-created PME jobs • Low likelihood of upgrading of existing low-skilled jobs

Interplay of business strategy, corporate talent management and digital technologies		Projected impact on labour due to digital innovation
Business strategy (including digital production techniques)	**Corporate talent management**	
Standardised products • Low proportion of workforce involved in designing new products and processes • Low proportion of workforce engaged in complex work • Low proportion of workforce engaged in working collaboratively with other workers	*'Zero-talent'* • Low proportion of jobs requiring high skills (degree qualifications, initial training, frequent learning) • Low proportion of workforce seen as adding significant value to firms • Low proportion of workforce seen as high potential, promotable and difficult to replace • Low proportion of workforce seen as showing discretionary effort	*Labour substitution with no labour upgrading* • High risk of labour substitution • Low likelihood of upgrading of existing low-skilled jobs

Two other points are worth mentioning. First, based on the interviews across the four firm archetypes, I observe the significant impact of corporate talent management on various aspects of professional life within a firm. Talent models influence even the dynamics of employee interviews conducted in this research study. 'Wealth of talent' firms typically offered a wide range of employees for research interviews, most of whom were eager to share their insights with the research team. In contrast, 'war for talent' firms only suggested high-potential employees for interviews. Initially, these employees often remain cautious, necessitating additional effort from the research team to create an environment where they feel comfortable sharing their views openly. We did not get access to those 'below the talent radar'. 'Constrained talent' firms assisted in identifying employees. However, these employees often declined to be interviewed. This could possibly be due to the narrow scope of their roles, making them uncomfortable connecting beyond their familiar tasks. Lastly, 'zero-talent' firms were reluctant to consider our suggestions for employee interviews. This could imply a lack of recognition for the value they see in their workforce. The differences in interview dynamics among the four archetypes of firms emphasise how deeply corporate talent management practices are woven into organisational culture and operations. This underscores the importance of taking corporate talent management seriously. Second, it is imperative to grasp that firms' adoption of labour-enhancing techniques is driven by pragmatic considerations of dollars and cents. Firms boasting a 'wealth of talent' may be labour-friendly, but such decisions are chiefly motivated by financial factors, as exemplified in the case of *dWOT-03*. The HR director, a soft-spoken gentleman, emphasised to the research team that business imperatives chiefly

guide the firm's labour-centric model. This illustrates how the demand for workers' creative capabilities in 'wealth of talent' firms remains deeply entrenched within the capital-labour relationship.

RQ2: Corporate talent management as a leading indicator of the future of work opportunities

Here, I take forward the empirical evidence presented earlier to discuss the extent to which corporate talent management as a firm-level indicator may be used to forecast the broader changes to the division of labour at the national level due to firm-level technological activities.

First, integrating the results of the BPSS cluster with qualitative findings, this study finds that only 'wealth of talent' firms preserve and enhance the occupational and organisational discretion of their high-skilled workforce in a pattern that fits the conceptual understanding of skills-biased technological change. At just a quarter of the establishments surveyed in the BPSS (25 per cent), this represents a small proportion. This finding may thus be an early indication that the Singapore economy is unlikely to experience skills-biased technological change that has characterised earlier periods of its post-independent history.

Second, 'war for talent' firms form the largest cluster at 30 per cent of the dataset, with digital programmes that show early signs of making high-skilled labour precarious. Together with 'wealth of talent' firms, 'war for talent' firms are currently a key source of good, professional jobs in Singapore. However, the qualitative findings show that the direction of the future of work opportunities in 'war for talent' firms is likely to lead to the firms keeping the pool of strategic 'talent' positions in Singapore but automate, standardise or offshore the work of those 'below the talent radar'. This finding may thus be an early indication of the increasing precarity of high-skilled, professional workers in Singapore.

Third, 'constrained talent' and 'zero-talent' firms are unlikely to use digital technologies to upgrade their workforce in large numbers. Combined, 'constrained talent' and 'zero-talent' firms are sizeable at 45 per cent of the dataset. Their cost-optimisation models mean they are unlikely to pursue skills-biased technological change to redesign jobs to demand higher skills and, therefore, higher wages, despite an acute awareness that more of their workforce increasingly hold degree qualifications. There is also preliminary evidence suggesting that PME positions could be filled remotely through cost-effective sourcing of workers with degree credentials from the region. This practice aligns with the digital programmes of 'war for talent' firms that prioritise fortifying top-tier positions, thereby exposing the remainder of their professional workforce to the risks of automation, standardisation, and offshoring. As a result, high-skilled workers in Singapore may face greater precarity, which is concerning given Singapore's plan to boost the number of degree holders in the economy (Singapore Ministry of Education, 2023). This study's findings highlight the necessity for caution, as the prevailing digital

strategies of firms in the Singaporean economy may not inherently evolve jobs to demand additional skills or discretion, potentially resulting in disappointment for the workforce.

Therefore, concerning RQ2, this study presents some evidence suggesting that corporate talent management practices at the firm level may foreshadow forthcoming changes in the division of labour at the national level due to digital technological advancements. Specifically, the fortunes of professional workers in the Singaporean economy are at risk. Notably, with only 25 per cent of firms categorised as 'wealth of talent', it is improbable that the broader Singaporean economy will exhibit outcomes indicative of skills-biased technological change that would forecast growth in high-skilled jobs. There is no clear evidence of 'hollowing out' either, which involves the displacement of middle-level jobs in relation to high-skilled and low-skilled positions. Instead, professional work appears to be most susceptible to automation, standardisation, and offshoring due to the digital strategies of other firm types in the economy.

The above finding aligns with results from a recent mandatory employer survey conducted by the Singapore Ministry of Manpower (2023), which indicates that professional and managerial roles are the most likely to be performed remotely. This study's observation regarding the challenge to professional work also corresponds with the findings of Souto-Otero et al. (2021). Through regression techniques applied to the same BPSS dataset utilised in this study, the authors discover that high skills do not shield workers from the impacts of technological change in Singaporean establishments. Their findings thus support the empirical evidence presented in this mixed-method study, indicating that high-skilled workers are not immune to technological substitution. Of vital importance is that the authors find two statistically significant factors that shield workers from the labour-substituting effects of technological change. These are (1) high value-add business strategies, and (2) management's positive perceptions of workforce competence. This study extends the authors' conclusions by revealing that these two factors may not be separate; instead, they are likely to interact significantly, shaping the labour outcomes resulting from technological innovation, as evidenced by the labour-enhancing effects of technological change in 'wealth of talent' firms.

However, in relation to RQ2, it is crucial not to overstate the forecasting capacity of this study's findings, given the significant limitation of the BPSS dataset used. The BPSS data was collected in 2016, and the technique of agglomerative hierarchical clustering using Ward Linkage was employed, leading to the identification of four clusters of corporate talent management (Clusters 1-4). Qualitative interviews were conducted in 2021, drawing from firms in these four clusters and beyond that have adequately confirmed the external validity of the clusters. However, it is unknown if the distribution of the four archetypes remains the same in the Singapore economy e.g. if 'war for talent' firms is still at 30% of the establishments in Singapore. Additionally, it is important to consider the workforce makeup

and size within each cluster when assessing the impact on jobs at the national level. However, due to the age of the BPSS survey, relying on quantitative estimates using BPSS data at this juncture holds limited value. What is presented here is, at best, a prognosis. First, the scenario of skills-biased technological change is unlikely, given the small proportion of 'wealth of talent' firms in the Singaporean economy. Second, there is the potential emergence of risks to professional labour, where jobs may be automated, standardised or offshored. Due to various weaknesses in the BPSS survey, following up with further data collection is essential to refine these observations. **Table 19** outlines the enhancements to BPSS that could bolster more robust forecasting to support future-of-work studies within the theoretical paradigm of the social relations of production.

Table 19. Enhancements to BPSS to enable more robust forecasting to support future-of-work studies

Area	Details
Strengthening key variables in BPSS	• The business strategy construct in BPSS should be improved to encompass a broader spectrum of strategies identified in the qualitative component of this study, such as collaborative customization ('wealth of talent'), adaptive customization ('war for talent'), cosmetic customization ('constrained talent'), and standardized approaches ('zero talent'). • BPSS currently makes no distinction between types of technologies. Scholars are seeking to understand if there is a clear distinction between how different types of technologies, such as robots, platform technologies, and machine learning, might impact the future of work (Alasoini & Toumivaara, 2022; Holm & Lorenz, 2022). It would, therefore, be useful if the BPSS survey required firms to specify the type of technological initiatives they undertake. • The qualitative data observe that the outcomes of digital change relate to upgrading, automation, standardisation, and offshoring. Currently, the BPSS survey covers only variables related to labour upgrading and automation. Therefore, the variables need to be strengthened to include the other two outcomes of technological change. • Questions in BPSS only capture responses as to whether technological change of work in processes leads to a decrease in workers, without reference to the occupational category. As the findings from this study show, it can no longer be assumed that technological change will shed low-skilled jobs. Given the qualitative findings of the risk of

Area	Details
	professional work being automated, standardised or offshored, BPSS variables can be strengthened to study the effects of technological change on different occupational categories. • The trend towards globally distributed work has been observed to increase since the COVID-19 pandemic, as organisational processes sanction remote working that may encourage firms to further invest in developing global digital work processes (Brynjolfsson et al., 2020). The examples of *dWFT-02* and *CT-01* that hire professionals as permanent remote workers show that such trends pre-date COVID-19. Elsewhere, my co-author and I have noted trends such as the use of high-skills workers recruited through labour platforms such as Fiverr, Toptal and Catalant (Brown & Sadik, 2023). The variables in BPSS, therefore, should capture new trends in establishments' recruitment practices in terms of hiring remotely and through high and low-skill labour platforms.
'Matched sampling' of enterprise and job-holder data	• The employee data in the qualitative interviews has been crucial in helping us understand the effects of technological change on work. There is thus significant value in extending the same approach quantitatively, whereby the BPSS survey captures workplace indicators from the perspectives of senior managers with a job-holder administered to capture the perspectives of their workforce. This approach of 'matched sampling' is powerful to deepen the study of the social relations of productions at the firm level. Indications of whether the workforce has space to experiment with digital technologies and the effects of digital technologies on their occupational and organisational discretion will strengthen the evidence base of changing patterns of work opportunities as a consequence of technological change.
Longitudinal studies	• Longitudinal studies of establishments will allow us to develop a deep understanding of the drivers of job creation, job destruction and job renewal at the firm level. The longitudinal technique enables the examination of the sequence of events, facilitating a detailed specification of causal mechanisms.

Considering the findings in light of academic literature

In light of the academic literature covered in Chapter 2, I am of the view that the findings strongly bolster the argument for the social relations view of technical change. (MacKenzie & Wacjman, 1999; Adler, 2004; Rikowski, 2002; Sawchuk, 2006). Specifically, this study reveals that labor outcomes of technological change are shaped more by the social relations of production than any intrinsic nature of digital technologies. Digital technologies expand the range of productive techniques that firms can use, but how they are used is ultimately shaped by decisions on business strategy and the corresponding labour strategy. When businesses demand labour's creative potential, such as in 'wealth of talent' firms, they are likely to utilise digital technologies to enable labour augmentation, underpinned by the autonomy granted to workers. When businesses require labour's compliance to prescribed methods, such as in 'war for talent' firms, they are likely to utilise digital technologies to support centralised control, putting workers at risk of automation and standardisation. Cost considerations may deter the use of digital technologies in price-competitive businesses, as shown in 'zero-talent' firms. Alternatively, it could lead to the introduction of new working arrangements, such as cheap-sourcing of remote high-skilled labour to sustain price-competition business models. Corporate talent management, viewed within the context of social relations of production, represents the talent dimensions of the business model that can be organised in various ways depending on business strategies. The framework of corporate talent management adds to the researcher's toolbox to capture the positive and negative impacts of the use of digital technologies on labour-power, sitting alongside other conceptual tools such as business strategies.

The above observations have important implications for future-of-work theories, be it skills-biased technological change, 'hollowing out' or technological underemployment (Arntz et al., 2016; Autor et al., 2008; Frey & Osborne, 2013; Goldin & Katz, 2008; Goos et al., 2014; Susskind & Susskind, 2015; Susskind, 2021). It suggests the limits of looking at digital technologies as either labour-substituting or labour-enhancing. Both scenarios may happen depending on the social relations of production shaped by firms' valorisation strategy. An alternative approach is advanced in this study – that the ensuing impact of labour outcomes from technological change depends on the mix of firms in an economy, alongside other industry or national-level factors that may deter or support labour augmentation. Adopting this approach underscores the importance of being attuned to business strategies and related concepts, including corporate talent management. It connects well with the framework by Fox (1974) that similarly shows the plurality of ways in which firms can organise their labour.

Specifically, the four archetypes of firms identified in this study correspond with specific patterns of labour outcomes from technology change. Combined, the composition of the firms in the economy allows us to forecast the likely changes to the division of labour at the national level. A prognosis is suggested: the likelihood of skills-biased technological change seems low, given the small proportion

of 'wealth of talent' firms in the Singaporean economy. Additionally, there are emerging risks to professional labour due to the valorisation strategies of other firm types, with potential automation, standardisation, or offshoring of high-skilled jobs. Admittedly, these conclusions are tentative due to the time period of the BPSS survey being conducted in 2016 and other significant limitations of the BPSS quantitative dataset, as shown in **Table 19**. With enhancements, BPSS could be a useful tool to monitor the 'future of work'. This approach broadens the use of the theoretical framework of social relations of production, allowing it to be effectively marshalled to anticipate future work trends in new ways. It goes beyond the theory's usual applications in examining past technological changes (Braverman, 1974; Hanley, 2014) and understanding strategies of labour resistance at the point of production (Burawoy, 1974; Gandini, 2019; López et al., 2022).

Additionally, this study's findings align with empirical investigations elsewhere indicating the use of digital technologies toward standardising, fragmenting, and increasing the precarity of professional labour, often referred to as digital Taylorism (Altenreid, 2020; Brown, 2021; Brown et al., 2011; Head, 2014). These studies attribute the trend to corporations' cost-efficiency strategies, contending that opportunities for digital technologies to enhance labour exist if firms pursue alternative business strategies. For example, Head (2014) briefly notes that such technologies can complement rather than supplant employee expertise, citing national institutions like the Scandinavian tradition of employee participation, as well as companies structured around alternative work cultures such as Lincoln Electric in the US and John Lewis in the UK. Fortunately, this study has the advantage of being able to extend and explore these observations further. It successfully identifies a range of outcomes from technological change that can be observed within a single study at scale. Its mixed-methods design enables the identification of both labour-degrading 'war for talent' and labour-enhancing 'wealth of talent' firms across a large national-level dataset.

Finally, the study contributes to comprehending firm-level factors that serve as a barrier against technology-driven automation and standardisation. Firm-level factors are potentially powerful because they suggest the ability of the corporate sector to self-regulate, mutually enhancing firm and labour outcomes, even without institutional intervention. Singapore provides an excellent case study due to its pro-capital environment with minimal government interference in firms' activities. At 25 per cent of the BPSS dataset, the notable presence of 'wealth of talent' firms in the economy is unexpected, providing compelling evidence that there is a strong business case for firms to adopt labour-enhancing strategies. As highlighted in Chapter 5, while certain firm archetypes may be statistically more common in specific sectors, the four archetypes are found across all industry sectors. For example, 'wealth of talent' firms are prevalent in knowledge industries like infocommunications and professional services but have also been identified in less knowledge-intensive sectors. An example is *WOT-02* that is in retail, and food and beverage. *dWOT-02,* the start-up selling non-complex medical devices, is also atypical in how it

runs its customer service team differently. Such examples indicate the potential for driving sectoral transformation of low-skill sectors in innovative ways. Furthermore, the findings from this study that 'wealth of talent' firms are more likely to report strong business performance in terms of increased profits, revenue, and market share, suggest a complementary relationship between labour-enhancing outcomes and firms' business viability. Therefore, this study's findings complement other factors at both sectoral and national levels that can facilitate labour-enhancing outcomes (Adler, 2004; Genz et al., 2018; Hanley, 2014; Lloyd & Payne, 2019; Stroud et al., 2020). Employing a multi-faceted strategy inclusive of tax incentives, minimum wage adjustments, and strategic industrial action is imperative for bolstering labour empowerment. Boushey and Rinz (2022) stress the importance of employing a range of strategies towards "blocking the low road and paving the high road" for firms, advocating for both labour-friendly outcomes and increased firm productivity. In the next section, we delve into the potential for integrating firm-level strategies with sectoral and national approaches to maximise labour-enhancing outcomes from digital technologies in the Singapore context.

Policy implications for Singapore

When applied to the broader 'job quality' challenges of the Singapore state as outlined in Chapter 3, the findings from this study suggest that these challenges are likely to be severe for the city-state. The four challenges outlined in Chapter 3 were (1) poor access to top jobs; (2) the multi-dimensional challenge of growing professional jobs; (3) the aspiration challenge of non-graduates; and (4) the SME job upgrading challenge. In this regard, the number of top jobs in the economy may be expected to be increasingly scarce and difficult to access, given that 'war for talent' firms pursue strategies of preferential development of only 10 – 20 per cent of its workforce, such that the bulk of the workforce (80 – 90 per cent) would not be well-positioned in terms of access to stretch postings to build the pathway to top jobs. The multi-dimensional challenge of growing professional jobs may be expected to be more acute, as digital tools increasingly allow for PME jobs to be automated, deskilled and/or offshored.

Given the likelihood of degree holders encountering labour market challenges, non-graduates may face even greater setbacks. The SME job upgrading challenge is acute, given the study's findings that they tend to use digital technologies to sustain price competition strategies.

'Wealth of talent' firms are a bulwark against this trend, and it therefore depends on the extent to which Singapore is able to grow the proportion of such firms in the economy. At present, policy levers in Singapore make no distinction between firms' value-creating activities – collaborative customisation and therefore, labour-enhancing outcomes across the broad proportion of the workforce in 'wealth of talent' firms, versus adaptive customisation and, therefore, labour stratification of a category of 'talented' workers versus those 'below the talent radar' in 'war for talent' firms. The underlying policy

assumption is that both types of firms lead to good professional jobs that offer the same set of opportunities. Interestingly, the pattern of 'wealth of talent' versus 'war for talent' extends even to technology start-ups, which Singapore's policymakers consider crucial for creating quality jobs.

Meanwhile, the majority of low-skilled jobs in Singapore, typically found in SME establishments within 'constrained talent' and 'zero-talent' firms, may not see upgrades due to firms' reliance on digital technologies to sustain, rather than challenge, their price competition models. Given the accessibility of qualified workers for SMEs in the region to work remotely at lower costs, these firms may find it even easier to maintain their competitive pricing models by implementing digital workflow processes. Therefore, the SME sector might not be able to compensate for the loss of 'good' jobs in the non-SME sector.

The likely outcome, therefore, is the pattern of labour restratification, specifically the use of digital technologies to change the job content and/or job contexts of high-skilled jobs to allow firms to enjoy cost arbitrage (Brown, 2021). In other words, the current systemic crisis of the developmental state that is outlined in Chapter 3 is unlikely to be resolved by the Singapore government's strategy to shift to a 'global city' powered by a concentration of digital activities. The strategy is likely to lead to the strengthening of a category of top-notch jobs that will lead to more intense job competition in the city-state, but unable to produce the kinds of professional work in the numbers that Singaporeans have come to expect when they pursue degree credentials. When contrasted with the expanding pool of qualified labour shaped by Singapore's higher education strategies, the risks of skill underutilization may become evident. This highlights the potential emergence of high-skill precarity as a new form of social inequality in Singapore.

There is, therefore, a need to increase the number of 'wealth of talent' firms in the Singapore economy whose valorisation strategy allows for digital technologies to be used to augment the workforce in inclusive ways. This points to the possibility of national and sectoral strategies to block the low road and pave the high road in business transformation (Boushey & Rinz, 2022). One national strategy may be through preferential treatment given to 'wealth of talent' firms. Here, the developmental state of Singapore has had significant experience. In its early post-independent years, it implemented preferential policies to encourage the establishment of transnational corporations (TNCs) in Singapore, fundamentally transforming the character of the Singapore economy. The job-creation capacity of such TNCs was crucial to decisively shape the creation of work opportunities at a scale that powered successive periods of economic and labour upgrading. However, the city-state is facing a significant challenge in taking forward the strategy in the current phase of its development. Its 'global city strategy' targeted at traditional and emerging corporate players, including technology start-ups, is showing signs of rupture in terms of how their activities are complementary to the use of local labour, given the

dominant practice of 'war for talent' within this corporate segment. However, this disconnect is currently seen as a temporary problem with the expectations that SkillsFuture education and training programmes will close the perceived 'skills gaps' over time. As this analysis shows, the primary problem has been how workers are positioned within such firms such that the top jobs are hard to secure by the average Singaporean worker, with those 'below the talent radar' not given the opportunity to develop high-end expertise. They are missing out on experience and workplace learning (Brown et al., 2019; Madgavkar et al., 2023). In contrast, 'wealth of talent' firms pursue inclusive approaches such that even those without stellar credentials have the ability to move into roles that strengthen their labour power. 'Wealth of talent' firms thus appear to be the necessary corporate players to support the socio-economic goals of the Singapore developmental state.

Most crucial for our purposes is that the qualitative analysis has shown that 'wealth of talent' firms come in all forms of sizes and origins. They include local and foreign TNCs, SMEs and start-ups. Encouraging their presence in Singapore is likely to create a healthy mix of players, rather than the current system of preferential policy that seeks to target mainly foreign TNCs and start-ups, and weaken the capacity of the local sector. This would require the Singapore state to develop alternative sensing mechanisms to build such firms locally and attract similar ones internationally. Due to the creative process of the activities of such firms that require significant face-to-face interaction, the risks of offshoring such high-skilled jobs are reduced. Elsewhere, my co-authors and I have found similar positive effects on labour when SMEs engage in high value-creation activities when transforming their businesses (Sadik et al., 2023b). Business owners in such firms articulate the significant challenge posed by COVID-19 when pandemic restriction measures did not allow workers to meet face-to-face. They lament how productivity levels have been affected significantly as the creative process required in-person brainstorming. In contrast, in SMEs that undertake low value-added activities, the pandemic restriction measures convince business owners that remote working would not undermine the firms' productivity and open up the possibility of hiring cheaper, highly qualified labour from outside of Singapore.

Other national policies that can be used to grow 'wealth of talent' firms in the economy include alternative financing mechanisms, given that current financing schemes are dominated by practices that focus on short-term profits that are harmful to the long-term partnership between capital and labour. Thus, the founder of *dWOT-03* takes elaborate steps to identify the right kinds of private equity partners to sustain his vision of mission-oriented entrepreneurship. *WOT-01* has access to funding from its European government that seeks to balance social and economic goals. Accessing to financing based on labour-friendly metrics will help make 'wealth of talent' strategies more viable. The Singapore government already has an investment arm through Temasek Holdings and the Singapore Economic Development Board that can be repositioned to support labour-centric metrics. Additionally, it is

attracting philanthropic and private wealth firms as part of its industrial strategy that can be repositioned to give priority to those supporting labour-centric objectives. Indeed, this set of strategies may seem idealistic at present. Still, Singapore has had a history of unconventional strategies, as seen in its approach of embracing export-led industrialisation in the early years of its independence. Significantly, 'wealth of talent' firms also emerge as the top-performing cluster in terms of business returns. Therefore within the scope of this study's findings, providing alternative financing using labour-centric metrics is not an exercise of subsidising underperforming firms, but rather to build pathways to nurture high value-creating and profitable businesses that create good jobs, in keeping with national interest.

The activities to shift other firm types to 'wealth of talent' firms can be taken at the sectoral level through the nationally-guided but sectoral-driven initiatives of the Singapore government, namely the Industry Transformation Maps, the Job Transformation Maps and the Singapore Skills Framework (Singapore Ministry of Trade and Industry, 2024; Workforce Singapore, 2023; SkillsFuture Singapore, 2023a). Again, the BPSS findings that 'wealth of talent' firms demonstrate the strongest business returns in terms of the likelihood of reporting an increase in profits, revenue, and market share are powerful to drive change, particularly if the business returns are consistent over time. Elsewhere, metrics are showing that corporate outcomes have been declining. McKinsey reports that the average lifespan of companies listed in Standard and Poor's 500 dropped from 61 years in 1958 to 18 years in 2016 (Hillenbrand et al., 2019). According to the OECD, productivity has slowed down considerably, which was unexpected given that "it has occurred at a time of rapid technological change, increasing participation of firms and countries in global value chains (GVCs), and rising education levels in the labour force, all of which are generally associated with higher productivity growth" (OECD, 2016: 1).

The evidence above indicates room for firms to be encouraged to adopt new approaches. Among the stakeholders I consulted, I spot acute challenges in securing the interest of TNCs to evolve their 'war for talent' practices, as senior leaders in Singapore feel limited in their ability to shift corporate priorities that are often decided in headquarters outside Singapore. However, there is a healthy interest in mid-sized and small companies, including start-ups. Not surprisingly, they are primarily drawn to the findings that 'wealth of talent' firms report the highest business returns. One of the stakeholders, a start-up consultant, commented that 'wealth of talent' appears to be the missing meta-model to power start-ups as it deftly connects business, technology and labour models in expansive ways. He offers the term 'new wealth' to complement the description of 'wealth of talent', seeing the labour strategy as a sustainable way for companies to unlock the potential of the workforce to create new products and services. Separately, I engaged in a conversation with the CEO of *CT-01* on the limits of its platform strategy, given that it does not fundamentally challenge the firm's price-competition business and is unlikely to help him grow a new revenue base. The CEO openly admits that he has not considered his

business strategy in that manner and is receptive to collaborating with us to formulate an alternative digital transformation strategy.

Even as policymakers may aim to grow the number of 'wealth of talent' firms within the economy, it is crucial to restrain indiscriminate automation and standardisation of professional tasks, especially given the risks to such categories of work in Singapore. Such a strategy would mark a significant departure from the current reliance on assumptions of skills-biased technological change in Singaporean policymaking regarding digital innovation. In the US, there have been policy recommendations advocating reforms to tax codes that are currently skewed towards encouraging firms to make machinery purchases rather than invest in labour (Acemoglu & Restrepo, 2019; Autor et al., 2020). In addition, drawing inspiration from Norway's labour movement, which focuses on fostering collective intelligence to identify opportunities for digitally redesigning work processes to facilitate job reshoring (Lloyd & Payne, 2019), Singapore's government could consider a parallel approach. This strategy entails pinpointing how the digital redesign of work processes can make professional jobs more 'sticky' in Singapore. Additionally, establishing institutional arrangements that leverage digital tools to enhance the quality of non-professional work is essential to boost overall job quality in Singapore. The quantitative study by Genz et al. (2018) shows the crucial role German work councils play in fostering the use of digital technologies in physically demanding jobs. This would be a crucial area for reform in Singapore too.

New possibilities for forecasting the future of work

One important area for future research is how data can be collected and organised in a more systematic manner to enable forecasting the future of work using the theoretical paradigm of social relations of production. An inspiration for this approach may come from economic forecasting. Here, a technique in use is assembling a set of leading, coincident, and lagging indicators (Klein & Moore, 1982). Leading indicators are forward-looking in that they provide a signal before a change in the economy itself. Coincident indicators occur in real-time and help clarify the state of the economy. Lagging indicators tend to move after changes in the economy have taken place and confirm patterns. By identifying a diverse array of indicators, including leading indicators, stakeholders can bolster their comprehension of the trajectory of the future of work. This, in turn, enables them to undertake appropriate actions aimed at mitigating social inequalities. Hinze et al. (2013) argue that leading indicators are valuable for signalling the areas required for corrective actions. Corporate talent management fits the definition as a leading indicator because it covers both the current and future dimensions of the distribution of work opportunities in a firm. As outlined in Chapter 4, variables measuring corporate talent management in BPSS cover senior managers' assessment of the *current* contributions and *future* potential of the workforce. The specific dimensions associated with the "look-ahead" quality include (1) talent as potential (% of workforce considered as showing promise to take on a bigger responsibility in the

future); (2) talent as promotability (% of workforce who are candidates for future promotion); and (3) talent as hard to replace (% of workforce considered as being hard to replace within three months if they resigned). What is crucial from the empirical findings is that corporate talent management is not a stand-alone indicator. Rather, the dimension interacts with the firms' business innovation strategies, as part of the wider business model. In this regard, the firms' business innovation strategies also have a "look-ahead" quality in terms of who is included and excluded in the design of the digital innovation agenda. Finally, establishments sit within a broader set of social relations of production that includes social institutions such as minimum wage, as well as capitalist institutions such as venture capital firms. There is, thus, a need to draw on other data sources to augment the development of the set of leading, coincident, and lagging indicators. The comprehensive labour market survey by the Singapore Ministry of Manpower that provides time-series data on changes in occupational structures can be identified as a lagging indicator that shows outcomes of the social relations of production on the wider economy. The metrics by the Singapore Ministry of Trade and Industry on the share of SMEs to GDP and employment could similarly be constructed as a lagging indicator.

The above assessment should be taken as indicative rather than exhaustive. Establishing a system of indicators to monitor the future of work opportunities within the paradigm of the social relations of production requires extensive development of new datasets and the stitching of data across datasets. It is an endeavour that would require the concerted effort of a broad range of scholars. Once set up, such a system may signal to societal actors the key areas of intervention to shape a more inclusive future of work. This aligns with the strategy of anticipatory innovation proposed by the OECD, which entails the ability of various actors to "consistently perceive, understand, and act on the future as it emerges in the present" (Tõnurist & Hanson, 2020).

Summary

In this chapter, I describe the results of the study in relation to the two research questions of this study. In relation to Research Question 1, I establish that the valorisation strategies of firms give rise to distinct talent models that shape who are included, empowered and excluded in digital programmes. The four archetypes of firms identified in this study align with varying labour outcomes, encompassing both labour-enhancing and labour-degrading effects of technological change. In relation to Research Question 2, given the small proportion of labour-enhancing firms in the BPSS dataset, I posit a prognosis indicating the improbable occurrence of skills-biased technological change within Singapore's context. Instead, there are potential new risks for high-skilled labour in Singapore due to the larger proportion of labour-degrading firms in the BPSS dataset. I illustrate how employing a mixed-method approach integrating social relations of production offers novel insights into forecasting the future of work, diverging from purely deterministic technological perspectives. I suggest these findings could inform new lines of policy action in Singapore by reshaping the composition of firms within the

economy. Finally, I recommend establishing a comprehensive system for monitoring the future of work, integrating leading, coincident, and lagging indicators for better anticipation and joint action.

Chapter 10 | Conclusion

Key contributions and limitations of the study

In this chapter, I summarise the study's academic contributions and discuss their implications for policymaking and corporate practice. I also identify the study's limitations and outline areas for further research.

Theoretical, methodological and empirical contributions

There are four key contributions of this research study, namely (1) its application of the theoretical paradigm of the social relations of production to forecast the future of work as an alternative to techno-centrism; (2) its interpretation of corporate talent management as an expression of the social relations of production at the firm-level; (3) its mixed method design; and (4) its empirical analysis of an Asian economy that has typically not had much representation in Western-dominated academic literature on the social relations of production.

First academic contribution

First, this study adds to an increasing body of work that offers a nuanced understanding of the impact of AI / digital technologies on work (Holm & Lorenz, 2022; Lassebie & Quintini, 2022). It makes a distinctive contribution to future-of-work studies by adopting the theoretical paradigm of the social relations of production. This approach is an alternative to the prevailing techno-centrism that has influenced many future-of-work studies. In relation to the common future-of-work theories of skills-biased technological change, 'hollowing out' and technological underemployment (Arntz et al., 2016; Autor et al., 2008; Frey & Osborne, 2013; Goldin & Katz, 2008; Goos et al., 2014; Susskind & Susskind, 2015; Susskind, 2021), this study's findings suggest the limits of looking at digital technologies as either labour-substituting or labour-enhancing. Both scenarios may happen depending on the social relations of production shaped by firms' valorisation strategy. An alternative approach is advanced in this study – that the ensuing impact of labour outcomes from technological change depends on the mix of firms in an economy, alongside other industry or national-level factors that may deter or support labour augmentation. The evidence in the empirical chapters of this research study shows that there is no single way in which digital technologies will impact labour. Instead, there is a plurality of ways in which firms use digital production techniques with contrasting effects on the workforce. Firms may select valorisation strategies that lead to the automation or degradation of work using digital technologies, but they may also choose strategies that produce labour-enhancing outcomes. Society's bet for social inclusion and shared prosperity has to go beyond assessing technological possibilities and the simple encouragement of organisations' adoption of technologies to building an in-depth

understanding of firms' changing contexts conducive to labour-enhancing outcomes. As more advanced digital tools emerge, such as ChatGPT, which has made visible the automation capabilities of generative AI for cognitive and creative work at scale, it is vital to understand why there is never a single way in which technologies will impact the labour market. The opportunity to upgrade but also degrade work is always possible, thereby drawing attention to the crucial role that societal actors play in shaping the future of work opportunities. This study adds to an increasing body of work that offers a nuanced understanding of the impact of AI / digital technologies on work (Holm & Lorenz, 2022; Lassebie & Quintini, 2022).

Second academic contribution

Second, the research study makes a novel contribution in its reinterpretation of corporate talent management as an expression of the social relations of production at the firm level, with evidence of how it mediates digital technology programmes and ensuing labour outcomes. In this way, I have sought to expand both the conceptual and methodological tools in the toolbox available for the study of the social shaping of digital technologies. As Marx & Engels (1970 [1845]) famously state, those with the means of material production also have the mental means of production. As a conceptual tool, corporate talent management is one aspect of the 'mental model' of production, reflecting the labour dimension of a firm's valorisation strategies upon which they decide who they should invest and who should be given the opportunities to shape strategic digital programmes and to what end. These decisions shape downstream effects on labour's fortunes. Corporate talent management, therefore, reflects the positional competition within firms in terms of how the workforce is organised to deliver what needs to be done not just currently but in the future, along with the distribution of rewards. In this offer of a conceptual tool to enhance the toolkit for studying the social relations of production, I have moved the analytical focus beyond the point of production that has dominated much of the field (Jaros, 2005; O'Doherty & Willmott, 2009; Thompson, 1990; Thompson & Smith, 2001). Such an analytical focus may have been necessary within Taylorist factory systems that still require spatial considerations. However, it would need to assume a different form with digital production techniques, where production can be decoupled from physical space (Altenreid, 2020). Additionally, the restructuring of entire global value chains using digital technologies presents a formidable challenge to resist and reshape at the point of production, as shown empirically in the study by López et al. (2021) of the limited scope of action by labour unions with the global deployment of H&M's digital systems.

Using a mixed-method design, the research study has successfully deployed corporate talent management as a conceptual and methodological strategy to uncover various ways firms organise their workforce for innovation and construct their digital strategies. Four patterns of corporate talent management have been identified from the Singapore data that can be interpreted as the labour dimension of firm's valorisation strategies. When firms pursue a business strategy of delivering non-

standard products and services that require labour to collaborate and innovate constantly, it is paired with inclusive corporate talent management or 'wealth of talent' practices that seek to enhance the discretion of the broad workforce. Digital strategies are pursued as bottom-up experimentation, with the workforce empowered to exercise discretion in how digital tools are built into products and services. Such firms tend to demand high levels of professional labour, but the culture of inclusion is also extended to non-professional labour, leading to a general pattern of labour upgrading. In contrast, when firms pursue a business strategy that seeks to produce innovations efficiently to mitigate costs, they pair it with a 'war for talent' strategy. High levels of professional labour are demanded, but a cadre of talent is designated to innovate, while the rest are tasked to execute activities. The narrowing of task range sees the discretion of high-skilled workers being transferred upwards to managers and other specialists through digital technologies in an encroachment of the discretion of the segments of the professional workforce that are 'below the talent radar' in what can be described as the beginning stage of the embellishment of high skills precarity in digital tools. Some of these high-skilled jobs are already being done offshore, such as in the case of *dWFT-02*, as part of the strategy of labour arbitrage. Meanwhile, 'constrained talent' and 'zero-talent' firms do not focus on product innovation, seeking to use digital tools to optimise processes to control costs. In 'constrained talent' firms, they pair their strategy of cosmetic customisation with the strengthening of managerial control and the creation of narrowly designed executive roles, similarly delivering the outcomes of high skills precarity as their 'war for talent' counterparts. Here, professional roles may also be offshored as remote work positions whose discretion is curtailed by the need to conduct their work through platform tools without ground contextual knowledge of the customers they support. 'Zero-talent' seeks a strategy to minimise labour costs extensively. When they use digital technologies, it is aimed at substituting labour with no upgrading of low-skilled jobs either. Across 'war for talent', 'constrained talent' and 'zero-talent' firms, workers in low-skilled jobs are marginalised, with their work redesigned to require the use of digital tools, but with no attempt to upgrade these jobs in terms of job complexity and enhanced autonomy to coordinate activities across tasks.

Consequently, old forms of corporate talent management have evolved into new forms of corporate talent management characterised by high-skill precarity. In the new approach, education and training are no longer markers to distinguish the category of trusted and empowered workers with high levels of discretion and rewards. Instead, professional workers 'below the talent radar' in 'war for talent' firms and new executives in 'constrained talent' firms are likely to experience degradation of work embellished by digital tools. Therefore, the trend of high-skills precarity converges in high-skills and low-skills firms of job roles with no let-up in education and training requirements, but no longer enjoying organisational trust and discretion. Meanwhile, in firms in which low-skilled jobs dominate, low-skilled roles are not augmented using digital tools, even when the jobholder is known to have a higher level of credentials, suggesting a different type of high-skill precarity.

On the research study's second research question, whether corporate talent management can be used to forecast changes to the division of labour at the aggregate or national level, there is insufficient evidence to make that conclusion with adequate reliability. This is because the Business Performance and Skills Survey (BPSS) is based on data collected in 2016, which does not allow us to adequately describe the distribution of firm types currently in post-pandemic Singapore. The weaknesses of some of the BPSS quantitative constructs are also discussed in Chapter 9. However, the early evidence is sufficient to allow us to make a tentative prognosis. With 'wealth of talent' being a small cluster, it is unlikely that the Singapore economy will experience skills-biased technological change. The ongoing degradation of professional work in 'war for talent' firms and the creation of new 'high-skills, low-discretion' roles in 'constrained talent' firms suggest that high-skills precarity may emerge as a new form of social inequality in Singapore. There is no let-up in education and training requirements for high-skilled roles. Still, they no longer enjoy the levels of professional discretion and wages usually associated with the training they receive. Meanwhile, the upskilling of work expected of the broad workforce engaged in low-skilled job roles in 'constrained talent' and 'zero-talent' firms is unlikely, as such firms use digital technologies to sustain rather than challenge their price competition strategy. Consequently, it may be possible to make a tentative prognosis that Singapore is likely to experience labour restratification, namely using digital technologies to change job content and/or job contexts of high-skills jobs, including digital offshoring of jobs (Brown, 2021). Within the limits of the data, we may hypothesise that a new category of precarity may emerge in Singapore - high-skill labour. Their professional discretion may be curtailed through digital tools and the risks of such roles being digitally offshored to cheaper locations around the region.

Third academic contribution

The third key contribution of this study is its mixed-methods design, which is novel at a scale not previously used in studies on the social relations of productions. The only known scholarly work in this field using mixed methods is by Fernandez (2001), who used quantitative and qualitative data to track one US firm's labour fortunes over time. The value of the mixed-methods design when using a national survey of establishments like the BPSS allows us to combine the generalising power of the quantitative approach with the intensity and richness in details of the qualitative approach (Lin, 1998). The quantitative component allows for capturing the range of corporate talent management approaches across the Singapore economy. The qualitative component enables a detailed description of the relationships structuring valorisation strategies, corporate talent management, digital programmes and labour outcomes. This unique design also allows the study to take forward unusual findings in the quantitative analysis, such as the pattern of high staff attrition in 'wealth of talent' firms, while also uncovering emerging patterns, such as the trend of remote work in *CT-01* and *dWFT-02*.

Fourth academic contribution

Finally, this study uniquely uncovers the patterns of social relations of production in an Asian economy. As can be observed in Chapter 2, most studies in this field are focused on Western contexts such as the US, the UK, Australia, Germany and Finland. As digital technologies make their way across the globe, academic scholarship must cover the range of ways in which digital technologies may play out in different national contexts and identify mechanisms for minimising social inequalities. Singapore's pro-business characteristics make it a good case for studying firm-level factors that shield workers from labour substitution and restratification. The discovery of 'wealth of talent' firms with highly inclusive practices in such a pro-business context is unexpected. It lends strong support to the theoretical paradigm of the field of social relations of production that contradictions will always exist in capital-labour relations and should be leveraged to strengthen labour power (Adler, 2004; Sawchuk, 2006; Piore & Sabel, 1984; Womack et al., 1990; Vidal, 2020). In this case, when companies pursue a valorisation strategy of collaborative customisation, it manifests in capital's need for workers' creative use of its labour power that acts as a bulwark against the pressure of valorisation. Managerial attention in these firms is focused on strengthening the motivation of the average worker, including the design of fair rewards. For instance, *WOT-02* incentivises its workforce to achieve work-life balance by being 50 per cent more productive than their clients' engineering team (see Chapter 6). Similarly, *dWOT-03* ensures a fair distribution of rewards across its product innovation cycle through a remuneration policy that is sensitive to recognising that workers in mature projects would not be penalised compared to those working in new, high-growth projects (see Chapter 8).

The above findings add an entirely new dimension for action by those seeking inclusive approaches to digital transformation beyond the social institution approaches, such as the regulation of platform workers and the negotiation role of work councils (Genz et al., 2008; Lloyd & Pane, 2019; Stroud et al., 2020). Institutionalist approaches, such as 'varieties of capitalism' (Hall & Soskice, 2001) and 'national innovation systems' (Edquist, 1997), often locate country differences in labour outcomes from technological change arising from the role of institutions. This study contributes by extending the argument that the success of such social institutions requires a partnership with a category of firms seeking to exploit labour's creative potential. This may explain the dominance of inclusive firms in countries such as 'mittlestand' companies in Germany (Pahnke & Welter, 2019) and 'hidden champions' in Denmark (Danish Technological Institute, 2014). They refer to a category of highly innovative global firms with inclusive workforce practices that contribute disproportionately to the share of the GDP in these economies. In other words, as social institutions regulate firms that might take more predatory practices if left to market forces, it also creates the conditions to allow those with the right balance to thrive and flourish. Boushey and Rinz (2022) describe such a strategy as "blocking the low road and paving the high road".

Implications for policy

This study has novel policy implications for the Singapore government. The city-state seeks to resolve its current period of systemic crisis through a 'global city' strategy powered by a robust digital innovation push. Its policies are built upon the assumption that upgrading into a digital economy will lead to skills-biased technological change. The outcomes from digital innovation are expected to create more and better professional jobs to meet the high aspirations of Singaporeans and sustain the balance between economic and social development that has characterised much of Singapore's post-independence history. Therefore, as part of a new industrial policy, it has deliberately attracted the digital activities of technology and non-technology players, including SMEs. Consequently, the policy assessment is that the most at-risk workers are non-professional workers, who would stand to lose out vis-à-vis professional workers who will be in higher demand. To redress these inequalities, lifelong learning through the SkillsFuture movement would provide non-professional workers with the skills to reinvent themselves through what a senior statesman described as 'constant upskilling and reskilling, and regular injects of learning through life' (Human Resources Online, 2022). Educational reforms are thus a vital solution to support social dislocations as part of the structural changes to the economy – indeed, an imagined race between education and technology, as described by Goldin and Katz (2008).

However, the tentative prognosis of this study shows that the likely outcome of the digital innovation process, based on the current mix of firms in Singapore's economy, is labour restratification of high-skilled labour. Only 'wealth of talent' firms exhibit the pattern of skills-biased technological change, forming a minority cluster based on the 2016 BPSS survey. When analysed against the other firm types, it can be observed that some professional workers are now joining the 'at risk' category. This results from ongoing efforts to unbundle and re-bundle professional work using digital tools to change job content and contexts. Although mainly driven by the activities of 'war for talent' firms to reduce expensive professional labour costs, there is already one firm, *CT-01,* in the 'constrained talent' cluster that is applying the unbundling of knowledge work as a strategy to get cheap professional workers to work remotely for it. This suggests the possibility of such a strategy being adopted by a wider group of price-sensitive firms who need but are struggling to afford Singaporean professional labour. Indeed, speaking to *CT-02* in a discussion two years after the first interview, the company representative shared that it had begun to explore hiring remote AI engineers. Combined, we can observe a pulling away of elite jobs, while high-skills precarity may be the fate and fortunes of professionals 'below the talent radar'.

While high-skills precarity may emerge as a new labour market phenomenon confronting Singaporean workers, this study does not find evidence that the fortunes of those in low and mid-skilled job roles would improve either. Instead, based on the mix of firms in the Singapore economy, it is likely that they are marginalised in the shift to the digital economy, with no evidence of digital technologies

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significantly increasing task complexity or strengthening their capacity to coordinate activities across tasks. Again, the exception is 'wealth of talent' firms that involve workers in mid-skilled job roles as part of their valorisation model of collaborative customisation. The marginalisation of workers in low and mid-skilled job roles is problematic, as more than 75 per cent of the Singaporean workforce have at least a technical education, with the proportion closer to 90 per cent among the younger workforce (Sadik et al., 2023a).

Therefore, rather than the description by Goldin and Katz (2008) of technology sprinting ahead of education, the implications for policy from this study is that the character and labour market outcomes of digital innovation may not match the high capabilities of the Singaporean workforce. Brown (2021) has described this as an issue of 'job scarcity', specifically the poor capacity of economies to generate jobs that are commensurate with the education and training of their workforce. The logical conclusion for Singapore policymaking drawn from this analysis is that there is a need to go beyond seeing the issue as one of delivery of education and training to putting job quality as the centrepiece of its policy challenge. This manifests in the ability of the Singapore state to work on the types of enterprises in the economy to stem the tide of increasing precarity of knowledge work alongside the redistribution of labour power across occupations. Again, 'wealth of talent' firms show how it can be done within the productive model of the firm in a positive-sum game. This mixed methods study shows that 'wealth of talent' firms come in all sizes and industry sectors. The quantitative investigation shows that such firms are more likely to generate the best business returns. Industrial policy may seek to cultivate such firms through tax holidays and other support. Additionally, attractive funding and support structures can be used as policy levers to incentivise SMEs and underwrite their risks such that they may be confident to use this period of digital innovation to challenge their underlying price-competition model towards one of high value-creation associated with 'wealth of talent' practices. Taking a leaf from the strategies of Norway's labour movement that seeks to build collective intelligence and spot opportunities for how digital redesign of work processes can support the reshoring of jobs (Lloyd & Payne, 2019), the Singapore state may adopt a similar strategy of identifying how the digital redesign of work processes can make professional jobs more 'sticky' in Singapore.

Currently, however, there is no evidence that the Singapore state is prepared for the capacity problem, seeing it primarily as a delivery issue of providing education, training and lifelong learning to prepare for a future of skills-biased technological change. Consequently, the focus is on the ability of education and training to anticipate the skills required of the workforce. Thus, the current education minister, Chan Chun Sing, describes a national strategy of working with workforce analytics firms to identify new and emerging skills relevant to Singaporeans that can be used to design education and training programmes (Singapore Ministry of Education, 2022). Additionally, a new category of labour market intermediaries, job-skills integrators, has been rolled out to work with industry, training and

employment facilitation partners to optimise training provision and job-matching services for companies and individuals (SkillsFuture Singapore, 2023b). Meanwhile, working on the assumption that the fortunes of high-skilled Singaporeans are secured, the Singapore Economic Development Board has taken the approach of working with regional players to set up sites from which firms in Singapore can recruit cheap professional workers, such as the Nongsa Digital Park in Indonesia (Singapore Economic Development Board, 2022).

Due to the weaknesses of the quantitative dataset used in the study, the prognosis in this study of the emergence of high-skills precarity may need to be more robust to convince policymakers of the urgent need to take alternative action, including rethinking the uncalibrated support for digital activities in Regardless, a more sensible approach in policymaking is to moderate the assumptions that the future of work opportunities in Singapore will indeed be characterised by skills-biased technological change. Given the high stakes involved, policymakers must take seriously the possibility of the emergence of high-skill precarity. This makes the 'future of work' monitoring system outlined in Chapter 9 crucial for bringing diverse stakeholders together to take a data-driven approach to making policy decisions for a fair and inclusive future for all.

Implications for practice

In many ways, the findings of 'wealth of talent' firms are not new, resonating well with the practices described extensively in organisational and innovation literature of high-performance work systems (HPWS), high-performance work practices (HPWP), and high-involvement management systems (HIMS), among others (Combs et al., 2006; Guest, 2017; Katzenbach & Smith, 2015; Pak & Sim, 2018; Posthuma et al., 2013; Úbeda-García et al., 2018; Wu et al., 2015). The novel contribution of this study from a practice perspective is the comparisons made between 'wealth of talent' firms and other firm types. It is a crucial finding that 'wealth of talent' firms are more likely to report generating the best business returns regarding the increase in profits, revenue and market share, as this shows that such firms are productive and profitable. It is also a crucial finding that narrow strategies of corporate talent management and using digital technologies as labour-substituting and standardisation tools are not the only route to mitigate challenging business contexts. Firms have options, and the 'wealth of talent' option could be leveraged to strengthen the socially responsible use of high-skilled labour while fostering sustainable, high-growth businesses.

The technique of constant comparison across firm types allows us to systematically discover the weaknesses that arise in the pattern of the social relations of productions across the firm types. 'War for talent' firms are full of contradictions in how they recognise the limits of their approaches yet continue to perpetuate them. As noted in Chapter 6, *WFT-03*, a large player in Singapore's retail scene, realised that its initial sense of weakness upon being confronted by new retail technology players such

as Alibaba was misplaced. It has come to appreciate that its traditional forte of warehousing and physical stores are strengths because they far exceed the capacity of any born-digital retail players when combined with new digital capabilities. Despite this realisation, the firm continues to be elitist by taking a 'buy' model of building digital capabilities rather than building and integrating the talent in-house. This stands in sharp contrast to the strategy of *WOT-04*. This learning consultancy sees it as a strength to build digital capabilities in-house, seeing it as less efficient to hire data analytics personnel who then have to be trained on the ins and outs of the industry. The 'buy' model *WFT-03* may reflect the ideological bias that business leaders may have, shaped by their control of the means and 'mental model' of production. Another example to bring to attention is dWFT-01, the low-code platform company discussed in Chapter 8, which finds that its business growth is significantly constrained by the availability of software engineers with prior experience in designing apps using its low-code platform. Yet it refuses to expand its workforce to grow that talent pool due to the ideological maintenance of being a platform company. Indeed, it is a crucial finding in this study that the mental model of production based on strong managerial control may lead to ideological biases favouring particular production techniques or HR strategies that may not coincide with what is the most efficient. Trusting the creative potential and professional judgement of labour is not an exercise of being soft-hearted and kind but anchored in the sound strategy of dollars and cents, as highlighted by managers in 'wealth of talent' firms.

Additionally, the technique of constant comparison across firm types allows us to be analytical in assessing which digital strategies are likely to pay off. Given the weakness of Singapore's local companies, all three 'constrained talent firms' analysed in this study would have been celebrated for their future-orientedness in using digital technologies such as machine learning, platform and chatbot technologies to enhance their operations. Indeed, at least one has been held up as an exemplary SME in the local media. By being analytical and comparing across firms rigorously, we can assess that these firms are, in fact, using digital technologies to sustain rather than challenge their underlying price-competition business model. This opens up new lines of conversation and action for how the leaders in such firms may be encouraged to use digital technologies to shift away from price competition and play in a new market. Indeed, as shared in the preceding chapter, the CEO of *CT-01* readily acknowledges that he has not considered the possibilities of using digital technologies to build new lines of products and services for his business. He accepts the option as sensible and is open to considering such possibilities.

Indeed, the challenge for practice is how to make the research accessible to a broader range of corporate players, consultants, venture capitalists and related actors in ways that can support them in making better decisions on their business and digital strategies that will also strengthen the corporate sector in the long-term. As discussed in the preceding chapter, global corporate outcomes have been declining,

with the average lifespan of companies listed in Standard & Poor's 500 dropping from 61 years in 1958 to 18 years in 2016 (Hillenbrand et al., 2019), while productivity has slowed down considerably across many national contexts (OECD, 2016). There is, therefore, an opportunity to identify how research knowledge arising from the tradition of the social relations of production can be shared with the wider business stakeholders. Such an approach may at first seem ironic given the deep criticisms of capital in the academic tradition of the social relations of production. Yet it is abundantly clear that the approaches in labour-friendly economies such as Germany and Scandinavia require building the right corporate players. As highlighted in Chapter 9, businesses and consultants in Singapore with whom we share these findings are intrigued by the conceptual contribution of 'wealth of talent' as a meta-model connecting business, labour and technology. They are taken in too by the research study's findings that 'wealth of talent' firms have reported the best business returns, informally christening them as 'new wealth' firms. Towards this end, my colleagues and I at the Institute for Adult Learning are exploring ways researchers can work with like-minded consultants and companies to shift firms towards setting themselves up as 'wealth of talent' firms.

Limitations of the study and areas for further research

There are several limitations in this research study. Its first significant weakness is its research design, which deliberately makes a trade-off regarding accuracy. As explained in Chapter 4, given the study's twin goals of theory elaboration and methods development, the research design is guided by the "logic of discovery" rather than the "logic of validation" (van Maanen et al., 2007: 1146). Consequently, the research is designed to draw from an existing BPSS survey, which is imperfect in capturing dimensions of interest in terms of 'future-of-work' theories. In Chapter 9, various recommendations have been made regarding how the BPSS survey can be enhanced to support 'future-of-work' studies. This includes strengthening variables that better capture the interaction between corporate talent management and business strategies (e.g. strategies of collaborative customisation versus adaptive customisation and cosmetic customisation), enhancing variables that capture a more comprehensive range of types and outcomes of technological change of work processes (e.g. digital and non-digital technological change), and introducing new variables that capture emerging work arrangements (e.g. remote and platform working). It is hoped that the findings from this study will allow for new conversations with the BPSS team to allow for enhancements in the next iteration of the survey in 2024.

The study's second central area of weakness is its focus on senior managers' view of the firm without adequate triangulation with employees' experiences, except in the qualitative component of the study. Even for this component, most employee data come from companies with a generous view of talent, namely 'wealth of talent' firms. This is a significant limitation as the changing patterns of work opportunities at the job-holder level are inferred within the limitations of the data. For instance, in 'war for talent' firms, there is no opportunity to interview workers in the non-talent categories as

organisational policies mean that only those trusted will be recommended for interviews with the research team. This meant that the assessment of work opportunities for those 'below the talent' radar was inferred based on senior managers' responses as well as by those designated as talent. Meanwhile, no 'zero-talent' firm was forthcoming in offering us employees for interviews that require inferring from senior managers' descriptions of how work is set up. The inadequate representation of employees is thus a major empirical weakness of this study, as the future of work opportunities cannot be sufficiently assessed without also looking at individual/ job holder level data including wage data. An area for further research is thus to evolve the design of BPSS to include a component whereby establishment data can be matched with individual-level data from the establishment's workforce. When measured over time, such longitudinal studies would capture both the changing contexts of establishments and individuals to allow us to make more robust conclusions on the future of work opportunities at the firm level, to be subsequently extended at the aggregate level.

The third major weakness of this study is its focus on a single national context, that of a small Southeast Asian city-state. Admittedly, the city's 'global city' strategy has brought a range of Asian and Western firms into its economic base. This mix is reflected in the BPSS survey, with non-Singaporean establishments heralding from a wide range of countries, including China, France, Germany, Japan, the UK, and the USA (Brown et al., 2019). The qualitative component includes a mix of non-Singaporean firms headquartered in Germany, the Netherlands, Norway, Switzerland, the UK and the US. It remains crucial to test the reliability of the findings through empirical investigation in other national contexts. In this regard, the second cycle of the Survey of Adult Skills (PIAAC) led by OECD is useful. Due to be released in 2024, the survey indicators will include an employer survey on the skills needs of enterprises and business factors affecting demand for skills (OECD, 2023), opening up significant possibilities for the comparative analysis of firms across national contexts.

Summary

In conclusion, this study has established the possible opportunities for the theoretical lens of the social relations of production to strengthen 'future-of-work' studies. Indeed, multiple studies of earlier periods of technological change have identified the decisive role of social relations of production in determining the character of technological deployment, with every possibility to deskill or upskill labour. However, this theoretical lens has rarely been used at scale to forecast the character of work opportunities in the 'fourth industrial revolution', with most future-of-work studies focused on technological possibilities. The contribution of this study is to reinterpret corporate talent management as a concept to capture changing patterns of social relations of production at the firm level that, alongside other indicators, could potentially allow us to make robust forecast estimates on the direction of work opportunities at the firm-level, with the possibility of its aggregation at the national level to inform the risks and options of minimising social inequalities. Admittedly, there are several weaknesses associated with this study's

design. Notwithstanding its shortcomings, it is hoped that it remains a useful scholarly contribution to inspire other scholars to take forward the investigation in new ways to secure a better and fairer future of work for all.

Appendix 1: Interview schedule – corporate

CORPORATE INTERVIEW

Guiding Questions

The study aims to gain a better understanding of the range of talent and skills issues of companies in today's dynamic business environment. We will begin the interview by asking you about your 'career journey' leading into a number of research questions that include:

What is a talent for you?

Can you describe the business challenges in your industry? How does your company stay competitive? How would you describe your business model?

Can you describe the talent and skills needs of your company? Can you get the talent you need?

What does performance mean for your company? What does high skills mean for your company?

Share with us how you recruit and develop your talent.

What new job roles / work tasks have you introduced in the company in the last three years?

How is digital changing your business?

What, if anything, has been the impact of the Covid-19 pandemic? Is there a 'new normal'?

Taking a business innovation activity that your company has embarked on recently, share with us the nature of this business innovation activity and who among your workforce was/is involved. Has there been any impact on jobs in your company?

To what extent do you look beyond Singapore for your workforce needs?

To what extent is the Singapore education system nurturing the workforce you need?

In 3-5 years' time, where do you see your business? Will there be changes in the kind of workforce you need?

What suggestions do you have in terms of how *SkillsFuture* can better support the development of your workforce?

Appendix 2: Interview schedule – employees

WORK JOURNEY INTERVIEW

<u>Guiding Questions</u>

The study aims to gain a better understanding of the range of talent management practices in Singapore's workplaces. We will begin by asking you about your 'career journey' leading into a number of research questions:

- Tell us about your career journey thus far – how you started, where you are now, and what may be next. What drives this professional journey of yours?

- Describe to us the main areas of work for your profession/job. How do you maintain currency in your profession / career?

- Reflecting on your profession/job, how has it changed in the last 3 years? How do you prepare yourself for the changes?

- To what extent do you see technology changing the areas of your work?

- Has Covid-19 pandemic impacted your profession/job in any way?

- Share with us what a talent is to you. Would you consider yourself to be a talent?

- How important is it to present your professional self? Is it important to present your professional self digitally?

- To what extent is it important to 'play the game'?

- To what extent do you feel confident about your labour market opportunities?

- To what extent do you see yourself advantaged or disadvantaged?

- What does it mean to be an agile worker?

Reflecting on your experience at <firm>:

- To what extent are you involved in coming with new ideas / solutions at work?

- How important is it for you/your profession/job to be working in a high-trust environment?

- To what extent do you feel engaged with the organisation(s) that you are in?

- To what extent do you feel that you are being valued /recognised in the organisation(s) you work in?

- To what extent have you been involved in activities to grow or improve the business? Tell us more about the activity/ies. Describe your involvement.

Reflecting on your overall professional development:

- What suggestions do you have in terms of how *SkillsFuture / governments* can better support your development?

Appendix 3: Consent form for employees

Wealth of Talent – Structuring Opportunities for the Broad Proportion of the Workforce

Please indicate that you consent to participation by agreeing to the following statements and then signing in the box below:

For Research Participant

I hereby acknowledge that:

1. The purpose of the research has been explained to me.

2. I understand that my data may only be used for research purposes, beyond the above mentioned research, and individuals will not be identified in any reports without their consent.

3. I agree to take part in the study.

4. I understand that a recording device (audio/video)* will be used during the interview and I am happy for this to be used.

5. I understand that I should keep a copy of this form and that, if I have any concerns, I should report these to the contact named in the attached Information Sheet.

to circle as appropriate

_____   _____
Name and Signature (Participant)   Date
Phone :_____
Email   :_____

I would like a copy of my consent form	YES / NO
I would like a copy of my transcript	YES / NO
I would like a copy of the research report	YES / NO

For Interviewer
I have provided information about the research to the research participant and believe that he/she understands what is involved in this exercise.

_____   _____
Name and Signature (Interviewer)   Date

For Translator
(only applicable if the Research Participant is unable to understand English)

This research has been explained to me by _____ (name of research team member). I have provided information about the research in_____ (language) to the research participant, who is _____ (relationship to participant). I commit to maintaining the confidentiality of the information that I translate.

_____   _____
*Name and Signature (Translator)   Date

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